research@ua

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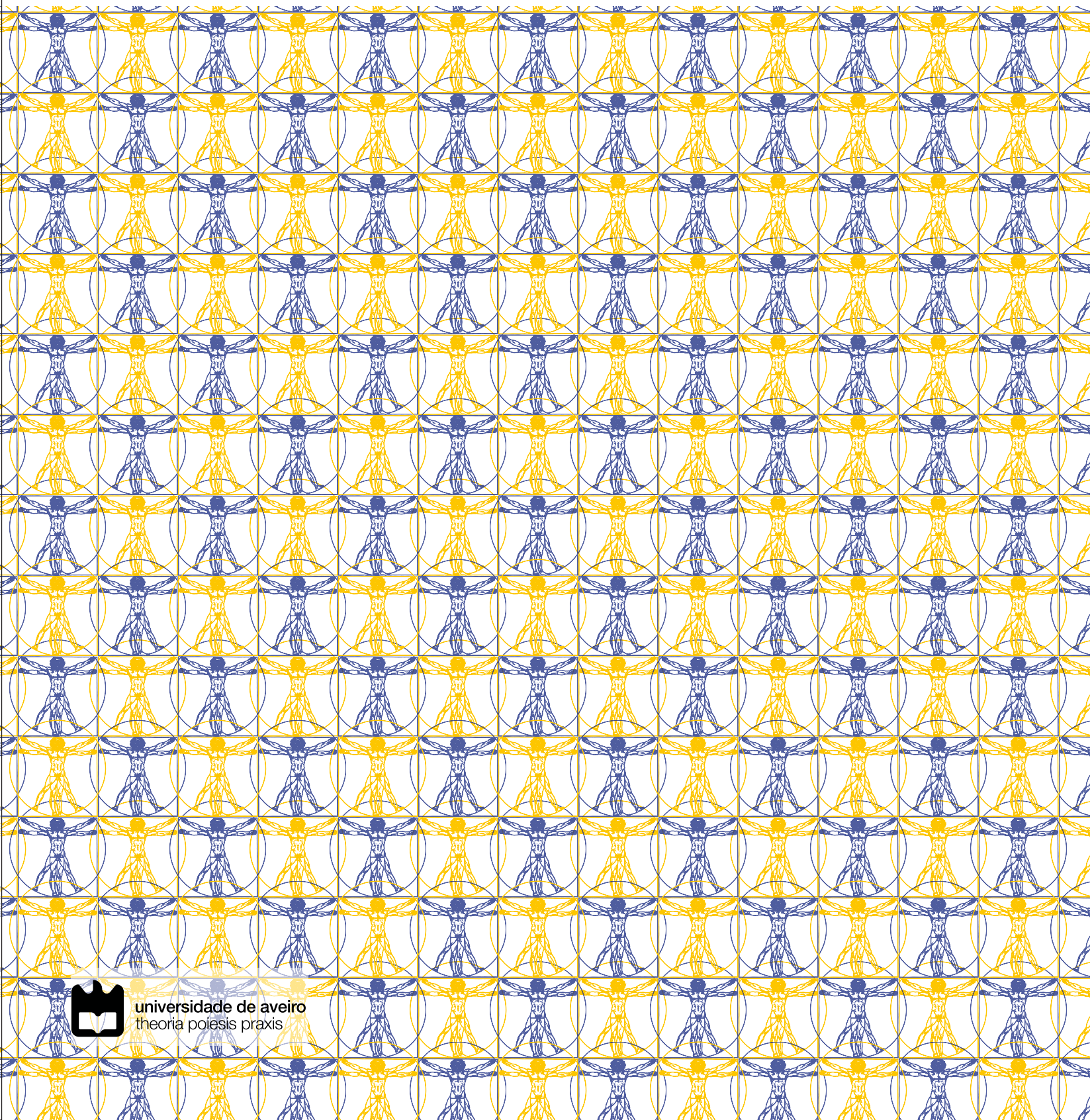

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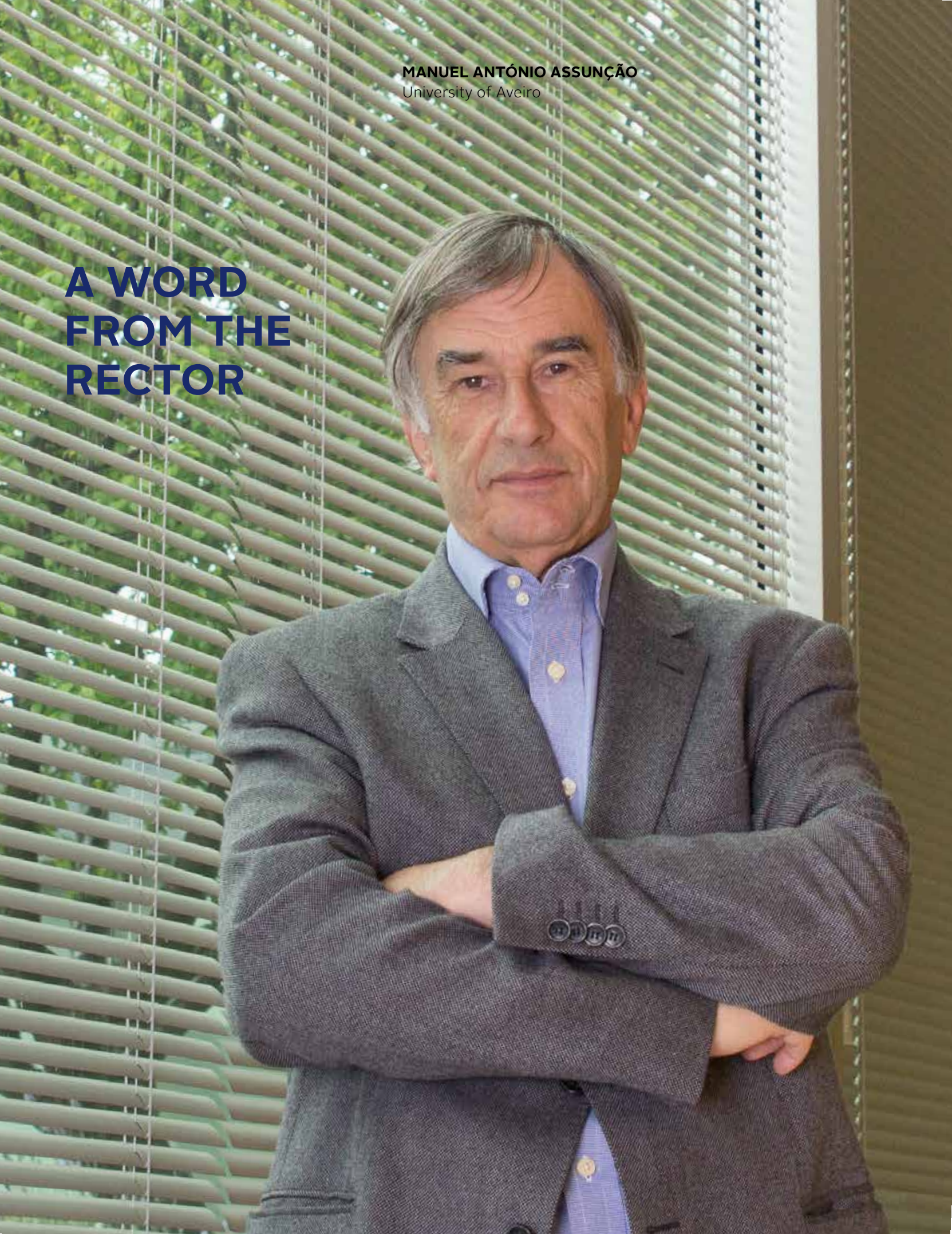
MANUEL ANTÓNIO ASSUNÇÃO
University of Aveiro

A WORD FROM THE RECTOR



" As a world-renowned university, UA pursues performance at the highest level in the discovery and transmission of knowledge. Conducting cutting-edge research and transferring it properly to society, together with the commitment to teaching, are at the core of the University's mission. It is my belief that with the excellency of our researchers, the well-established culture of interdisciplinary cooperation and the research infrastructures available, the University of Aveiro is well positioned to remain one of the top national research universities and to increase its role in Europe and worldwide."

JOSÉ FERNANDO MENDES
University of Aveiro

MESSAGE FROM VICE-RECTOR FOR RESEARCH AND DOCTORAL SCHOOL

Research can make a difference in a number of ways and be transformative in the society. Our robust, multi-disciplinary and collaborative research approach has driven innovation and delivered significant economic, social and environmental benefits for society. On the one hand, research should answer the most pressing needs of our local communities and environment, but on the other hand, it should also change the wider world, by making a difference in varied fields as health, information and communication technologies, environment, materials, culture, literature and so many other research fields that impact on society in general.

At the University of Aveiro, we have the opportunity to make a difference. Our range of research activities is broad and deep. We operate at regional, national and international levels and understand that a global field of action is needed for the global challenges we embrace. I am personally committed to internationalization of our University and research. It is my belief that a truly international cooperation brings about more knowledge, fosters innovation, attracts students and researchers and empowers the research potential.

One of the best mechanisms for enabling this international exchange of knowledge and ideas is through personal contact with academic and scholarly communities across the world. When I visit other universities, I try to learn through their leaders about their organization, their culture and their capacity. But, above all, I disseminate the brand "University of Aveiro" as a young, determined and open-minded university, encouraged to address widespread problems and challenges.

Another way to foster international cooperation is through the numerous high-level scientific conferences organized at the campus, which strengthen the international perception of the University of Aveiro and allow the dissemination of the extraordinary achievements of our researchers and scientific production, which has placed the University among the best universities in Europe and worldwide, according to different rankings published in 2015.

The participation in three Horizon 2020 TEAMING actions, of which two entered Phase II, will hopefully provide new opportunities to UA, with real prospects for growth in strategic research areas through the establishment of new scientific networks, links with local clusters and opening up access to new markets.

To this respect, efforts have also been developed at regional level to further develop these strategic research areas, following the closing of the MaisCentro five strategic projects held during 2012-2015. These new projects are interdisciplinary and basic research-oriented projects and aim at potentiate our research capacity in pivotal research areas for the next 3 years and allow the hiring of high-level staff. In this domain, the definition and contextualization of permanent research positions has also constituted a priority in 2015 and its operationalization this 2016 will foster our capacity to attract and retain the best researchers at the campus.

General collaboration or learning or research co-operation agreements were also intensified national and internationally in 2015, derived, naturally, from the work of the Doctoral School, which is expanding its important role in the national and international joint degrees and cotutelle agreements, providing students with a truly international environment during the doctoral programmes, and as result of the participation in several Horizon 2020 Marie Curie Training Networks.

Directly or indirectly, the recognition of a solid and capable research university potentiates the participation and approval of external funded projects, generating national or international research projects, contributing to the university sustainability and international positioning, and this is a task all UA researchers can perform. I hope that Research@UA 2015 may contribute to disseminate the research developed at our campus and bring about future collaborations.


3


RESEARCH
UNIVERSE

Interdisciplinary research centres and facilities

Excellence in research is one of the hallmarks of the University, where the pursuit of diverse scientific topics of an interdisciplinary nature promotes a closer integration and collaboration of the different disciplines and scientific areas, such as Engineering, the Natural Sciences, the Arts and Humanities, Business and Economics, Life Sciences and Medicine, among others.

Dealing with pioneering emerging research areas of global and societal relevance enhances the need of a truly integrated interdisciplinary research-oriented strategy. High-level researchers, postdoc and PhD studentes, from a wide range of disciplines and scientific areas, populate our campus, constituted by departments, research centres, polytechnic schools, interface units and a vocational education network. This integrated structure permits the articulation and harmonization of the teaching and research environments, as well as the association with innovative science outreach activities.. The existence of 19 research centres, from which 7 are poles, sharing infrastructures and know-how at the campus fortifies this reality of a multidisciplinary and collaborative research environment.

Research centres at the campus

CESAM – Centre for Environmental and Marine Studies
Research areas: Atmospheric Processes and Modelling, Environment Processes and Pollutants, Functional Biodiversity, Ecotoxicology, Stress Biology, Adaptation Biology and Ecological Processes, Marine and Estuarine Ecology, Oceanography and Marine Geology, Coastal Zone Planning and Management
Unit coordinator: Casimiro Pio
http://www.cesam.ua.pt/

CIC.DIGITAL – Center for Research in Communication, Information and Digital Culture
Research areas: Media and Technology, Society, Culture and Arts, Information and Communication
Pole coordinator: Lídia Silva
http://www.cicdigital.org/

CICECO – Aveiro Institute of Materials
Research areas: Inorganic Functional Nanomaterials and Organic-Inorganic Hybrids, Multifunctional Ferroic Ceramics and Nanostructures, Materials for Energy and Functional Surfaces, Biorefineries, Biobased Materials and Recycling and Biomedical and Biomimetic Materials
Unit coordinator: João Rocha
http://www.ciceco.ua.pt/

CIDMA – Center for Research and Development in Mathematics and Applications
Research areas: Algebra and Geometry, Complex and Hypercomplex Analysis, Functional Analysis and Applications, Gravitational Geometry and Dynamics, History of Mathematics, Optimization, Graph Theory and Combinatorics, Probability and Statistics, and Systems and Control
Unit coordinator: Luís Castro
http://cidma.mat.ua.pt/ma/home.php

CIDTFF – Research Centre for Didatics and Technology in Teacher Education
Research areas: Education, Didatics, Supervision, Evaluation, Society and Training
Unit coordinator: Nilza Costa
https://www.ua.pt/cidtff/

CLLC - Centre for Languages, Literatures and Cultures
Research areas: Literary and Cultural Studies (Poetics of Mobility in Literature and Culture; Cultural Flows and Literary Mediations); Language Sciences (Linguistic Variation; Translation and Terminology)
Unit coordinator: Teresa Cortez
https://www.ua.pt/cllc/

CINTESIS – Center for Health technology and Services Research
Research areas: Clinical & Health Services Research, Ageing & Neurosciences Research, Diagnosis, Disease & Therapeutics Research and Data & Methods Research
Pole coordinator: Carlos Silva
http://www.cintesis.eu/

CIPES - Center for Research in Higher Education Policies
Research areas: Higher Education, System Level Policies, Institutional and Organisational Analysis and Resources, Performance and Human Capital
Pole coordinator: Teresa Carvalho
http://www.ua.pt/cipes/

GEOBIOTEC – GeoBioSciences, GeoTechnologies and GeoEngineering
Research areas: Lithospheric Evolution, Complex Environmental Systems, Georessources, Geotechnics and Geomaterials
Unit coordinator: Fernando Rocha
http://www.ua.pt/geo/PageText.aspx?id=17534

GOVCOPP – Governance, Competitiveness and Public Policies
Research areas: Public Policies, Competitiveness, Local and Regional Innovation Systems, Territory, Development and Tourism
Unit coordinator: Eduardo Castro
http://www.ua.pt/govcopp/

IBIMED – Institute of Biomedicine
Research areas: Human ageing, protein aggregation, epigenome, ageing related diseases, systems biomedicine, clinical studies
Unit coordinator: Manuel Santos
http://www.ua.pt/ibimed/

Research Institute for Design, Media and Culture [ID+]
Research areas: Design, Art, Media and Culture
Pole coordinator: Vasco Branco
http://www.idmais.org/pt-pt/

IEETA – Institute of Electronics and Informatics Engineering of Aveiro
Research area: Information Processing, Information Systems, Biomedical Informatics, Biomedical Tecnologies, Intelligent Robotics, Intelligent Systems
Unit coordinator: Armando Pinho
www.ieeta.pt/

INET-Md – Institute of Ethnomusicology - Research Centre on Music and Dance
Research areas: Ethnomusicology and Popular Music Studies, Historical and Cultural Studies in Music, Dance Studies, Creation, Theory and Music Technologies, Performance Studies and performance as Artistic Research, Education and Music in Community
Pole coordinator: Susana Sardo
http://www.fcsh.unl.pt/inet/

I3N – FSCOSD – Institute for Nanostructures, Nanomodelling and Nanofabrication – Physics of Semicondutors, Optoelectronics and Disordered Systems
Research areas: Modelling of materials behaviour, Nanofabrication and micro-technologies, Nano and microstructured polymer-based systems and Physical characterization of self-assembled nanostructures
Pole coordinator: Armando Neves
http://www.i3n.org/

IT – Telecommunications Institute
Research areas: Wireless Communications, Optical Communications, Networks and Multimedia and Basic Sciences and Enabling Technologies
Pole coordinator: José Neves
http://www.it.pt/

QOPNA – Organic Chemistry, Natural Products and Agro-food Stuffs
Research areas: Organic Chemistry, Natural Products, Food Science /Biochemistry and Mass Spectometry
Unit coordinator: José Cavaleiro
https://www.ua.pt/qopna/

RISCO – Aveiro Research Centre of Risks and Sustainability in Construction
Research areas: Risks in the Built Environment, Construction Sustainability, Built Heritage Conservation and Restoration
Unit coordinator: Paulo Vila Real
http://www.ua.pt/risco/

TEMA – Centre for Mechanical Technology and Automation
Research areas: Advanced Mechanical Engineering and Fracture Mechanics, Applied Energy, Biomechanics, Nanoengineering, Transportation Technology and Simulation Software Research and Development
Unit coordinator: António Bastos
https://www.ua.pt/tema/

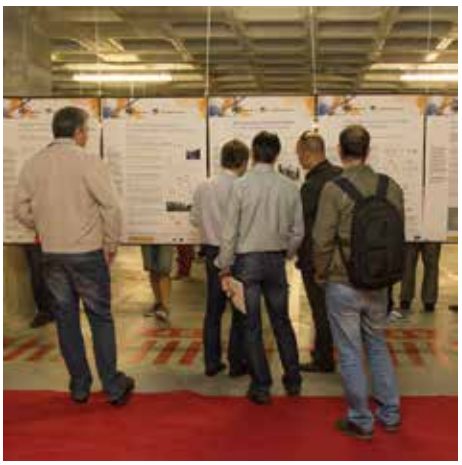

4

SPOTLIGHT ON RESEARCH DISSEMINATION

Research Day 2015

The Research Day@UA is a premier annual event celebrating student and faculty research activities. This event is dedicated to highlighting the breadth of research and discovery on issues of major disciplinary, multidisciplinary, and global significance, done through poster sessions, oral presentations and presentations by highly-reputed invited speakers.
The Research Day@UA has grown in numbers, since its first edition in 2011, and in importance with contributions from all research units, promoting, therefore, cross-campus and cross-disciplinary research, as it seeks to encourage networking among researchers and interchange of ideas among those studying and researching in their respective academic disciplines at the campus.

Last year's edition was held in May 20th and was attended by post-graduation students, researchers and professors. The presence of foreign invited speakers, in areas as diverse as research, science management and funding, has been always treasured and provide Research Day attendees with unique and distinctive moments. Last year, Geoff Rodgers (Deputy Vice-Chancellor Research, Brunel University London, Uk), Paulo Pereira (Member of the Board of Directors, Fundação para a Ciência e Tecnologia), Alessandro Curioni (Vice-president and Director of the IBM Research - Zurich Lab), Lars Montelius (Director General of International Iberian Nanotechnology Laboratory) and Sérgio Salústio (Development Director at Bosch Termotecnologia) have given their insights on research, development and innovation, involving topics on funding and research management, enriching the program and contributing greatly to this stimulating research day at the campus.



Researchers of the Month 2015

MARIA RUTE FERREIRA ANDRÉ
Department of Physics
rferreira@ua.pt

1. What are your personal perspectives as a researcher?

As researcher, I aim to strength the R&D activities in the area of photonics, in the framework of the Group of Functional Organic-Inorganic Hybrids of the University of Aveiro at the national and international levels. In particular, R&D activities related with the development of new materials for the areas of lighting, photovoltaic conversion (luminescent solar concentrators) and integrated optics.

In what concern my R&D, I highlight our contribution to the field of lighting where the recent development of a white LED prototype with enhance light emission properties compared with that of commercial white LEDs made of natural, abundant and recyclable hybrid nanoparticles placed organic-inorganic hybrids as new down-converter phosphors for white light. Are we able to combine other materials in order to further improve their performance as white light emitters?

2. In your opinion, what are the biggest challenges in your area of research?

The challenges for the field of photonics are well illustrated by the two recent events related with the attribution of the Nobel Prize in Physics to the three Japanese scientists (I. Akasaki, H. Amano e S. Nakamura) "for the invention of efficient blue light-emitting diodes which has enabled bright and energy--saving white light sources" and the proclamation by UNESCO of the 2015 as the International Year of Light emphasising that light is a key cross-cutting discipline of science and engineering with impact in a myriad of applications that have revolutionized society through medicine, communication, entertainment and culture. Big challenges include, therefore, the demonstration to policymakers and stakeholders of the light potential towards a sustainable technological development, in parallel with the recruitment and formation of young people in this field.

3. Where are the strengths of the UA in your opinion?

The University of Aveiro is a multi-disciplinary campus that favours the collaboration between distinct groups in related and complementary areas. The existence of several Associated Laboratories provides the presence of new researchers that have been contributing with knowhow and new ideas and to the attraction of diverse funding. Also, it enables the synergy between teaching (and human resources formation) and research activities that improve the quality of the Masters and Ph.D. programs lectured at UA.

4. Could you give one idea to improve research in the UA?

Establish the map of the research that have contributed to the effective growing of UA at the national and international levels and establish the road map for the permanent recruitment of high-level senior researchers, avoiding the migration of consolidated R&D activities.

RICARDO SOUSA
Department of Mechanical Engineering
rsousa@ua.pt

1. What are your personal perspectives as a researcher?

After doing Master and PhD thesis in the area of computational mechanics and simulation of technological processes, I have decided to embrace more applied and experimental areas. Next directions to follow, scientifically speaking, are to efficiently combine numerical techniques and experimental validations in a framework integrating design, modelling and assessment for product development in a wide range of mechanical engineering applications, from automotive and aerospace to kitchen utensils.

2. In your opinion, what are the biggest challenges in your area of research?

I'm currently conducting two research lines. The first one is devoted to incremental forming processes, a technique that allows you to produce sheet metal formed parts without needing to employ dedicated – and costly – tooling, which makes this process ideal to produce ready-to-use prototypes or small batches of customized parts. The deep implementation of this process into industrial environment has been impaired for two main reasons: large forming times and geometrical innacuracy. So, using a innovative machine built at TEMA labs, research has been conducted in order to improve the process in terms of accuracy and forming time. Results are encouraging. The second research line is related to safety devices in engineering, and particularly on the application of the natural material by excelence – cork – for impact applications, like is the case of helmets. There is still much to be done in this area, not only on material development side, but also on design and injury evaluation. The work has been progressing with a small – but very dynamic – group of researchers. For both areas, there is also the common challenge of finding industrial interest, and funding, to develop final applications.

3. Where are the strengths of the UA in your opinion?

UA is a young and dynamic university. The matricial system, without faculties, makes much more easy to access central services and eliminates a good ammount of bureaucracy. Furthermore, it is a University with close relations to the industrial pole of the region, making easier to establish connections and employ students. Geographicaly, it is close to other research centers, like Coimbra and Porto, which estimulates also scientific cooperation. Finnaly, it is a university opened to international students and staff exchange, a university thinking globally. Nowadays, this is quite important to keep pace of technological evolution.

4. Could you give one idea to improve research in the UA?

Research fields are becoming more and more interdisciplinary. There has been many innitiatives the show up what has been done in the campus, being the most visible one the Research Day. However, few selected works are present from each Department-Research unit. It could be a good a idea to promote kind of "thematic" research days covering just 2 or 3 research areas (e.g. Chemical, Civil and Mechanical). In this sense, a larger range of works could be presented while maintaining the aspect of crossing-over different research fields.

VÂNIA CALISTO
Department of Chemistry/ CESAM
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1. What are your personal perspectives as a researcher?

My scientific career is still in a very early stage, as I concluded my PhD only 4 years ago. Yet, I am very passionate about my work and I definitely aspire at building a solid research group dedicated to investigation concerning the presence of pharmaceuticals in the environment and ways of mitigating such problem in a near future. The presence of this kind of micropollutants in the environment is a problem of growing proportions and by building a research group working concertedly and towards a well defined purpose in this field, I expect to make a difference at national and global levels. I really believe in the importance of using science and technology towards the protection of the environment which is strictly related to health and welfare of the human being – this is the driving force that I would like to imprint in my research group. I hope to be able to embrace the right opportunities to fulfill that goal in a near future; naturally, for this, I would have to start by getting a researcher position, hopefully at UA!

2. In your opinion, what are the biggest challenges in your area of research?

In the last two decades, there was a huge amount of research performed internationally concerning the occurrence of pharmaceuticals in the environment. So, at this moment, the problem is correctly identified and, in my opinion, it is not sufficient to continue to demonstrate how relevant this issue is without directing our efforts to find a way of minimizing it. It is in this context that the research performed towards the development of new alternatives to effectively reduce the levels of pharmaceuticals in treated urban and industrial effluents is growing in the last years. It is specifically in this area that my main research work is focused. Nevertheless, this is a very challen-ging subject: in fact, most of the tentative solutions to efficiently remove pharmaceuticals (and other micropollutants) from contaminated waters do not jump from being an academic interesting solution to be applied in a real context. So, I believe that creating solutions that are really feasible for a practical application and that surpass the academic gates to the real world is the main challenge of this area of research for the next decade, and the key to properly address this problem.

3. Where are the strengths of the UA in your opinion?

UA have a fantastic multidisciplinary campus which enables close proximity between the majority of its Departments and Associate Laboratories and with several very young promising researchers. In my opinion, these two characteristics are extremely important to allow for the development of creative and collaborative work inside UA, which undoubtedly strengths the existence of a common driving force inside the university.

4. Could you give one idea to improve research in the UA?

I think UA should improve the efforts to support young researchers (post-doctoral fellows and researchers) which have the extremely difficult task of starting and consolidating their careers in such a troubled period. By correctly selecting and supporting the best researchers currently working here, UA is also protecting the future of its research and research groups.

MILENE MATOS
Department of Biology/ CESAM
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1. What are your personal perspectives as a researcher?

My view of science is that of public utility. Ultimately, every research aims at advancing collective knowledge and in some way seeks providing better life quality for all. Notwithstanding, this understanding is far from being commonly shared whithin societies. Scientists are still regarded as some closed academics, doing things no-one understands and of questionable utility. So, I think it is the researchers' responsibility to change public perspective on the fundamental importance of their own work. Thus, in my opinion science communication is of overarching priority. There is plenty to do, for the sake of science itself, our work and, ultimately, for everyone!

2. In your opinion, what are the biggest challenges in your area of research?

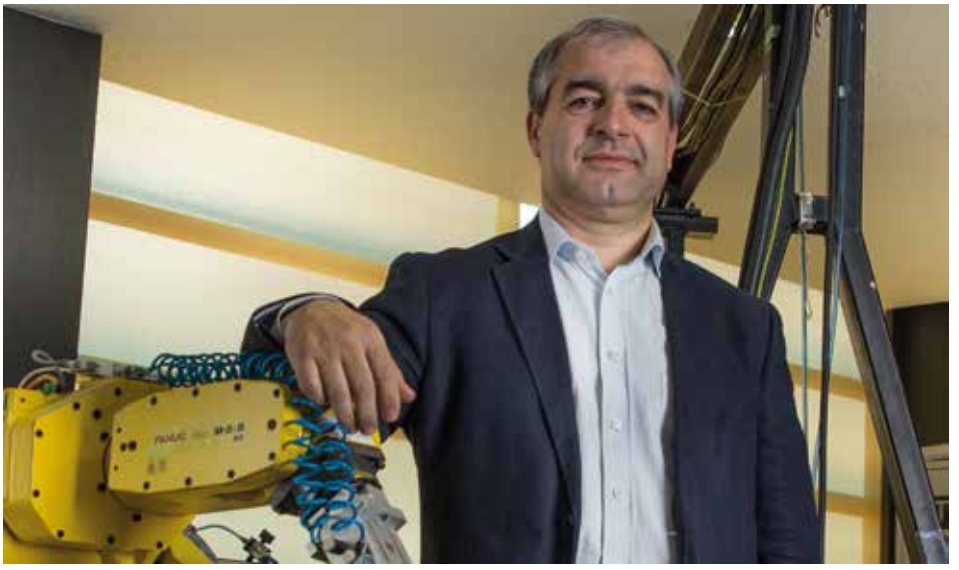
In terms of conservation biology, the biggest challenges are the lack of funding, which in turn is related to the misperception of what "conservation" implies. Unfortunately, despite natural resources, biodiversity and ecosystem services are what support life itself, their management and conservation are far from being priorities in terms of governance. This leads to other challenges, in the field of science communication, scientific literacy and education for sustainability – there is an urgent need of improving these collective skills and perceptions.

3. Where are the strengths of the UA in your opinion?

No doubt that the most valuable strength of the UA is its openness to work in practical, straightforward and applied proximity with the society, in the most various aspects. It is an institution that perfectly combines science and cutting edge knowledge with public service and usefulness.

4. Could you give one idea to improve research in the UA?

I think that in this period of crisis, where science and technology are bottom public (non)priorities, UA is doing a good job, by improving interdepartmental collaborations, whether through formal platforms, or informal working groups. However, most young researchers rely too much on the national scientific system and funding, which is pretty much out of touch. Thus, UA should incite and support researchers even harder in searching for alternative sources of funding, improving collaborative funding with private companies and create even more international frameworks, presenting UA as a leading institution in new ways of making science.



VÍTOR M. FERREIRA DOS SANTOS
Department of Mechanical Engineering
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1. What are your personal perspectives as a researcher?

My long time dreams on technological achievements were concerned with the capabilities of computers doing many things better than humans, and this led my interests into engineering and ultimately framed my research interests into perception and robotics.(...) Locomotion of artificial devices is undoubtedly a field that excites both the general public and experts but, most certainly, the greatest breathtaking moment occurs when humans are faced with intelligent artificial systems that move, perceive and interact. So, this is actually the field that draws my major research perspectives, that is, the development of artificial systems with strong perception and reasoning capabilities allied with human coexistence and interaction by touch and contact.

2. In your opinion, what are the biggest challenges in your area of research?

There are scientific and technical challenges, but there are also operational and methodological challenges. And at some point, they intersect and interfere with each other. Engineering is very stimulating, and trying to make artificial systems succeed in imitating human skills is a never-ending venture with surprise and awe at every algorithm and device built and successfully tested. On the other hand, research in engineering can be restricting if restrained by immediate or manufacturing-oriented concerns. One of the main clients of engineering-grounded solutions are the industrial partners who not always share the same deadlines and efficiency metrics as academic researchers. (...) Furthermore, in some highly competitive areas of production, such as for example the automotive industry, advanced research from the academia has little chance of significant cooperations because companies have their research and development activities shielded or protected from external research institutions, most probably due to industrial property concerns.

3. Where are the strengths of the UA in your opinion?

The University of Aveiro has a strong commitment on research, which has been demonstrated by the administration policies and all the events promoted both centrally and locally by several labs and research-related units. Opening to internationalization and external cooperations are without question a strong point that makes the research at UA a very promising endeavor. Also, the matrix organization, that is, the philosophy of distributed and unrepeated competences or expertises among the several units, favors the creation of transversal efficient research groups. Although it may not have been fully accomplished for all cases in the past, this is potentially a huge strength that researchers can take advantage of.

4. Could you give one idea to improve research in the UA?

With globalization, modern research is hardly a solo activity, and the establishment of groups is a must. So, recruiting or hiring people and create the bonds and interdependencies of skills and competences is the key methodology to successfully set up a lab. One of the central elements in this structure are PhD students, who are required for a successful model of research, because they ensure both the majority of the specific research activities, plus they complete the liaisons with lab technicians and Masters' students with the Post-doc and lab managers. (...) For the sake of research in the near future, a comprehensive assessment of the labs could be carried out to identify and correct these situations.

It seems consensual that fund raising for research has now become a task more challenging than the research activity itself. Therefore, it cannot be expected that everyone stands out in all fronts, like for example, professors that have to ensure so many tasks that little time and resources remain to perform intensive research. So, there should be groups of experts in fund raising and assistance in the preparation of applications for funding. This means that the fund raisers would not be the main spenders of those funds, which is something probably not very popular; therefore, some form of compensation should be devised from the institution to create such a sustainable system.

HELENA ALVES
Department of Physics
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1. What are your personal perspectives as a researcher?

I believe that researchers have a personal responsibility towards society, to help towards technological, societal and economical development. Our contribution cannot stop on scientific advances, solving problems or creating new knowledge and opportunities. We have to envision a closer relationship, taking the generated knowledge into industry and to general public, through actions capable of producing quality, competitive and fascinating products, and to improve education and people awareness of current challenges.

2. In your opinion, what are the biggest challenges in your area of research?

I work on organic electronics, which promises new products through a strategy of embedded electronic devices in current objects and new application that are not possible to achieve with traditional inorganic materials. Some of the materials and devices already developed are just looking on forms of scaling up the technology, so they can be competitive and which markets they will fit better. But there are still many challenges in developing materials to fit certain properties and to develop new devices where some of the properties can be taken advantage.

3. Where are the strengths of the UA in your opinion?

UA is very strong in material science, with many researchers working on a large variety of materials with many different properties. These can be exploited in many different applications, on energy, health, environmental or communication topics. There are also some relationships with strategic industry sectors, which can facilitate the transfer of knowledge.

4. Could you give one idea to improve research in the UA?

A good strategy would be to use the existing knowledge on materials and develop some proof of concept applications of these materials. This would increase the potential interest both from industry and general public.


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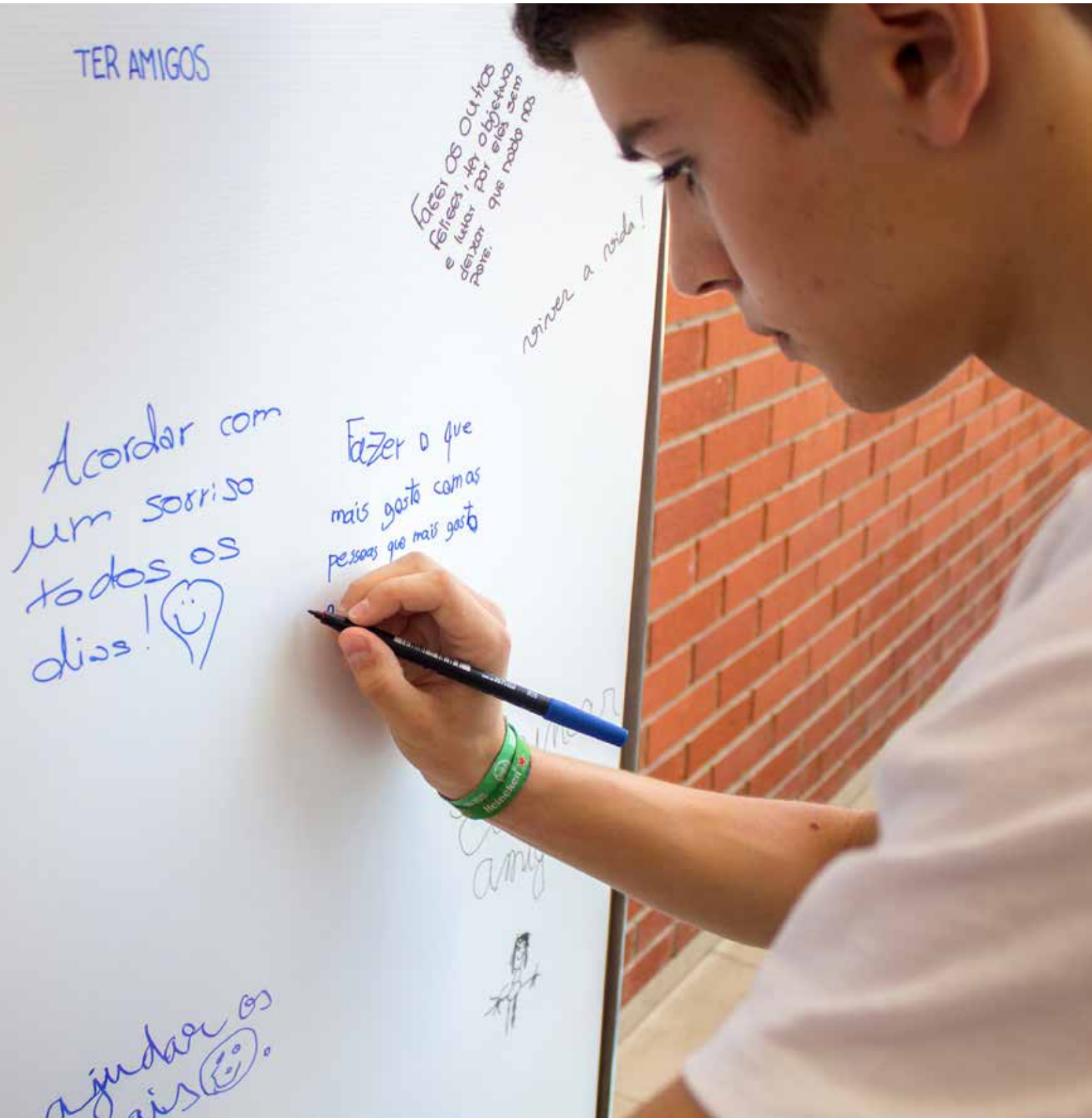
Academia de Verão



ACADEMIA DE VERÃO – SCIENCE FOR YOUNG PEOPLE

The "Academia de Verão" (Summer Academy) is an initiative organized by the University of Aveiro every July. When the classes are over and the exams are just closing the academic calendar, the campus is invaded by children and young scientist full of joy and appetite to have scientific fun and curious experiences.

The 2015 edition welcomed 398 participants, aged between ten and nineteen years old, which joined one of the twenty-four different thematic programs offered by the sixteen departments and schools involved.

The Summer Academy is the most intense scientific dissemination activity aimed at pre-university public. It can be enjoyed in a residential model, in which participants are integrated in campus life 24/ 24 hours.

The promotion of public understanding of science, the concern in communicating the scientific outreaches to the society, the development of "science to all" initiatives is a strong focus of the UA organizational culture. Since its foundation the UA promoted an open Day, lately transformed in an open Week, dedicated to strengthen the ties between the society and the scientific world and promoting the scientific areas and the different offer of study cycles. The creation of a dedicated structure to communication in the UA, in the mid-90s of the XX century, and the Fabrica – Live Science Centre in 2004 were very innovative and pioneer enterprises in the context of the Portuguese universities. Nowadays, the efforts of these structures are permanent and the commitment was strengthened to the global university community.

The UA concern about science outreach and public engagement with scientific and technological issues is also seen as an opportunity of improvement of the citizenship and welfare of our society. This is an all-year round premise that is also true during Summer Academy. Children and young people are welcome to join and get involved in the scientific and cultural activities, promoted especially for them, during the Summer as well as throughout the year.

5

RESEARCH HIGHLIGHTS

Do wildfires pose a risk of contamination by mercury?

Isabel Campos[1], Nelson Abrantes[1], Carlos Vale[2], Jan Jacob Keizer[1], Patrícia Pereira[3]

1 — Department of Environment and Planning & CESAM, University of Aveiro
2 — CIIMAR
3 — Department of Biology & CESAM , University of Aveiro

The increased frequency, severity and extent of wildfires over the past decades have become a major societal and environmental concern in Mediterranean-type climate regions across the world, including Portugal. These concerns are further aggravated by the likely future climate conditions, increasingly propitious to wildfire ignition and spreading.

Whilst the impacts of wildfires on vegetation and soil hydrological processes have received considerable research attention, little is known about contaminants in ashes and burnt soils, and their mobilization with time-since-fire. In particular, the fire-induced release of mercury (Hg) into the environment, which assumes a singular concern due to its toxicity, persistence and tendency to bio-accumulate, with potentially harmful impacts on the environment as well as human health, have been neglected.

Hence, as a contribution to understand the role of wildfire in the Hg mobilization, a field-monitoring program was conducted by the Eco-hydrology Lab of CESAM under the scope of the FIRECNUTS project (PTDC/AGR-CFL/104559/2008). Levels of Hg were analysed in various burnt and unburnt eucalypt and pine plantations in north-central Portugal (Sever do Vouga municipality). Soils and ashes were collected immediately after the fire as well as 4 months later, after a period of heavy rainfall. Mercury contents of the soil and ash samples were determined using an Hg analyser, in which samples were thermally decomposed by controlled heating. The final decomposition products were passed through an Hg amalgamator heated to 700 °C and Hg was released and detected by absorption spectrometry at 254 nm.

Major findings of this study revealed that: ashes exhibited higher Hg content relatively to soils in both forest plantations; soils and ashes from eucalypt stands were consistently enriched in Hg relatively to pine; and post-fire rainfalls had a key role in the Hg washout from ashes, leading to substantial losses over time.

Overall, this study brings a new insight on the importance of wildfire and subsequent rainfall in the mobilisation of Hg accumulated in the easily-erodible ashes, which poses a considerable contamination risk to downstream aquatic habitats, especially in eucalypt-dominated areas.

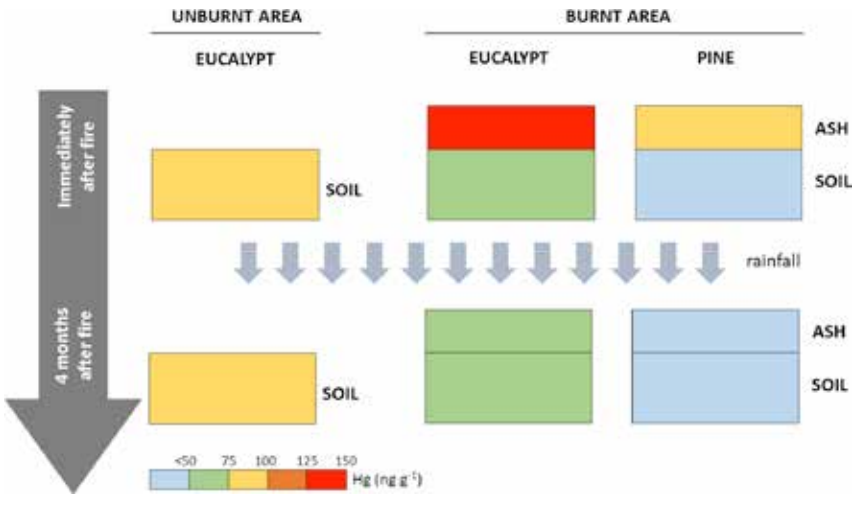


FIGURE 1
Mercury concentrations (ng g-1) in soils and ashes collected immediately after fire and 4 months later in unburnt eucalypt and burnt eucalypt and pine forest plantations in Ermida (Sever do Vouga).

Resilience to urban heat waves under climate change: a modelling case study for an urban area

C. Borrego, D. Carvalho[1], M. Marta-Almeida[1], A. Rocha[1], E. Sá[1], A. Fernandes[1], S. Rafael[1], J. Valente[1], V. Rodrigues[1], H. Martins[1], C. Pio[1], M. Lopes[1], A.I. Miranda[1]

The CLICURB project intended to assess the risks and to consider solutions addressing the challenges of climate change (CC) in cities, using the urban area of Porto as a case study. An integrated analysis of CC, air quality, heat fluxes and urban development was elaborated, allowing for the inclusion of adaptation strategies in the city's planning and in the decision making process. The presence of green spaces, the use of green roofs and surfaces with high levels of solar reflection in buildings, are among the most effective measures for reducing the temperature in urban areas and were taken as resilience factors for the study.

To study the impacts of the resilience measures on surface temperature, air quality and heat fluxes, a cascade of numerical models, from the global to microscale was applied to a heat wave in future climate (2050), under a CC scenario (Representative Concentration Pathway RCP8.5).

Five scenarios were compared with the base scenario (without resilience measures): double the green areas (S1); application of green roofs (S2); application of white roofs (S3); combination of S1 and S2 (S4); combination of S1 and S3 (S5). The results show that all tested measures lead to increased resilience of Porto to CC, promoting the reduction of temperature, energy released into the atmosphere and ozone concentrations, where the green roofs appear as the most efficient resilience measure.

Given the expected increase of the heat waves frequency and intensity in future climate projections, the investigation of the resilience measures and its effectiveness to mitigate the changes in the urban metabolism, is of great importance for urban planning stakeholders and decision-makers. Two of the main outputs of CLICURB project are the book (http://arquivo-gemac.web.ua.pt/arquivo-clicurb/CLICURB_livro.pdf) with the main results achieved over the project and the urban atlas (http://atlas-clicurb.pt/), where the citizen can find the future projections in terms of climate, fluxes and air quality in Portugal and in Porto urban area.

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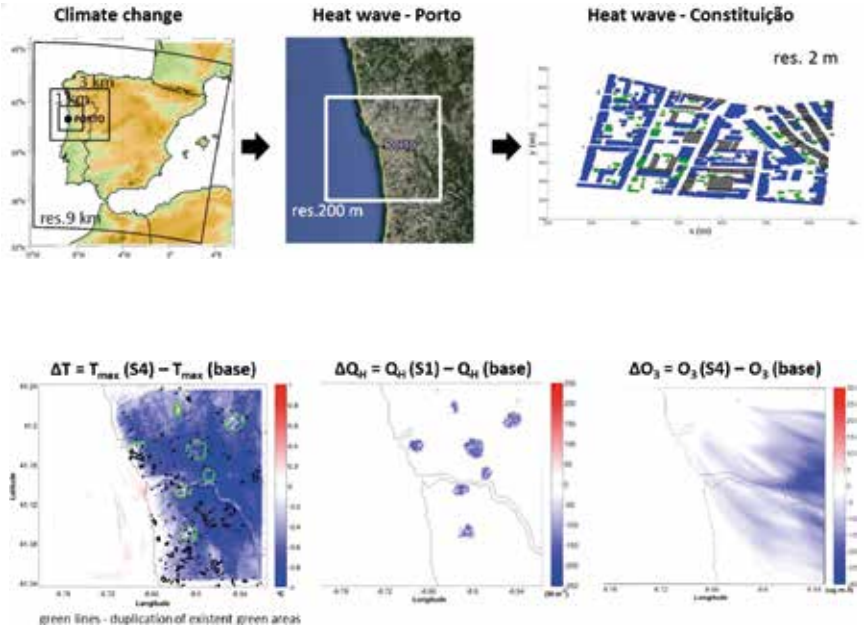

Coral symbiotic algae calcify outside their coral host

Frommlet J.C.[1], Sousa M.L.[1], Alves A.[1], Vieira S.I.[2], Suggett D.J.[3], Serôdio J.[1]

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3 — University of Technology, Sydney, Australia

Dinoflagellates of the genus Symbiodinium are of central importance for coral reef ecosystems. They form mutualistic symbioses with reef-building corals in which they provide their hosts with photosynthates and they actively support the reef-building process by enhancing coral calcification. However, this symbiotic lifestyle is not strictly obligatory, i.e. Symbiodinium spp. are also capable of living outside their hosts. These free-living populations represent an important pool for the acquisition of symbionts by coral juveniles and could play a pivotal role in maintaining coral functional diversity and reef ecosystem viability, yet their biology and ecology remain largely unknown.

An international team lead by researchers from CESAM now discovered that free-living Symbiodinium spp. in culture commonly form calcifying bacterial-algal biofilms and produce calcified structures named "symbiolites" that encase Symbiodinium as endolithic cells. The study demonstrates that this calcification reaction is driven by algal photosynthesis but that bacterial communities also play a critical role in the process. Interestingly, the Symbiodinium cells inside of symbiolites remain alive for weeks and can later leave their mineral cages and return to the environment. Thus, symbiolites could act as a temporary refuge in the sense of a "safe house", providing a barrier against grazing and exposure to UV radiation.

These findings indicate that the formation of symbiolites could comprise part of a temporary endolithic phase in the Symbiodinium life history; an insight that offers new perspectives on fundamental questions regarding the biology and ecology of these important dinoflagellates. Further, the results suggest that Symbiodinium may play an important role in mineralization processes outside the coral host and may eventually help explain how changes in ocean chemistry over millions of years led Symbiodinium to ultimately establish a symbiotic lifestyle.

FIGURE 1
Coloured scanning electron micrograph, showing a symbiolite in partial view - deposited calcium carbonate (blue), organic matrix (olive green), Symbiodinium cells (lime green) and bacteria (orange). Adapted from Frommlet et al. 2015.

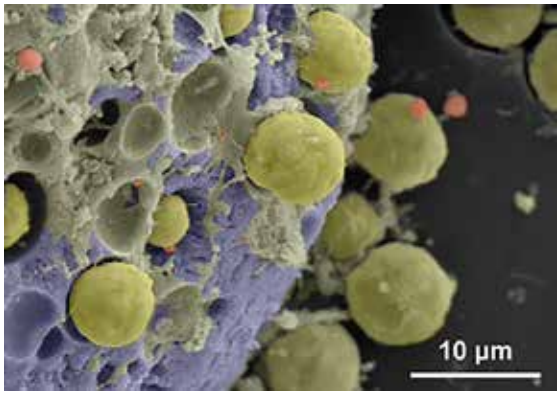
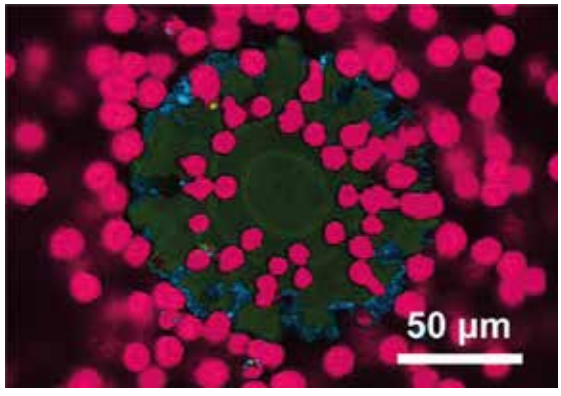


FIGURE 2
Confocal laser scanning micrograph of symbiolite fluorescence properties – organic matrix (blue), calcium carbonate (green), Symbiodinium chlorophyll fluorescence (red). From Frommlet et al. 2015.



Boosting thermoelectric performance by defect chemistry engineering

Aleksey A. Yaremchenko[1], Sascha Populoh[2], Myriam Aguirre[3], Sónia G. Patrício[1], Javier Macías[1], Philipp Thiel[2], Duncan P. Fagg[4], Anke Weidenkaff[5], Jorge R. Frade[1], Andrei V. Kovalevsky[1*]

Thermoelectric (TE) harvesting is expected to play an important role in future sustainable energy technologies, provided by simplicity, excellent scalability and reliability, and self-sufficiency to enable mobile or remote applications. Donor-substituted strontium titanates are amongst the most promising oxide thermoelectrics, mainly for conversion of high temperature heat sources with enhanced Carnot efficiency, overcoming critical shortcoming of intermetallic-based thermoelectrics (toxicity and limited thermal and redox stability). Recent work in our group boosted the high-temperature thermoelectric performance in tantalum - (Fig. 1, top left graph), niobium and tungsten-substituted strontium titanates, by shifting prevailing structural defects from Ruddlesden-Popper-type (SrO^{RP}) and other oxygen-rich defects (O''_{shear}), confirmed by TEM (Fig. 1), to oxygen (Vö) and cation nonstoichiometry (V''_{Sr}). This unique approach of defect chemistry engineering can be combined with complementary microstructural design to further promote electrical transport and suppress thermal leakage, thus opening new possibilities to upgrade $SrTiO_3$-based thermoelectrics.

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5 — Materials Chemistry, Institute for Materials Science, University of Stuttgart, Germany

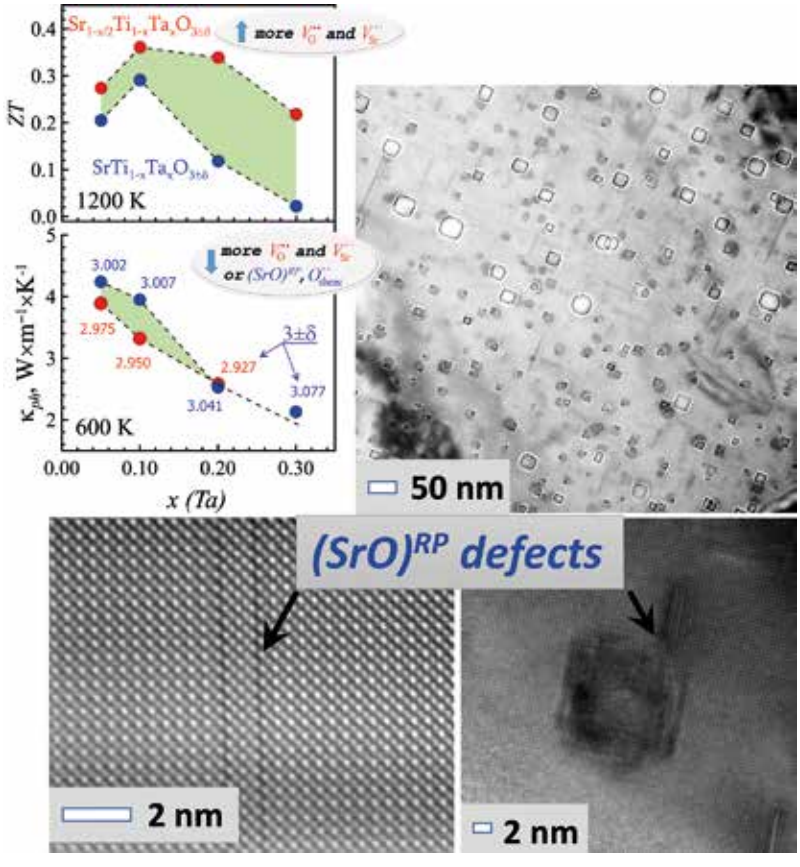

FIGURE 1
The top left graph shows dimensionless figure of merit (ZT) and lattice thermal conductivity (κ_{ph}) of $SrTi_{1-x}Ta_xO_{3\pm\delta}$ (blue circles) and $Sr_{1-0.5x}Ti_{1-x}TaxO_{3\pm\delta}$ (red circles) ceramics. The numbers indicate total oxygen content, obtained from thermogravimetry data. The green area illustrates *ZT* enhancement and κ_{ph} reduction due to defects engineering. High-resolution TEM images of $Sr_{1.05}Ti_{0.9}Nbo_{.1O3\pm\delta}$ lamellar sample, confirming the formation of Ruddlesden-Popper-type defects, are also shown.

Strong piezoelectricity in single-layer graphene deposited on SiO_2 grating substrates

Gonçalo da Cunha Rodrigues[1], Pavel Zelenovskiy[2], Konstantin Romanyuk[1,2], Sergey Luchkin[1], Yakov Kopelevich[3], Andrei Kholkin[1]

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3 — Instituto de Física, UNICAMP, Campinas, São Paulo, Brazil

Piezoelectricity is an ability of certain materials to produce mechanical strain under applied electric field or charge under mechanical stress. It is widely used in various devices such as sensors, actuators and transducers.

Piezoelectricity in 2D materials such as graphene opens up new opportunities for functional devices based on the direct and converse piezoelectric effects. Being 2D monoatomic material with many unique properties, graphene is one of the favorable candidates for these applications. However, its centrosymmetric structure does not allow for any piezoelectricity. In this work, we discovered strong piezoelectric effect in a single-layer graphene deposited on SiO2 calibration grating (left panel of Figure 1). Vertical displacement induced by applied voltage was measured by Piezoresponse Force Microscopy (PFM) in a contact mode (right panel to Figure 1). The calculated vertical piezocoefficient is about 1400 pmV-1, that is, much higher than that of the conventional piezoelectric materials such as lead zirconate titanate (PZT) and comparable to that of relaxor single crystals (PMN-PT).

The observed piezoresponse was associated with polar surface states induced by the chemical interaction of graphene's carbon atoms with the oxygen from the underlying SiO2. Piezoelectric activity was mainly observed on the supported graphene regions where van der Waals and/or chemical interaction between the SiO2 surface and graphene layer can induce an anisotropic strain and detectable PFM signal. The correlation of mechanical in-plane strains in a graphene layer with the substrate morphology was established via Raman mapping.

The results provide a basis for future applications of graphene layers for sensing, actuating and energy harvesting. The displacement level can be even increased by fabricating thin SiO2 membranes or bridge/cantil-ever structures.

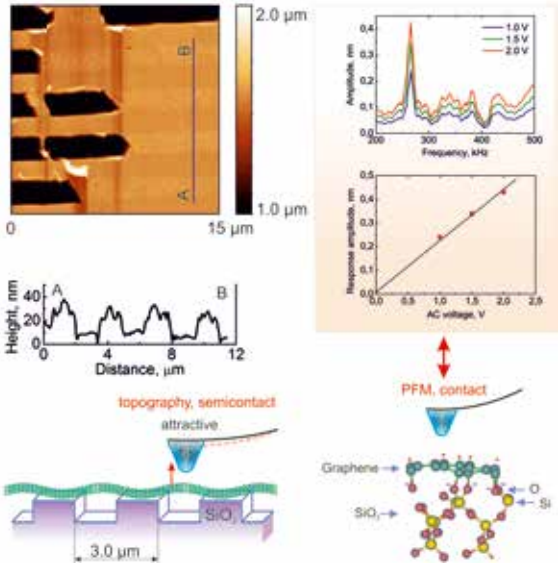

FIGURE 1
Left panel: Topography of the graphene membrane deposited on the SiO2 grating with the pitch 3 μm. Right panel: piezoresponse as a function of frequency and ac voltage and schematic of the C-O bonds formation leading to strong piezoelectric effect.

The magic of aqueous solutions of ionic liquids: ionic liquids as a powerful class of hydrotropes

Ana Filipa M. Cláudio[1], Márcia C. Neves[1], Karina Shimizu[2], José N. Canongia Lopes[2], Mara G. Freire[1], João A. P. Coutinho[1]

Advances in the dissolution of poorly soluble compounds in aqueous media play an important role in the formulation of more effective drugs, cleaning agents and personal care products. Hydrotropes are compounds typically used in these formulations to increase the concentration of hydrophobic solutes in aqueous solutions.

Recently, we demonstrated that ionic liquids are a new class of powerful hydrotropes, where both the cation and the anion synergistically contribute to increase the solubility of poorly water-soluble compounds in water.[1] The effects of the ionic liquid chemical structures, their concentration and the temperature on the solubility of two model solutes/antioxidants (vanillin and gallic acid) were evaluated and compared with the performance of conventional hydrotropes. The solubility of these two solutes was studied in the entire composition range, from pure water to pure ionic liquids, and an increase in the solubility of up to 40-fold was observed in aqueous solutions of ionic liquids. Using dynamic light scattering, nuclear magnetic resonance spectroscopy and molecular dynamics simulations, it was demonstrated that the remarkable enhanced solubility observed in aqueous solutions is related to the formation of ionic-liquid-solute aggregates, and that ionic liquids act as hydrotropes, as depicted in Figure 1.

Finally, we demonstrated that the hydrotropy phenomenon induced by ionic liquids can be used to recover value-added solutes from aqueous media by precipitation, simply by using water as an anti-solvent (the greenest solvent overall). The results obtained have a significant impact on the understanding of the promising role of ionic liquid aqueous solutions in the extraction of value-added compounds from biomass[2] as well as in the design of novel processes for their recovery from aqueous media. We are now actively engaged on the application of ionic liquids (hydrotropes) aqueous solutions to the extraction and recovery of value-added compounds with therapeutic properties from biomass.

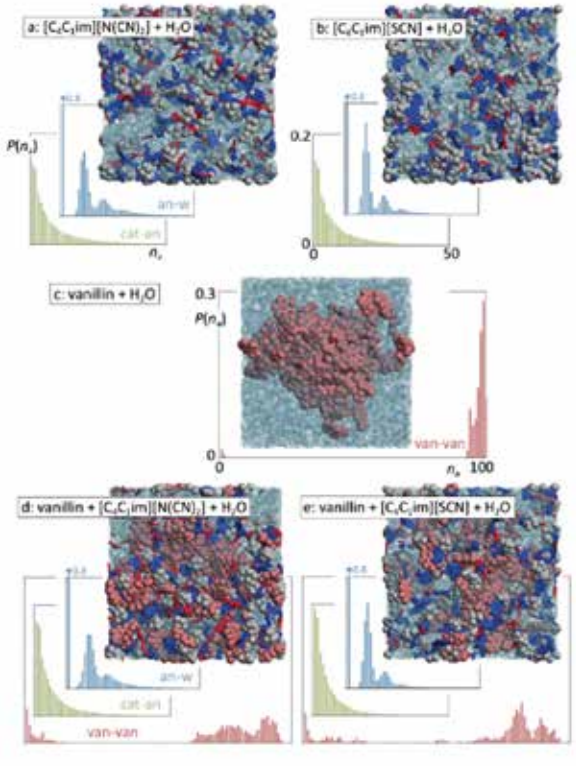

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FIGURE 1
Simulation snapshots and discrete probability distribution functions of aggregate sizes, P(na) for different types of system and aggregate type. (a-b) Ionic liquid aqueous solutions; (c) water-vanillin mixture; (d-e) vanillin in ionic liquid aqueous solutions. (green graphs): ionic liquid polar aggregates (strands); (blue graphs): anion-water network; (red graphs) vanillin clusters.

Academic development in Higher Education through innovative approaches in teaching, assessment and feedback

Pedrosa-de-Jesus, M. H. (CIDTFF) and colaborators (Correia, A.[1*], Gonçalves, F.[1], Almeida, A.[1], Cunha, A.[1], Moreira, A.[2], Lopes, B.[3], Guerra, C.[3] and Watts, D. M.[4])

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The research highlighted here has been developed at the University of Aveiro (UA) and has involved close collaboration between researchers in education (Specific Didactics) and five university biology teachers over a period of some twelve years (ending in 2015). The main goal of this collaboration has been to enhance inquiry-based learning in practice and to weigh the impact on these teachers' academic development and growth. This work entailed (i) working alongside university teaching colleagues in designing and adopting novel practices to meet new demands on their time and teaching; (ii) evaluating such innovative teaching and learning strategies in action, and (iii) promoting university teachers' academic reflection on issues of teaching and learning at this level.

Outcomes show a marked interest in the design and development of innovative approaches to teaching, learning, feedback and assessment. These teachers demonstrated strong collaborative practices, insightful reflections on their teaching activities, willingness to share evaluations both within and without of university contexts, and successfully contribute thoughts and ideas to a wider audience.

One of the highlights of the research developed is that, whatever the challenges to improve the quality of the teaching and learning process in higher education, a core aspect of change is the scholarship of teaching and learning (SoTL). SoTL focuses on university teachers' academic development by drawing on literature and research on teaching to inform practices; publishing and making presentations about teaching, and applying for funding for research on teaching. Some indications of the 'SoTL products' to emerge from the project have ranged from contributions to internal university teaching and learning events, to external international conference presentations. This research in academic development has contributed to the production of relevant knowledge in the area. The success can be attested by, for example, the number of financial projects obtained (3), PhD and master's degrees, the large number of articles published internationally and the changes of practices of the HE teachers involved.

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Estudo do Desenvolvimento Académico na Universidade

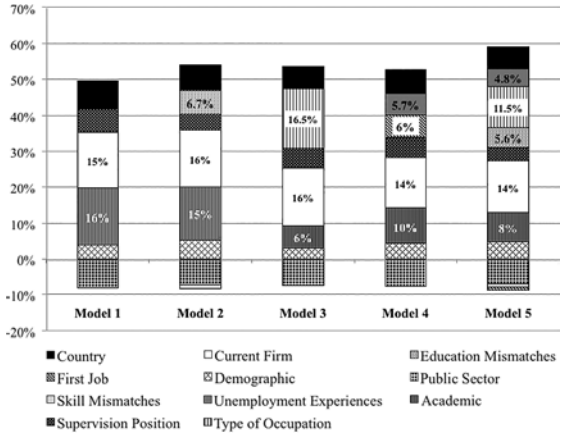
Gender Pay Gaps and the Restructuring of Graduate Labour Markets in Southern Europe

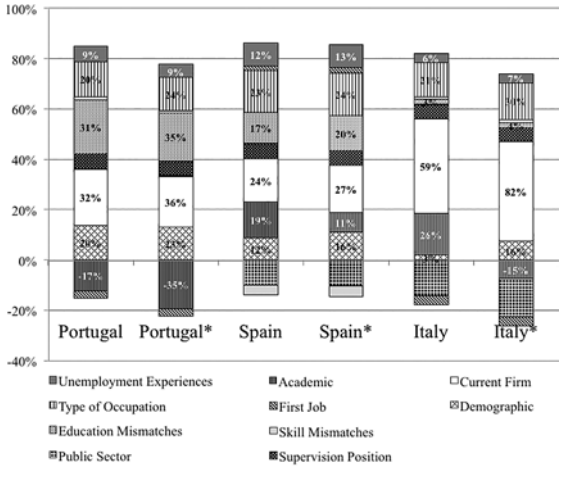
Hugo Figueiredo [1], Vera Rocha[2], Ricardo Biscaia[3], Pedro Teixeira[4]

Traditional analyses of gender pay gaps (GPGs) were initially motivated by the idea that a significant part of such gaps could be explained by different individual endowments – presumably determining productivity in the labour market. This created the expectation – in European political circles for example – that GPGs would tend to disappear as women's endowments (education levels in particular, but also employment participation) converged over time. As this happened and while unadjusted GPGs have decreased, sizeable earnings differentials between genders have persisted, including among university graduates.

In this paper we suggest that, as education-related differences between men and women disappear, new sources of inequality are being created as the result of growing career heterogeneity and education-job mismatches in graduate labour markets. We show that – because these processes are not neutral from a gender perspective – they constitute important explanatory factors of gender pay gaps among university graduates in Southern Europe (Portugal, Spain, and Italy). We use standard decomposition techniques and test the implications of controlling for selection bias. Our results indicate, in particular, that women who occupy *new graduate jobs* – in which graduates used to be a minority in the past – move to already feminised jobs and are more likely to be overeducated. Furthermore, we show that individual-related determinants of earnings (e.g.: field of studies) are strongly mediated by such aspects of labour market integration. Our results also confirm that firm-level characteristics (firm size and ownership) remain important determinants of pay gaps even when controlling for these other factors.

These findings thus call for further research on the specific task content of male- and female-dominated *new graduate jobs* and whether female-dominated occupations do to some extent trade-off higher labour market temporal flexibility for lower wages as to better accommodate women's historical dual role in society. They raise the need to look into direct processes of gender discrimination in graduates' recruitment to male-dominated graduate jobs but also into wider and more indirect processes of segregation that could explain why young highly qualified women choose or are forced to stay out of specific areas of activity.





1 — Department of Economics, Management, Industrial Engineering and Tourism, & CIPES, University of Aveiro
2 — Copenhagen Business School, Department of Innovation and Organizational Economics & CIPES
3 — ESTGA, University of Aveiro, Portucalense University Infante D.Henrique & CIPES
4 — Faculty of Economics, University of Porto & CIPES

FIGURE 1
Share of the gender wage gap explained by groups of observed characteristics (pooled)

FIGURE 2
Contribution of observed characteristics to the explained part of gender wage gaps, by country[a]

[*] Decompositions based on selectivity adjusted gender wage gaps.
[a] Decompositions computed from the estimation results for the full specification model.

The driving forces of change in energy-related CO2 emissions in eastern, western, northern and southern Europe: The LMDI approach to decomposition analysis

Victor Moutinho[1], António Carrizo Moreira[1]

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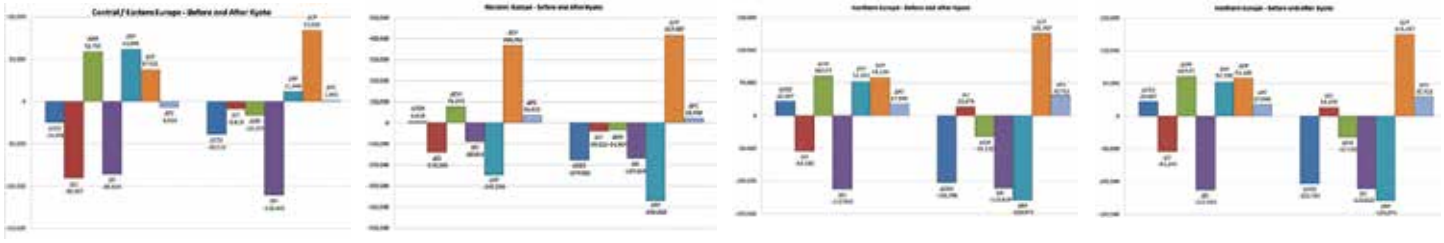
The objective of this work is to identify the relevant factors that have influenced the changes in the level of CO2 emissions among four groups (eastern, western, northern and southern) of European countries. Our re-sults in fig.1 for Central/Eastern Europe Group (Czech Republic, Poland, Hungary, Slovakia and Estonia) show that in the 1999-2004 period (pre-Kyoto), there is a decrease (-24.41 tons) in the variation of emissions of approximately 4.1%. On the other hand, in the post-Kyoto period (2005-2010) the decreasing trend in the variation of CO2 (-38.53 tons) continues with a decrease of 6.8%. The behaviour of the variation of emissions of countries for Western Europe (France, Netherlands, Belgium, Austria, Germany and Luxembourg) is presented in fig.2. Clearly, there is a slight increase of 0.4% in the pre-Kyoto period. On the other hand, during the post-Kyoto period there is a decrease in the variation of the carbon emissions (-174.02 tons), which corresponds to a decrease of 9.5%. Fig 3 present the results for the group of countries in Northern Europe (Finland, Denmark, Ireland, United Kingdom and Sweden). The pre-Kyoto period is dominated by the positive and significant effects of energy mix, renewable capacity productivity and renewable capacity per capita, overpowering the negative effects of emissions intensity and energy intensity and contributing to an average increase of 22.01 tons, or a 2.7% change in the carbon emissions. However, the post-Kyoto period saw a significant volte-face in the emissions behaviour, with a decrease of 102.77 tons – a 12.2% decrease compared to the pre-Kyoto period. The Southern European countries (Italy, Spain, Portugal, Greece and Slovenia), as can be seen in Fig 4, testify to the fact that there was a major reversal in the variability of the carbon emissions behaviour. The pre-Kyoto period shows a positive and significant change in the emissions of 13.4% (i.e. a rise of 127.92 tons). In the post-Kyoto period the emissions behaviour changes markedly, falling by 12.7% (a drop of 140.55 tons). This improvement can be explained by the energy intensity and renewable capacity intensity effects which proved much larger than the major positive effects of renewable energy capacity per capita and energy mix. One can observe when analysing the four groups of European countries that most countries reduced their CO2 emissions as a consequence of promoting renewable sources in energy used and reducing both the intensity and fuel mix factors.



Evolution of Robustness to Protein Mistranslation by Accelerated Protein Turnover

Dorottya Kalapis[1], Ana R. Bezerra[2], Zoltán Farkas[1], Peter Horvath[1], Zoltán Bódi[1], Andreea Daraba[1], Béla Szamecz[1], Ivo Gut[3], Mónica Bayes[3], Manuel A. S. Santos[2*], Csaba Pál[1*]

The accuracy of protein synthesis is fundamental to ensure healthy living of all organisms. For this reason, it is generally assumed that protein synthesis fidelity is maintained at very high levels at all times. However, recent studies show significant degradation of protein synthesis accuracy (mistranslation) under nutrient starvation, diseases and aging conditions. These observations raise several questions. For example, how do cells sustain continuous synthesis of aberrant proteins? how does accumulation of aberrant proteins alter cell physiology? do aberrant proteins aggregate in the cell? how do cells eliminate such aberrant proteins? To answer some of these questions Manuel Santos and his iBiMED´s colleagues and Csaba Pal at the Hungarian Academy of Sciences designed a long term (over 250 generation) experiment to follow the evolution of tolerance and adaptation of cells to continuous synthesis of aberrant proteins.

Aberrant proteins produced large intracellular clumps and had a marginal effects on cell viability, suggesting that, conversely to common thinking, protein aggregates per se may not kill the cell. More surprisingly, cells adapted very fast to accumulation of aberrant proteins and were able to erase protein clumps very efficiently.

They did so by rearranging their genome at fast rate, boosting protein synthesis, degradation and energy consumption (glucose consumption) rates. In other words, accumulation of aberrant proteins may not kill the cell but has major impact on homeostasis and physiology. It also pushes cells to the verge of energetic collapse. The iBiMED team is now trying to figure out if these data are relevant to better understand the molecular basis of aging and degenerative diseases.

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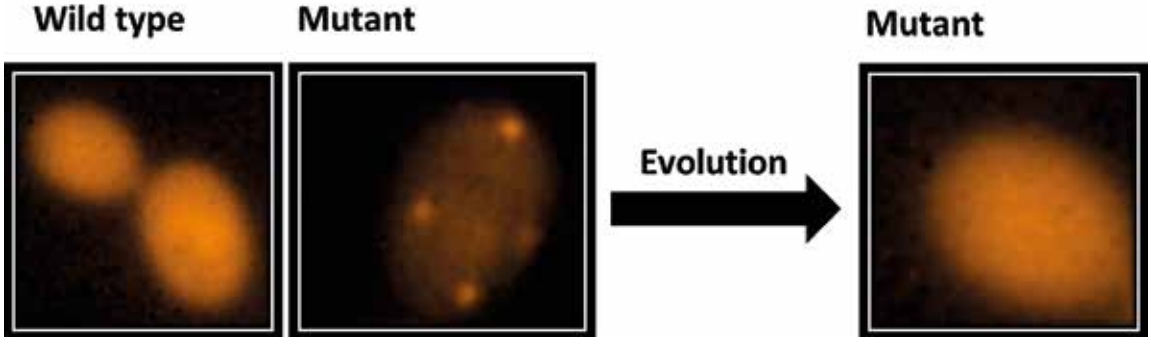

FIGURE 1
The figure shows a yeast wild type cell stained with a fluorescent sensor of protein aggregation (left panel). In this WT cell proteins are synthesized correctly and do not aggregate, resulting in even distribution of fluorescence in the entire cell. The mutant cell (middle panel) production of proteins with high level of errors leads to their aggregation in specific locations in the cell (fluorescent foci). Cells survive and adapt rapidly to the presence of protein aggregates and are able to erase them during evolution, as indicated by the even distribution of the fluorescent sensor in the evolved Cell (right panel).

RUN and FYVE domain-containing protein 4 enhances autophagy and lysosome tethering in response to Interleukin-4

Seigo Terawaki[1], Voahirana Camosseto[2], Prete F, Wenger T, Papadopoulos A, Rondeau C, Combes A, Rodriguez Rodrigues C, Vu Manh TP, Fallet M, English L, Santamaria R, Soares AR, Weil T, Hammad H, Desjardins M, Gorvel JP, Santos MA, Evelina Gatti[3], Philippe Pierre[3]

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In addition to removing defective proteins or deteriorated subcellular organelles, autophagy is key to eliminate parasitic microbes in response to a variety of stress and metabolic changes. Most of our current knowledge about autophagy regulation was obtained through the study of starvation induced-autophagy in yeast. This process is used to recycle cellular material upon acute lack of nutrients. Autophagy is conserved among species and this pioneering work has served as a blue-print for chartering the molecular basis of autophagic processes in higher eukaryotes; however, little is known about the existence of cell – or tissue-specific factors controlling autophagy in multicellular organisms in other circumstances than amino acid starvation. Few are the molecules involved with the autophagic process that display cell – or tissue – specific expression. The groups of Philippe Pierre and Evelina Gatti have unraveled the positive regulatory role on autophagy of RUFY4 (RUN and FYVE domain containing 4), which is expressed in subsets of immune cells, including dendritic cells (DCs). DCs orchestrate the eradication of pathogens by coordinating the action of the different cell types involved in microbe recognition and destruction during the immune response. To fulfill this function, DC display particular regulation of their endocytic and autophagy pathways in response to the immune environment. Autophagy flux is down-modulated in DCs upon microbe sensing, but is remarkably augmented, when cells are differentiated in the presence of the pleiotropic cytokine IL4 (interleukin 4). From gene expression studies aimed at comparing the impact of IL4 on DC differentiation, the iBiMED researchers identified RUFY4, as a novel regulator that augments autophagy flux and, when overexpressed, induces drastic membrane redistribution and strongly tethers lysosomes. RUFY4 is therefore one of the few known positive regulators of autophagy that is expressed in a cell specific manner or under specific immunological conditions associated with IL4 expression, such as allergic asthma. The study of RUFY in the future might help to understand the role of autophagy in allergic asthma and potentially other types of lung inflammation.

FIGURE 1
Rufy4 facilitates STX17 or WIPI2 recruitment on phagophore via its RUN domain to concentrate these molecules and favor autophagosome formation

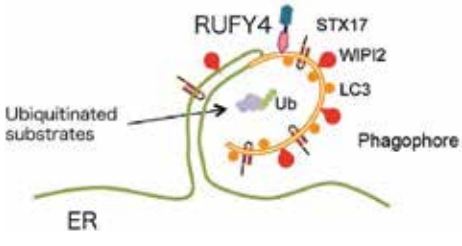
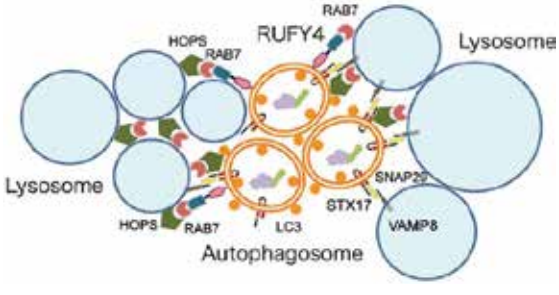


FIGURE 2
Interaction between Rufy4 and RAB7 or HOPS induces autophagosome and lysosome tethering?



Classifying heritage by (re)classifying identities. the inclusion of Kola San Jon in the portuguese list of intangible heritage

Ana Flávia Miguel[1], Susana Sardo[1]

Kola San Jon (KSJ) is a polysemic performance practice which, originally, take place in Cape Verde. This practice, related to the religious devotion to St. John the Baptist, is materialised through the performance associated with music (such as the beating of the drums, the use of whistles and the sung word), with dance, and the use of artefacts of a religious and ritualistic nature.

The relationship between Cape Verde and Portugal underwent a situation of colonial dependence, which was politically abolished on July 5th, 1975, the country's Independence Day. The city of Lisbon and especially the Cova da Moura neighbourhood, came to constitute a privileged place in which the Cape Verdian immigrants settled. It was in this context that KSJ emerged in 1991 in Portugal, as an annual feast of the neighbourhood, supported by the Associação Cultural Moinho da Juventude. In the Cova da Moura, the central element of the event is a procession along the streets, accompanied by music and dance with a very similar performative profile as the one in Cape Verde.

In October 2013 the Portuguese Official Gazette published the registration of the performative practice Festa de Kola San Jon, in the National Inventory of Intangible Cultural Heritage (PCI). The inclusion of performative practices in the national list of intangible heritage refers, usually, to expressive behaviours associated with the country of registration by attributes of belonging and also to non-discontinued traditions, anchored in the past. In this context, and taking into account the post-colonial profile of the relation between Portugal and Cape Verde, it is important to understand how the classification of Festa de Kola San Jon as Portuguese intangible heritage drives to the reclassification of both Cape Verdian and Portuguese identities. We argue that this procedure is probably a condition to legitimize actions of coexistence, of living together and building a common world among Cape Verdeans, and between Cape Verdeans and the Portuguese. This paper is a draft analysis of three processes: (1) the transplant to Portugal of the performative practice Kola San Jon, (2) how its recontex-tualization also led to its resignification and, finally, (3) how the patrimony classification is also a way of enabling identity reclassification.

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Salicornia ramosissima J. Woods: a gourmet product from the salt pans of Ria de Aveiro

Diana C. G. A. Pinto[1], Ana M. L. Seca[1,2], Helena Silva[3], Artur M. S. Silva[1]

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2 — DCTD, University of Azores
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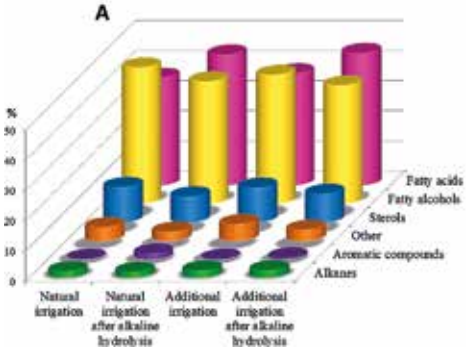
Salicornia ramosissima J. Woods commonly known as glasswort (Fig. 1), is an annual halophytic plant with 3-40 cm tall, often highly branched, apparently leafless, with articulated green and succulent salty stems. The small seeds, up to 1.5 mm in length, develop in spike-like fertile branches that are mature in late autumn, germinate in early spring and produce succulent stems in early summer that are very appreciated, before flowering, as gourmet food. It is the only species of Salicornia vegetating in the Portuguese coast; it can tolerate high salinities and, therefore, frequently colonize the salt pans of Ria de Aveiro".

A joined team from the Biology and Chemistry Departments is studying this species in order to valorise Aveiro natural resources. And in doing so *S. ramosissima* health benefits can be validated as well as structurally interesting natural products can be found.

FIGURE 1
Salicornia ramosissima J. Woods



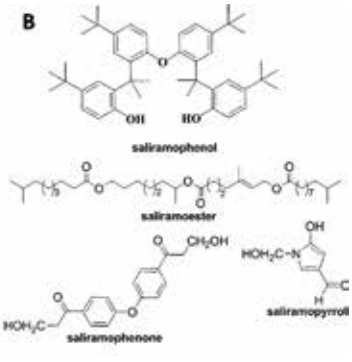


FIGURE 2A
Lipophilic profile of *Salicornia ramosissima* under distinct irrigation conditions.

FIGURE 2B
Structure of the secondary metabolites isolated from *Salicornia ramosissima* aerial parts.

Since this joined project started *S. ramosissima* lipophilic profile (aerial parts) was investigated and the effect of natural and extra irrigation in that profile was assessed (Fig. 2A). Our results showed that *S. ramosissima* can be considered as important dietary sources of health promote phytochemicals. For example, the essential polyunsaturated ω-6 and ω-3 fatty acids ratio (ω-6/ω-3, correspond in this study to the ratio linoleic/linolenic acids) detected in lipophilic fraction of *S. ramosissima* is 2.35. This ratio is very interesting since a ω-6/ω-3 ratio lower than 5 is associated with a significant decreased in the manifestation of cardiovascular and/or cancer diseases. Additionally, it was concluded that the extra irrigation increases the content of esterified lipophilic compounds.[1]

Furthermore the preliminary phytochemical study of *S. ramosissima* aerial parts allowed the isolation of four new natural compounds, saliramophenol, saliramoester, saliramophenone and saliramopyrrol (Fig. 2B). The isolation and structural elucidation of saliramophenol has added a completely new skeleton to the already large and varied family of chemical structures obtained from natural resources.[2] This fact was noticed by the international scientific community since saliramophenol was included in the "Hot off the press" selection of new natural compounds.[3]

Valorization of macroalgae as a source of added value polar lipids

Elisabete da Costa[1], Tânia Melo[1], Elisabete Maciel[1, 2], Ana S. P. Moreira[1], Eliana Alves[1], Vitor Azevedo[1], Pedro Domingues[1], Ricardo Calado[2], Maria H. Abreu[3], Maria Rosário Domingues[1]

Marine macroalgae, or seaweeds, have been used for direct human consumption, as additives in the food industry, and cosmetics. Lipids are one of the main nutrients of macroalgae and represent promising bioactive phytochemicals.

We have characterized, for the first time, the full lipidome of the edible seaweeds *Chondrus crispus* and *Codium tomentosum*, produced through Integrated Multi-Trophic Aquaculture (IMTA). We have also pioneered the detection of lyso-glycolipids in cultivated seaweed (1,2). Considering that glycolipids from algae have shown to be promising anti-inflammatory, antitumor and antimicrobial phytochemicals, and as such, rapidly acquiring importance in this "antibiotic resistance era", the lipidomics of macroalgae unravel and allow to identify glycolipids and other polar lipids as promising added value compounds.

These findings contribute to the valorization of these seaweed species by increasing their economic value and fostering novel nutraceutical, cosmeceutical and biomedical applications. This smart valorization of endogenous marine biological resources is paramount to promote Portuguese Blue Economy and stimulate further research on marine bio-resources.

This work is being developed by a multidisciplinary team from QOPNA and CESAM, in collaboration with the private enterprise ALGAplus, with relevant findings being made available in reference journals on algal research (1,2).

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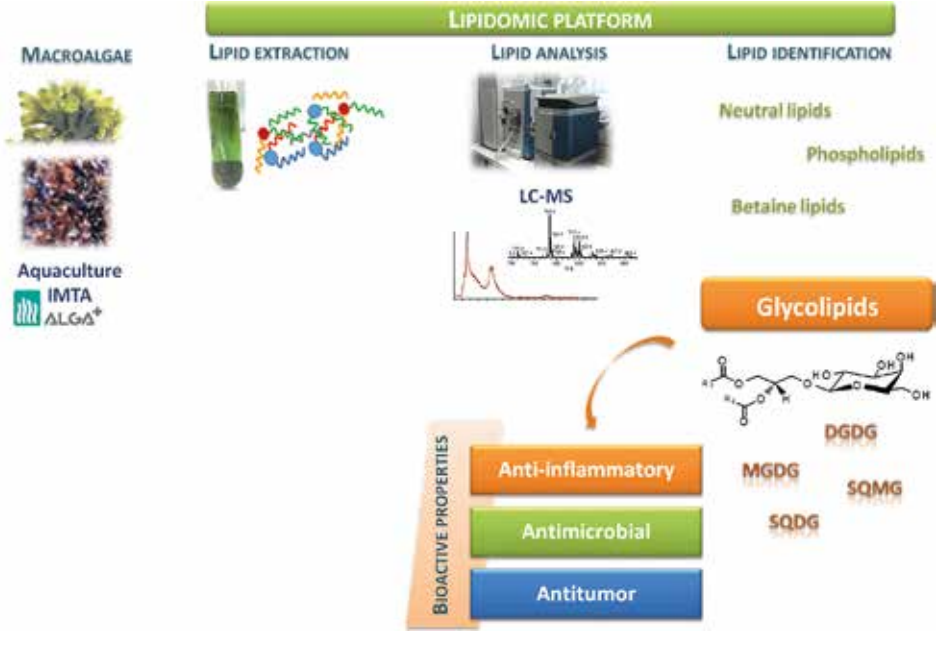

A microstructure-based model for describing the material properties of Al–Zn alloys during high pressure torsion

M. Borodachenkova[1], F. Barlat[1,2], W. Wen[1], A. Bastos[1], J.J. Grácio[1]

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2 — Graduate Institute of Ferrous Technology, Pohang University of Science and Technology

Several techniques of severe plastic deformation (SPD) have been developed to improve the mechanical properties of metals. Among these techniques, HPT (Fig.1) is especially effective to introduce extremely large strains on materials leading to exceptional grain refinement. In the present work, the material properties of the super saturated solid solution Al–30wt%Zn alloy deformed under HPT have been studied. It has been determined that HPT leads to a strong softening process at the initial stage of plastic deformation (Fig.2). To explain observed material behavior, the microstructural evolution during plastic deformation has been experimentally studied. It has shown that the fundamental phenomena of the process are solid solution decomposition, Orowan looping and dislocation density evolution. The material properties are dictated at the beginning of plastic deformation by the decomposition of supersaturated solid solution and after saturation strain by saturation grain size. Such a material behavior is captured by a new model called MBWG that is based on strain induced diffusivity of Zn in Al grains and the evolution of the dislocation mean free path with plastic strain. The model considers the material properties to be determined by the gradual increase in the mean free path of dislocations resulting from precipitation and diffusion of Zn atoms towards the grain boundaries. The calculated results by MBWG model present a good agreement with experiment. This model shows the capability to describe both the softening and saturation processes. The calculated shear stress evolution is mostly contributed by the solid solution shear stress. This suggests that the decomposition of super saturated solid solution plays the dominated role in the material properties of Al–30wt%Zn alloy. The MBWG model allows evaluate the contribution of the different strengthening mechanisms during the deformation and it can be adapted to other softening processes during plastic deformation.

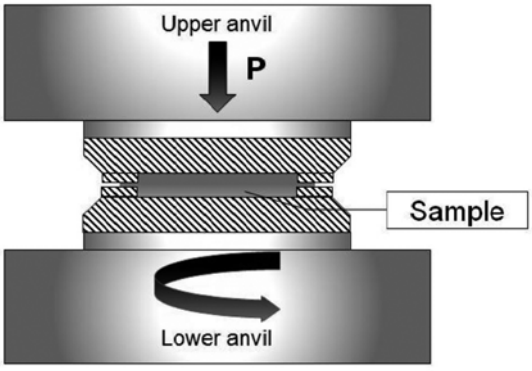


FIGURE 1
Schematic illustration of quasi-constrained HPT setup.

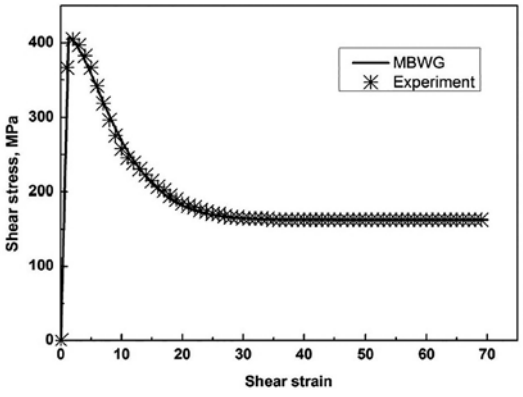


FIGURE 2
Comparison between the predicted and experimental shear strain-shear stress curves.

Static and dynamic crush performance of in-situ foam-filled tubes

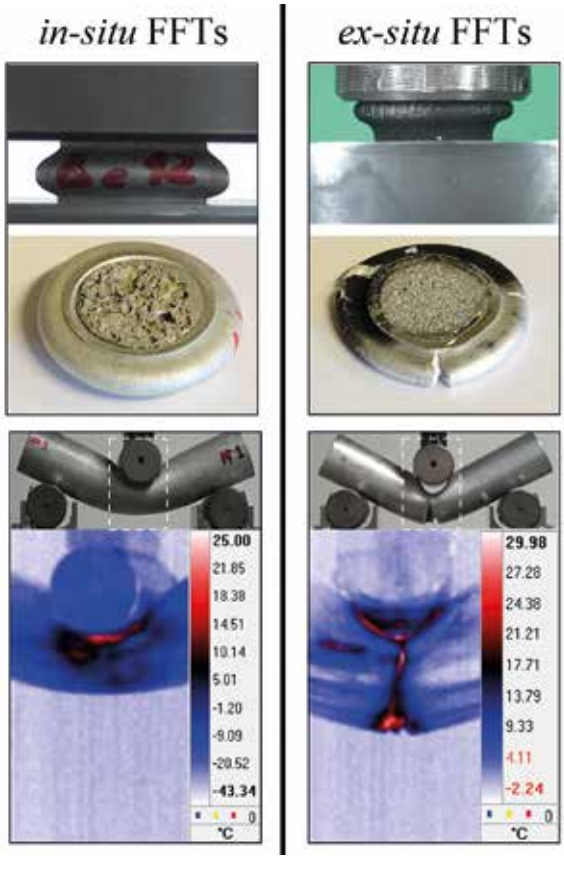
Isabel Duarte[1], Matej Vesenjak[2], Lovre Krstulović-Opara[3], Zoran Ren[2]

The current trend in transport industry is to increasingly integrate lightweight materials into vehicle designs to reduce their overall weight. This can be effectively achieved with a combination of light metals and cellular materials, like the aluminium alloy (Al-alloy) foams. Such foams have been tested for use as fillers in multifunctional construction elements for energy and sound absorption, vibration damping and heat dissipation.

The most common and cost-effective solution to bond foams with other materials is by using polymeric adhesives. However, such bonding is limited due to high-temperature sensitivity, recycling difficulties and consequently environmental impacts. Usability of some other joining processes (e.g. welding, brazing and soldering) has thus been investigated. The tests have demonstrated that the cellular structures are damaged during these bonding processes and have been deemed not suitable to fabricate foam filled tubes (FFTs) which are widely used key components in automotive body parts. Moreover, this additional joining step makes the process expensive, resulting in non-competitive products.

Alternatively, we have developed and tested lightweight, recyclable, non-inflammable *in-situ* FFTs made of light Al-alloys through powder compact foaming method wherein the joining between the foams and tubes is achieved during the liquid foam formation, resulting in good metallic interface bonding, a pre-requisite for better mechanical response of the composite structure. Fig. 1 shows the main results in which the mechanical crushing behaviour and the failure mechanisms were assessed by compression and three-point bending tests supported by infrared thermography. The mechanical response of the *in-situ* FFTs was compared to the individual components and *ex-situ* FFTs prepared by insertion of the pre-shaped foam into the tube.

The results clearly demonstrate that the new *in-situ* FFTs have a superior mechanical performance and that they ensure high ductility and very good crashworthiness behaviour since they deform under compressive and bending loads without formation of cracks and without abrupt failure. A good interface bonding also contributes to a more axisymmetric deformation. We believe that the incorporation of such structures into the automotive structures can further reduce the vehicle weight, increase the active safety in case of an accident and increase the passive safety by reducing the noise and vibrations while driving.



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2 — FS, University of Maribor, Slovenia
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FIGURE 1
Compressive and bending responses of *in-situ* and *ex-situ* FFTs.

Discovering TV contents in a second screen – the Guider application

Jorge Abreu[1], Pedro Almeida[1]

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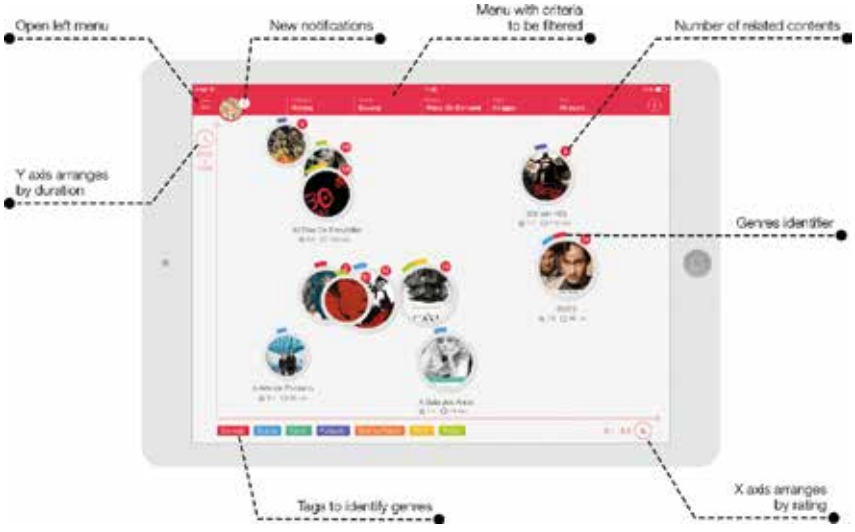
The actual trends in the TV ecosystem bring considerable social, organisational and technological challenges in the value-chain of Pay-TV operators. Among these are the global increase in bandwidth, the shifting of the storage capacity to the cloud, and the competitiveness of new over the top (OTT) content providers. In parallel, Pay-TV operators are presenting their customers with a huge offer of contents available from linear-TV, Catch-up TV and VoD services. To be competitive in this overloaded TV ecosystem, operators need to provide innovative and reliable solutions to foster the user experience, namely, when discovering the right TV content for a specific context.

Having this in mind, the Social iTV team of the Digimedia Research Unit developed the GUIDER App and, with the support of PT Inovação (currently Altice Labs) integrated it into the technical infrastructure of the MEO TV service. This application designed to be used by TV viewers with second screen devices (iOS tablets) offers an original interface for those "mindless zapping" situations where viewers do not know, in advance, what they are in the mood to watch on TV. The main GUIDER area is the discovery screen, structured as a multi-dimensional graphic that lays out the TV programs according to the set of criteria defined by the user. Programs are represented as circles and spatially distributed according to its IMDB classification (x axis) and duration (y axis). Users are able to choose any content (from linear and non-linear TV offers), find related TV programs, get the details on each program (including its trailer) and send the chosen TV program to the main screen.

The App was evaluated in Portugal and Brazil with a sample of 20 participants in each country. Despite the differences in the corresponding TV ecosystems, both countries demonstrated to be promising markets for this kind of applications, with Brazilians revealing an even higher perception of the added value of GUIDER. The conceptual model of the App was considered relevant as a second screen alternative to help users discovering TV contents to watch. This fact supports a possible decision to integrate it in a commercial version of a MEO app.

Promotional website: http://goo.gl/zeknVV
More information: http://socialitv.web.ua.pt/



Black Hole Shadows

Pedro V. P. Cunha[1], Carlos Herdeiro[1], Eugen Radu[1], Helgi Rúnarsson[1]

100 years after Albert Einstein formulated General Relativity (GR), we finally face a realistic prospect of testing one of its most dramatic consequences: black holes (BHs). The evidence for astrophysical BHs, gathered for over half a century, has built a strong case, but it could not yet confirm the existence of event horizons, the defining property of BHs.

We live, however, exciting times. A new channel of observation – gravitational waves – has just been opened and electromagnetic measurements of unprecedented precision are taking place, hopefully clarifying this central issue.

A particularly promising prospect is the use of Very Large Baseline Interferometry (VLBI) techniques to resolve the angular scale of the event horizon for some supermassive BH candidates and determine the corresponding BH "shadow". This is the silhouette of the BH against background light sources. Its observation would probe the spacetime geometry in the vicinity of the horizon and consequently test the existence and properties of the latter. It is therefore timely to study BH models that yield phenomenological deviations from the paradigmatic GR BH, described by the Kerr metric.

Exact solutions with physically reasonable and astrophysically plausible matter sources, however, are scarce; but Kerr BHs with scalar hair (KBHsSH), discovered in 2014, by Aveiro U. researchers [1] are arguably one such model. These are exact solutions of Einstein's gravity minimally coupled to a massive complex scalar field, and interpolate between Kerr BHs and gravitating solitons – boson stars – suggested as dark matter candidates and BH mimickers.

In this letter we have shown that the shadows of KBHsSH are distinguishable, or even drastically different, from those of Kerr BHs, and can thus yield new templates for the ongoing and future VLBI searches of BH shadows.

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FIGURE 1
The shadow of a KBHSH, produced by our lensing code, against nebula NGC 346 (NASA/ESA image).

FIGURE 2
Image with the lensing of a boson star.

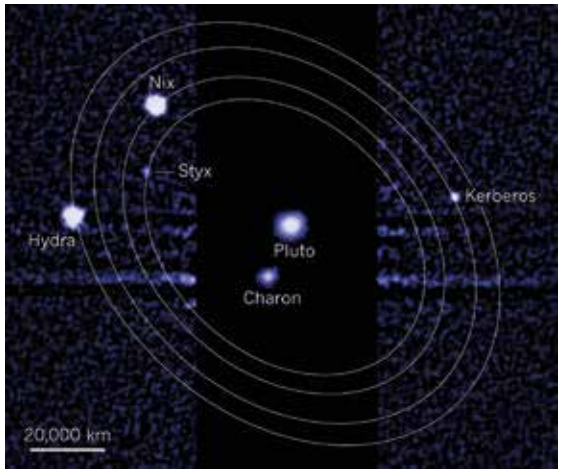
"The chaotic rotation of Pluto's small moons explained"

Alexandre C. M. Correia[1], Adrien Leleu[1], Nicolas Rambaux[2], Philippe Robutel[2]

1 — Departmente of Physics & CIDMA, University of Aveiro
2 — Observatório de Paris, França

In June 2015, the Nature journal has announced that the four small moons of Pluto have a chaotic rotation. A research led by scientists Mark Showalter (SETI Institute) and Doug Hamilton (University of Maryland) showed that the rotation of moons Nix, Hydra, Kerberos and Styx, unlike what happens to the moons of most planets that were already known, is not synchronous with the orbital mean motion, and varies unforeseeably over time.

The University of Aveiro researchers have explained the reason for the strange rotation of Pluto's four moons by applying the laws of gravity. In order to understand this problem it is necessary to consider two factors that distinguish these four moons from all others, namely from Charon, the other moon of Pluto that has a regular synchronous rotation:



1) the four moons in question are small-sized bodies less than 50 km across, they look more like potato-shaped asteroids than spherical bodies like the Moon and the Earth. They have therefore one axis longer than the others.

2) unlike the four small moons, Pluto's biggest moon, Charon, is almost as big as Pluto. Therefore, technically, the Pluto-Charon system must be classified as a binary system and not as a planet-moon system.

As a consequence, the small moons attempt to point the long axis not only to Pluto, but also to Charon. Since this is not possible, the gravitational perturbations from the inner system on the long axis constantly destabilise the rotation of the small moons, preventing them from achieving the synchronous state. More details can be found in the journal Astornomy & Astrophysics Letters.

Sexual dimorphism and attractiveness in human faces

Mariana L. Carrito[1, 2, 3], Isabel M. Santos[1, 2], Carmen E. Lefevre[3], Ross D. Whitehead[3], Carlos F. Silva[1, 2], David I. Perrett[3]

At the age of puberty, the physical differences between human males and females become more evident. The effect of testosterone in the faces of young men produces structural changes as the growth of the jaw, cheekbones, brow ridges and facial hair. From an evolutionary perspective, masculinity is proposed to be attractive in men, since it advertises the quality of an individual in terms of heritable benefits, i.e. good genes passed to the offspring. However, if females are considering a long-term relationship, a preference for more feminine facial traits in men may arise, since less masculine men have been associated with better parenting, less aggressiveness, higher honesty and warmth. A preference for a more feminised facial structure has been found in previous studies. In our work, facial skin coloration is proposed to be a sexually dimorphic feature (i.e., to significantly differentiate between men and women), in addition to shape. Overall skin colour has strong effects on apparent health and attractiveness in human faces. Skin colour varies considerably between people from different regions of the globe but is hypothesized to be sexually dimorphic within a specific region.

In this study, we aimed to test this hypothesis and to understand how the two dimensions of sexual dimorphism, skin colour and shape, contribute to women's judgments of male facial attractiveness. In three experiments, participants were able to manipulate independently or simultaneously the two sexually dimorphic parameters. In line with previous research, we found a clear preference for feminine shape in male faces. However, participants searching for the most attractive appearance while considering either shortor long-term relationship contexts chose to masculinise the colour of male faces more than the colour of female faces (Fig. 1). Our results suggest that a darker, redder and yellower complexion is typically masculine (Fig. 2) and, importantly, seems to be attractive in males. These results provide evidence that skin colour might constitute an additional criterion in sexual selection processes.

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2 — Institute for Biomedical Imaging and Life Sciences (IBILI), Faculty of Medicine, University of Coimbra
3 — School of Psychology & Neuroscience, University of St Andrews, United Kingdom

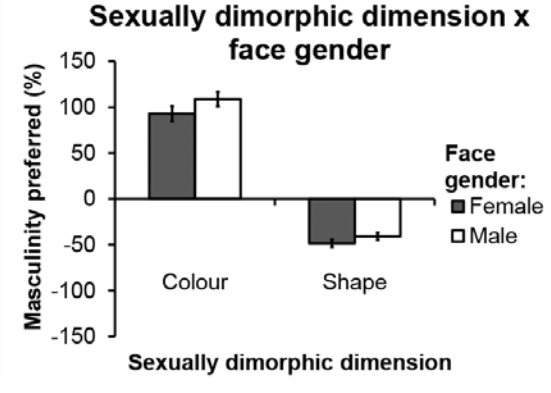

FIGURE 1
Mean masculinity level preferred (in colour and shape) for male faces according to long- and short-term relationship contexts. Error bars show standard errors of the mean.

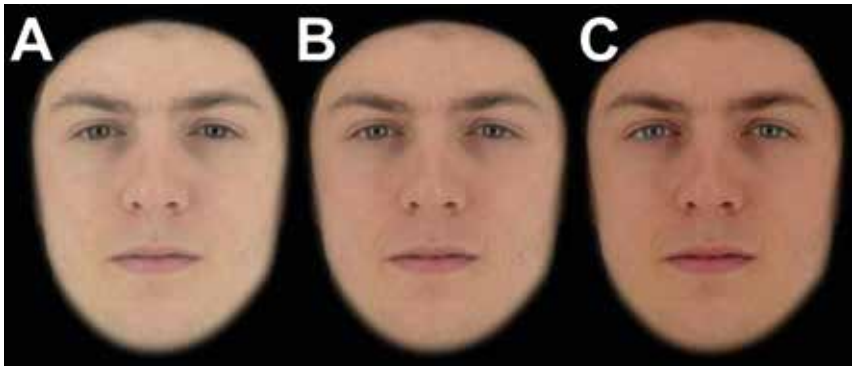

FIGURE 2
Colouration applied to faces along sexually dimorphic colour. A represents low masculinisation, B is the original image and C represents high masculinisation.

Plants as metal bioindicators in abandoned mining areas

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Considering the current economic growth and technological development, a continuous demand for new ore deposits and/or the re-exploitation of low-grade ore deposits and tailings is crucial. This poses two approaches: (1) the prospecting of new or the already known mineral deposits; and (2) the recovery and treatment of the tailings produced by mining activities, preferentially using environment friendly techniques.

Plants have a limited capability for the selective uptake of elements, resulting on the absorption of non-essential elements during water and nutrient uptake, particularly between those with similar chemical properties. Physico-chemical conditions and metal-support phases (mineralogy) of the rhizosphere are also key factors in the mobility and bioavailability of metals to plants. Despite the risk of toxicity when exposed to metal levels exceeding the typical thresholds, some species known as metallophytes tolerate high concentrations of metals. Moreover, a restricted number of plant species (hyperaccumulators) are also capable of uptaking considerable amounts of metals into their shoots.

Thus, the use of plants as metal bioindicators may be useful for biogeochemical prospecting, in order to assess the presence and nature of the underlying mineralization, and phytoremediation, a low-cost and eco-friendly technique for the reclamation of contaminated soils and waters.

The very particular, and in some cases, extreme environmental conditions prevailing in mining areas, are critical to understand the biogeochemical processes between the geogenic environment and plants. In addition, they also allow the development of tests that can contribute to the improvement of phyto-management strategies.

With the aim of evaluating the nature of the mineralization and investigate potential metal hyperaccumulators, soil, tailings and plant samples were collected from several mining areas in Portugal. The obtained results showed a clear correlation between metal levels in plant tissue and the substratum. We conclude that some of the collected plant species could be an effective tool for metal bioindication and biogeochemical prospecting. Furthermore, some plants have also exhibited potential for phytoremediation.

Tailoring Nitride Semiconductor Nanostructure Properties Towards Optoelectronic Applications

N. Ben Sedrine[1], J. Rodrigues[1], T.C. Esteves[1], M. A. Sousa[1], L. Rino, M. R. Correia[1], A. J. Neves[1], T. Monteiro[1]

For the purpose of achieving solid state light emitters in the short wavelength range and white light sources, we have deeply studied semiconductor nitride nanostructure quantum well (QW)-based InGaN/GaN systems grown by metalorganic chemical vapour deposition (MOCVD) and subject to post-growth treatments by implantation and thermal annealing.

It is known that phosphor-based white light devices suffer from low efficiency, for this reason, a monolithic system could be a possible solution. We have demonsrated [1] by photoluminescence analysis that warm white light emission can be efficiently emitted from a monolithic InGaN/GaN single quantum well (QW)-based high quality structure. Indeed, the control of the yellow/blue bands intensity ratio, responsible for the white emission, could be achieved after annealing at 1000 °C.

Furthermore, due to the green efficiency drop of the existing emitting solid state devices, quantum well intermixing was proposed as a possible solution to improve their efficiency. For this purpose, we have studied green emitting InGaN/GaN MQW system that was subject to nitrogen implantation and high temperature and high pressure annealing. Our results [2] demonstrate that the green emission band was found to be surprisingly stable upon annealing up to 1400 °C. Our findings are of high interest in the group III-nitride-based optoelectronic applications.

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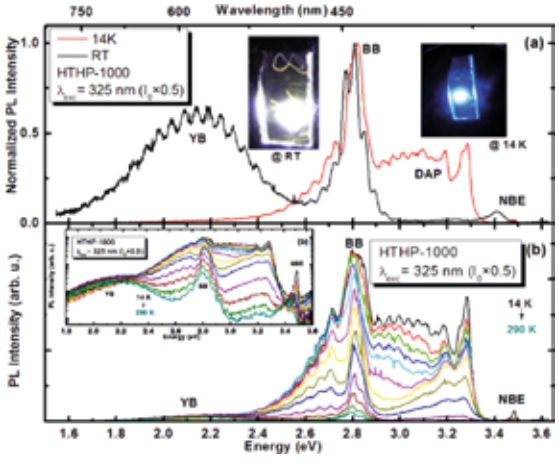

FIGURE 1
(a) 14 K and RT PL of the HTHP-1000 sample obtained with 325 nm laser excitation. Inset: photographs of the low and high temperature emissions (the bright circle in the center corresponds to the saturation of the camera's detector due to the laser spot). (b) Temperature dependence PL spectra of the HTHP-1000 sample obtained with 325 nm laser excitation. Inset: PL temperature dependence in logarithmic scale for clarity. [1]

Nano carbon hybrids: new materials for electronics

Nuno Santos[1], Alexandre Carvalho[1], Tiago Holz[1], António Fernandes[1], Florinda Costa[1]

1 — Department of Physics & I3N, University of Aveiro

The intensive research efforts put in carbon based materials resulted in major scientific and technological breakthroughs awarded with two Nobel prizes in the last two decades. The wide range of carbon allotropes (eg. graphite, fibres, diamond, buckyballs, nanotubes, graphene) possessing distinct physical and chemical properties allowed innovative solutions in areas spanning from structural reinforcement to biomedical or electronic applications. Nowadays, a strong challenge consists on the combined synthesis of different allotropes in a single hybrid material in order to tailor the desired properties towards a specific application.

In fact, nano-carbon hybrid structures are very stimulating materials not only due to the recognized excellent individual properties of each carbon allotrope but also to the synergistic combination possibility of sp2 and sp3 bonded forms. Particularly, both sp2 (graphene, graphite) and sp3 (diamond) phases of carbon exhibit outstanding mechanical, thermal and complementary electronic properties, being graphene a superior electrical conductor and diamond an excellent electrical insulator. Our group has been studying the resulting properties of multi-phased carbon forms produced by Microwave Plasma Chemical Vapour Deposition (MPCVD). The latest focus has been put on graphenediamond hybrids (GDH) and diamond-graphite nano-platelets (DNP).

The simultaneous synthesis of graphene-diamond hybrids is highly desirable in order to explore the synergistic effects of these complementary materials. Although being a hard task since the thermodynamic conditions to synthesize one phase are unfavourable to the other, it was successfully accomplished for the first time [1]. These hybrids consist in few-layer graphene sheets sprinkled by nanocrystalline diamond (NCD) hemispherical clusters (Figure 1). A strong covalent bond between both phases was found, foreseeing applications in field effect transistors (FETs) and electron field emission in cold cathode devices.

Diamond-graphite nanoplatelets consist on vertically aligned diamond nanoblades (~ 5-10 nm thick) encapsulated by a nanographite thin layer (Figure 2). This hybrid outperforms standard NCD coatings in convective heat dissipation due to the enhanced surface area provided by its particular high aspect ratio structure [2]. Thus, DNP enable effective heat transfer at low production cost, weight, and thickness, which are crucial characteristics when developing thermal management solutions for the increasingly miniaturized, yet powerful, new generations of microelectronics.

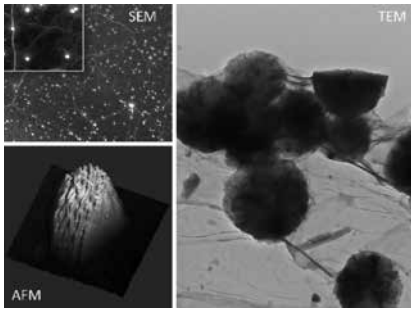

FIGURE 1
The GDH hybrids, as displayed by three different techniques: scanning electron microscopy (SEM), transmission electron microscopy (TEM) and atomic force microscopy (AFM). The bright spots seen in SEM correspond to the NCD clusters, whose hemispherical morphology is clearly depicted in TEM and AFM images. Graphene sheets wrapping the NCD clusters are visible in TEM.

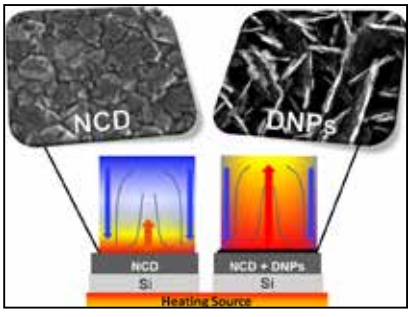

FIGURE 2
Schematic representation of the experiment used to demonstrate the increased convective heat dissipation performance of the DNPs hybrids compared to NCD. This behavior arises from the distinct materials' morphologies, as depicted in the SEM micrographs.

“Quantifying merit in science”

Sergey N. Dorogovtsev[1], José F. F. Mendes[1]

The problem of citation-based metrics of a researcher’s performance is essentially about ranking scientists. In this age of big data and high social and professional mobility, ranking has become one of the central issues in social life and information technologies. Ranking algorithms, including the famed Google PageRank, enable automated selection of relevant information and the efficient functioning of the search engines. Ranking is an obligatory task of various selection and evaluation boards, significantly influencing academic careers and even reshaping research behaviours.

Currently the ranking of scientists is largely based on the *h*-index (Hirsch, 2005) as a measure of an individual’s scientific research output. In our work “Ranking scientists” [Nature Physics 11 (2015) 882], to examine the performance of this metric, we studied a representative sample of researchers from physics and complex systems from the Thompson Reuters Web of Knowledge database and analysed correlations between their *h*-index and number of papers, *N*, and total number of citations. From these statistics we find that for a researcher having a given total number of citations, his or her *h*-index, on average, markedly increases with *N*. Consequently the *h*-index is not merely imperfect but it unfairly favors modestly performing scientists and punishes stronger researchers with a large mean number of citations per paper.

We proposed a new simple measure of scientific research output that focuses on a researcher’s most cited paper to substantially indicate his or her major achievement, but also accounts for *h*. We introduced the scientific output index (*o*-index) that is the geometric mean of the number of citations of the most cited paper and the *h*-index of a researcher. We showed that the *o*-index clearly distinguishes successful researchers and provides a natural, easily implementable ranking criterion for scientists.

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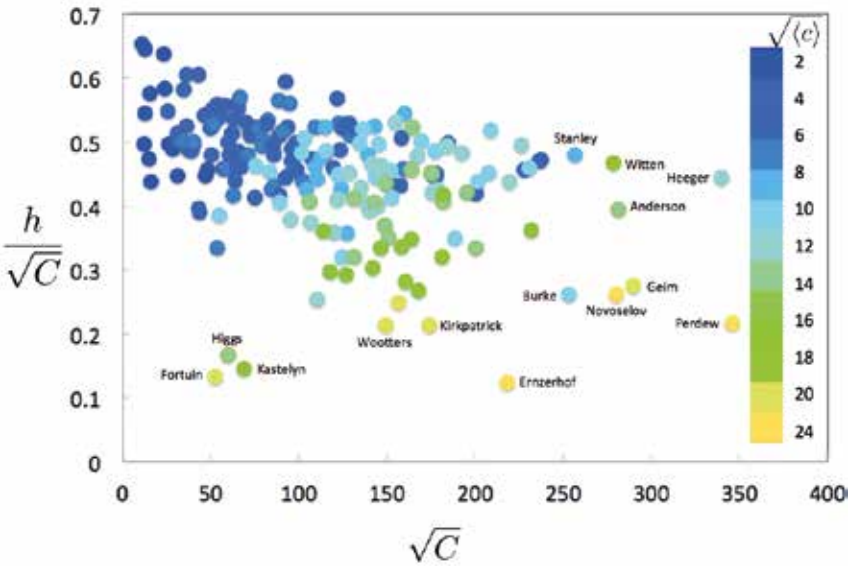
FIGURE 1

Correlations between *h*-index, total number of citations, *C*, and the mean number of citations per paper, <*c*>, for individual researchers. The colour of a dot shows the mean number of citations <*c*> for the researcher’s papers. The bright dots tend to occur at the bottom of the plot, indicating that for a given *C*, on average, *h* decreases with increasing <*c*>.



BeMonitored

Susana Brás[1], Sandra C. Soares[2], Ricardo Moreira[3], José M. Fernandes[1]

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2 — Department of Education and Psychology & CINTESIS, University of Aveiro
3 — Department of Electronics, Telecommunications and Informatics, University of Aveiro

Psychological studies involve the study of individual's emotions and reactions, therefore it is of the utmost importance that researchers can recreate, as accurately as possible, real life conditions. This requirement is not always possible. Phobias are a common anxiety disorder. Phobia consists in an irrational, persistent and intense fear towards a specific object, activity or situation. Given that phobias are rather context specific, their study is the ideal candidate to assess the feasibility of using a mobile and wearable device for obtaining physiological and behavioral data. BeMonitored is a smartphone based solution to support more ecological valid monitoring of psychological experiments. The application (Fig. 1) allows the delivery of customizable specific context dependent audio-visual stimuli. Also, it captures the subject's behavior, physiology and environment, by the use of external resources connected via Bluetooth or smartphone own resources. The system provides basic session management, it stores participant's demographics, and allows offline review of session data.

The selected case study was spider phobia. The smartphone camera allowed to quantify the face motion (Fig.1). We showed that the spider phobics differed from control participants in face motion. Moreover, we also found out that there were heart rate differences between spider and neutral stimuli by phobic participants.

The presented system proved to be a viable system that may be further extended to provide other physiological and behavioral parameters. This study was focused on spider phobia, but the BeMonitored system could be applied in other anxiety-related assessment and monitoring. The presented results emphasize the usefulness of smartphones on phobia monitoring. Considering its intrinsic characteristics, smartphones may constitute the natural evolution from the lab to more realistic contexts.

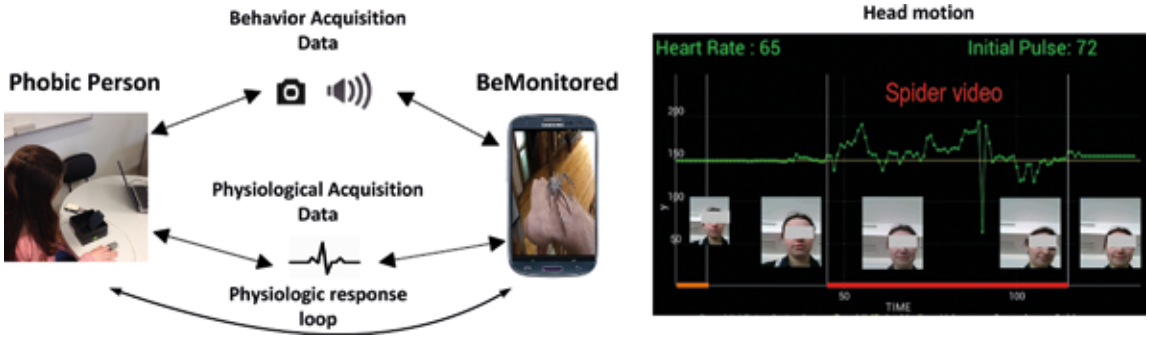

FIGURE 1
BeMonitored is able to monitor physiological and behavioral (face motion) response while a subject is receiving audio and visual stimulus (e.g. videos with spiders). In the right side it can be observed that the head motion increases while the spider video is being presented.

Towards novel theranostics for Ebola virus: exploring genomic relative absent words

Raquel M. Silva[1,2], Diogo Pratas[3], Luísa Castro[1], Armando J. Pinho[3], Paulo J. S. G. Ferreira[3]

Ebola virus (EBOV) causes high mortality hemorrhagic fevers, for which no vaccine or treatment currently exist. In the latest and largest ever EBOV outbreak, over 28000 cases and 11000 deaths from the virus occurred mainly in West Africa. Although experimental therapies are being tested, namely, recombinant viral vectors or antibodies for the viral glycoprotein, innovative approaches are still needed for the development of diagnosis tools and identification of druggable targets.

Minimal absent words are the shortest sequence fragments that are not present in the genome of a given organism. In this study, published in Bioinformatics (doi: 10.1093/bioinformatics/btv189), we introduce minimal relative absent words (RAWs), a concept that has not been used so far in the context of personalized medicine, but which is deemed useful for differential identification of sequences that are derived from a pathogen genome but absent from its host. To identify RAWs we have developed the EAGLE tool (freely available from http://bioinformatics.ua.pt/software/eagle/).

Analysis of 165 EBOV genomes allowed the discovery of RAWs that are present in these viral sequences but absent from the human genome. Only three RAWs of length 12 exist and consistently appear within conserved regions of two EBOV proteins, the nucleoprotein (NP) and the viral RNA-polymerase (LP). Moreover, these words can discriminate between the different Ebolavirus species and even between EBOV sequences from different outbreaks (Figure 1). Both NP and LP are critical for the virus replication and constitute good targets for therapeutic intervention.

The alignment-free method used is able to identify species-specific sequences that are important for future therapeutics and diagnosis, or theranostics, strategies for EBOV. It can also be applied to other pathogens of biomedical or economical relevance to detect genomic signatures for quick and precise action against infectious agents, namely in outbreak scenarios.

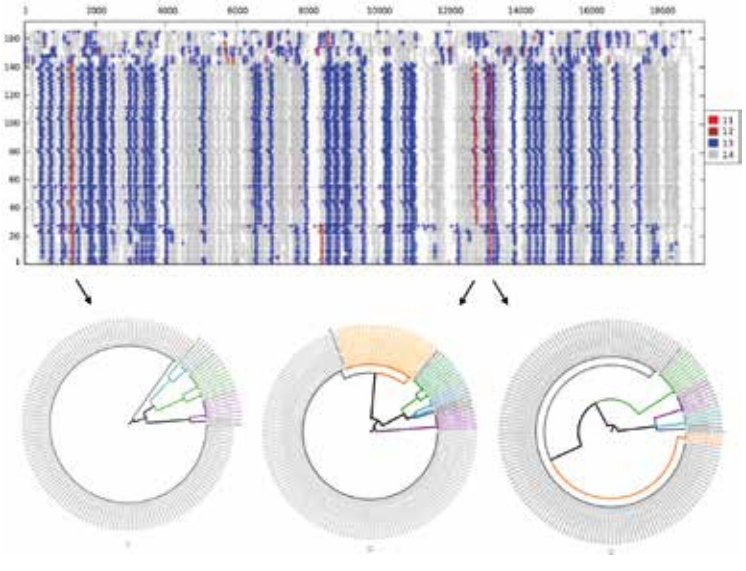

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FIGURE 1
Top panel, identification of relative absent words (RAWs) in 165 Ebolavirus genomes with the human genome as reference. RAW sequences are shown in red (k= 11), dark red (k= 12), blue (k = 13) and grey (k = 14). Sequences 1-24, Zaire ebolavirus (EBOV) genomes from previous outbreaks; 25-28, EBOV genomes from the 2014 DRC (Democratic Republic of the Congo) unrelated outbreak; 29-142, EBOV genomes from the West African 2014 outbreak; 143-147, Bundibugyo ebolavirus (BDBV) genomes; 148-154, Reston ebolavirus (RESTV) genomes; 155-164, Sudan ebolavirus (SUDV) genomes; and 165, Tai Forest ebolavirus (TAFV) genome. Bottom panel, phylogeny of 165 Ebolavirus based on RAW1 (left), RAW2 (middle) and RAW3 (right) sequences. EBOV, SUDV, BDBV, TAFV, and RESTV are shown in grey, green, blue, dark blue and purple, respectively. EBOV sequences that diverge from the West African 2014 outbreak are shown in orange (28 and 4 genomes for RAW2 and RAW3, respectively). Reference genomes are displayed in black.

Flexicell – Next Generation Cloud Radio Access Networks

Arnaldo S. R. Oliveira[1], Paulo P. Monteiro[1], Nuno B. Carvalho[1], Jorge Santos[1], Daniel Belo[1], Diogo Viana[1], João da Silva[1], Miguel Drummond[1], Diogo Riscado[2], Nelson V. Silva[2], Paulo Jesus[2], José Salgado[2]

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2 — Altice Labs, Aveiro, Portugal

The convergence of fixed transport networks, based on high-speed optical infrastructures and broadband spectrally efficient wireless components has been identified as a key enabler of future access networks. The next generation of wireless systems (5G) should fulfil several goals, among which: provision of true broadband wireless access and enhanced system capacity, when compared with current third (3G) and fourth (4G) generation networks. A traditional cellular network is built with many stand-alone base stations (BSs), each one covering a cell and processing and transmitting its own signal to and from the mobile terminals. The issues regarding the growing complexity of BSs, the need for cooling, the increasing number of BSs for improved coverage and the difficulties in the acquisition of sites has led to some rethinking of the cellular concept, whose main trends are currently converging to Cloud Radio Access Network (C-RAN). C-RAN has been defined in several different ways, but essentially designates a network architecture where several distributed Remote Radio Heads (RRHs) with reduced complexity are linked to a central or Base Band Unit (BBU) at which joint radio signal processing is performed. The connection between the RRHs and the BBU is established through a high capacity network link, named fronthaul, typically supported by an optical infrastructure. In the scope of the Flexicell project, a collaborative research of IT-Aveiro/UA and Altice Labs, a complete C RAN testbed for next generation mobile networks was developed and successfully demonstrated with a 25 km length fronthaul. The most important aspects of the Flexicell project are:

· Utilization of Passive Optical Networks (PONs) as the physical infrastructure for the fronthaul, in coexistence with triple-play services (voice, video, and data), avoiding dedicated and expensive links and simplifying the deployment of small cells for improved coverage and spectral efficiency. Figure 1 shows this infrastructure sharing.

· Compression of the fronthaul traffic data between the BBU and the RRH to increase almost 50% of fronthaul traffic capacity in PON systems with negligible performance degradation.

· Upgradability to future PON technologies (e.g. NG-PON2) that will support larger fronthaul bandwidths for next generation mobile networks with wider channels and bit rates.

· Adoption of software defined radio approaches from the BBU to the RRH, leading to an access infrastructure that is agnostic and upgradable to future network standards.

· Baseband processing and core network virtualization for more flexible deployment, management and upgradability, as well as better energy and resource efficiency.

· Interoperability of the developed mobile network infrastructure with commercial mobile terminals, for demonstrating end user applications (e.g. mobile internet access, voice and video calls) and evaluate overall system performance.

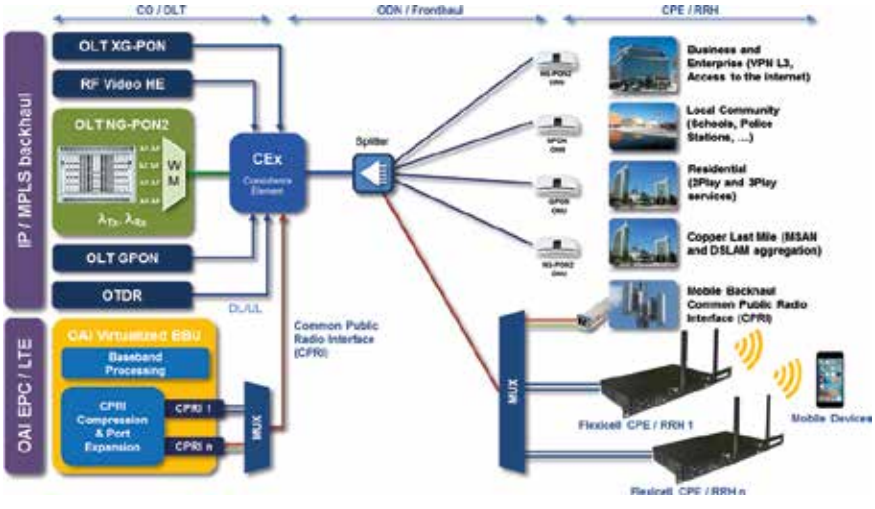


FIGURE 1
Deployment scenario of the Flexicell project in the scope of Radio Access Network converged with a Passive Optical Network infrastructure.

Dependable Vehicular Communications for Improved Road Safety

Joaquim Ferreira[1,3], Arnaldo Oliveira[2,3], Paulo Pedreiras[2,3], José Fonseca[2,3], Muhammad Alam[3], João Almeida[3], Cristóvão Cruz[3], Bruno Silva[3], Luís Silva[3], Awais Khan[3]

Wireless vehicular networks for cooperative Intelligent Transport Systems (ITS) support cooperative applications that can improve vehicle and road safety, passenger's comfort and efficiency of traffic management. Some of these applications are safety critical and have tight timeliness and throughput requirements. Despite the obvious potential benefits of vehicular communications, designing dependable wireless vehicular networks is a research challenge, due to the high speed mobility and the open nature of such environment.

In the last few years, a research team from "Instituto de Telecomunicações" led the vehicular communications work package of the FP7 project "Intelligent Cooperative Sensing for Improved traffic efficiency", providing the following contributions to the state-of-the-art:

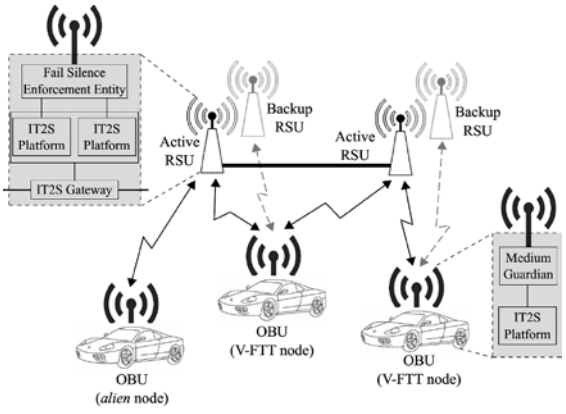
· A flexible ETSI ITS G5 station (IT2S), based on reconfigurable hardware, supporting time-triggered packet transmission and protection, at the medium access control (MAC) layer, against non-compliant on-board units (OBU);

· A TDMA based real-time MAC protocol, the Vehicular Flexible Time Triggered (V-FTT), providing both spatial and temporal redundancy;

· A fault-tolerant network architecture supported by the road-side infrastructure, including techniques to enforce fail-silent behavior and active replication in the critical nodes of the network;

· A Human-Machine Interface (HMI) application, able to present safety events to drivers and passengers and enabling the implementation of the recent eCall system in Europe.

The aforementioned contributions were successfully tested and validated in the field trials conducted in the A5 highway in Lisbon with the collaboration of Brisa and other members of the ICSI consortium. The field trials included the installation of six road-side units (RSUs) placed along the motorway, some vehicles equipped with OBUs and the integration with the ICSI Web and data distribution platforms.



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3 — IT, University of Aveiro

FIGURE 1
ICSI field trials in A5 motorway in Lisbon.

FIGURE 2
Dependable vehicular network architecture proposed in the scope of ICSI project.

"Toward a telco cloud environment for service functions"

João Soares[1,2], Carlos Gonçalves[2,3], Bruno Parreira[1], Paulo Tavares[1], Jorge Carapinha[1], João Paulo Barraca[2,3], Rui L. Aguiar[2,3], Susana Sargento[2,3]

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2 — IT, University of Aveiro
3 — Department of Electronics, Telecommunications and Informatics, University of Aveiro

Deploying network Service Functions (SFs) is an essential action for a network provider. However, the act of creating, modifying and removing network SFs is traditionally very costly in time and effort, requiring the acquisition and placement of specialized hardware devices and its interconnection. Fortunately, the emergence of concepts like Cloud Computing, Software Defined Networking, and ultimately, Network Functions Virtualization (NFV) is expected to raise new possibilities about the management of SFs with a positive im-pact in terms of agility and cost. From a telecom operator (Telco) viewpoint these concepts can help to reduce both OPEX and open the door to new business opportunities.

Our work is focused in identifying how Telcos can benefit from these paradigms, and explore some of the aspects that still need to be addressed in the NFV domain. We address two major aspects: enabling Telco infrastructures to adopt this new paradigm; and orchestrating and managing SFs towards Telco-ready cloud infrastructures. Our Cloud4NFV architecture makes extensive use of reference platforms such as OpenStack and OpenDaylight, as well as ETSI NFV, and proposes methods allowing Telcos to effectively deploy and manage SFs in a distributed cloud infrastructure. Special attention is given to the way SFs are modeled towards cloud infrastructure resources, in particular when considering the classification and forwarding processes. Therefore, we consider both tag based approaches (e.g., VLANs), where packets are marked at the classification stages and then routed, and tag less based approaches, where traffic is continuously analyzed.

With this insight it became possible to apply Service Function Chaining, one of the fundamental features in the composition of SFs, to the Cloud4NV platform. Our prototype, validated in a real world proof of Concept, demonstrates how a Telco can benefit from these technologies, and enhance the flexibility of their infrastructure.

FIGURE 1
Cloud4NFV architecture detailing the high level components.

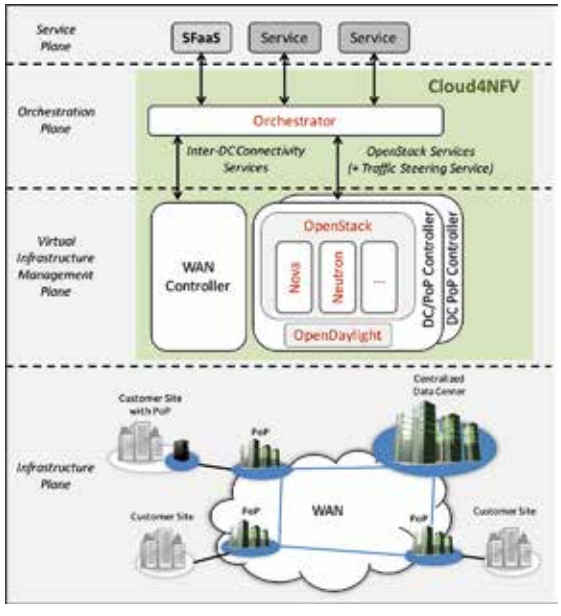
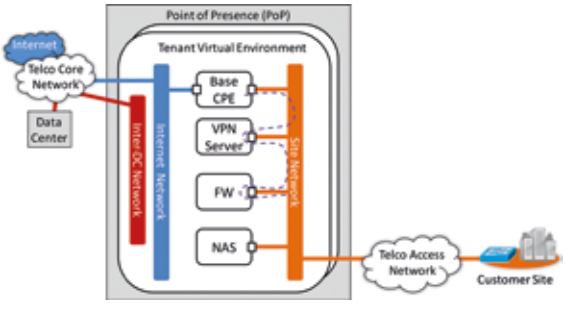


FIGURE 2
Example of a PoP with a virtual environment applying SF chaining.



Lateral-torsional buckling of beams with corrugated webs subjected to fire

Gonçalo Correia Lopes[1], Carlos Couto[1], Paulo Vila Real[1], Nuno Lopes[1]

Steel buildings stand on columns and beams, that are commonly composed of I-shaped profiles, which are build up with two horizontal plates – the flanges – and one vertical flat plate – the web –, connecting both flanges. Traditionally, the web plate represents 30 to 40% of the total weight of these elements, which the main structural purpose is to bear vertical loads (shear stresses), while the flanges are meant to resist the major external stresses. Therefore, aiming to strive material optimization, the majority of the section area should be used for the flanges instead of the web, which performs its function even with reduced thicknesses. However, by excessively reducing the web thickness, it can become susceptible to the phenomena of local buckling, compromising the stability of the whole structure.

To overcome this issue, instead of using a flat web panel (flat web beams – FWB, with thicknesses up to 40 mm), beams can be made with a waved-formed panel – the so-called corrugated web – with a much thinner thickness (in the range of 2-5 mm). Thus, web corrugated beams (WCB) are a recent structural solution, which major asset lies in taking advantage of the increase of rigidity on the web, leading to better resistance against local buckling and improved shear capacity resulting in higher loadbearing capacity.

Despite the increasing number of researches on the benefits in terms of resistance and material efficiency of WCB at normal temperature (20ºC), there is still a need for simplified formulae for predicting their behaviour in a fire situation (where steel structures are particularly vulnerable), in order to enable the designers to better exploit this structural system. Focusing on this aspect, the aim of this study was to develop simplified methods to predict the load-bearing capacity obtained numerically from simulations with finite element software.

The new proposals developed in this research of WCB introduces a new design philosophy for a fire situation, based on previous researches on FWB developed in the Civil Engineering Department of UA, closer to the principles of other structural systems, while at the same time, achieving more accurate, practical and cost-efficient solutions for engineers to use.

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FIGURE 1
Computer models of beams with sinusoidal and trapezoidal corrugated webs

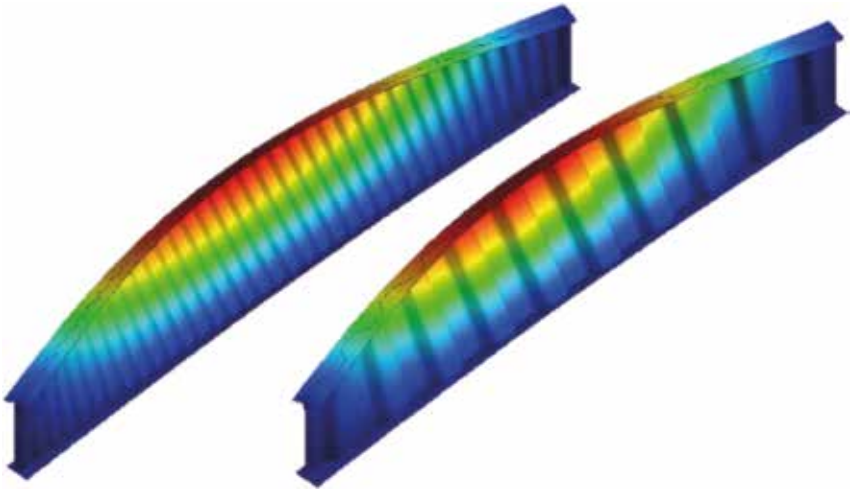
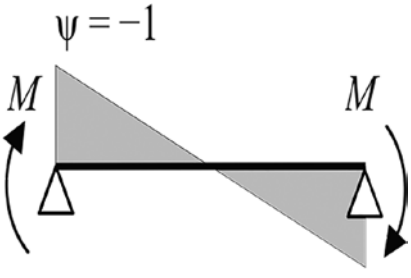
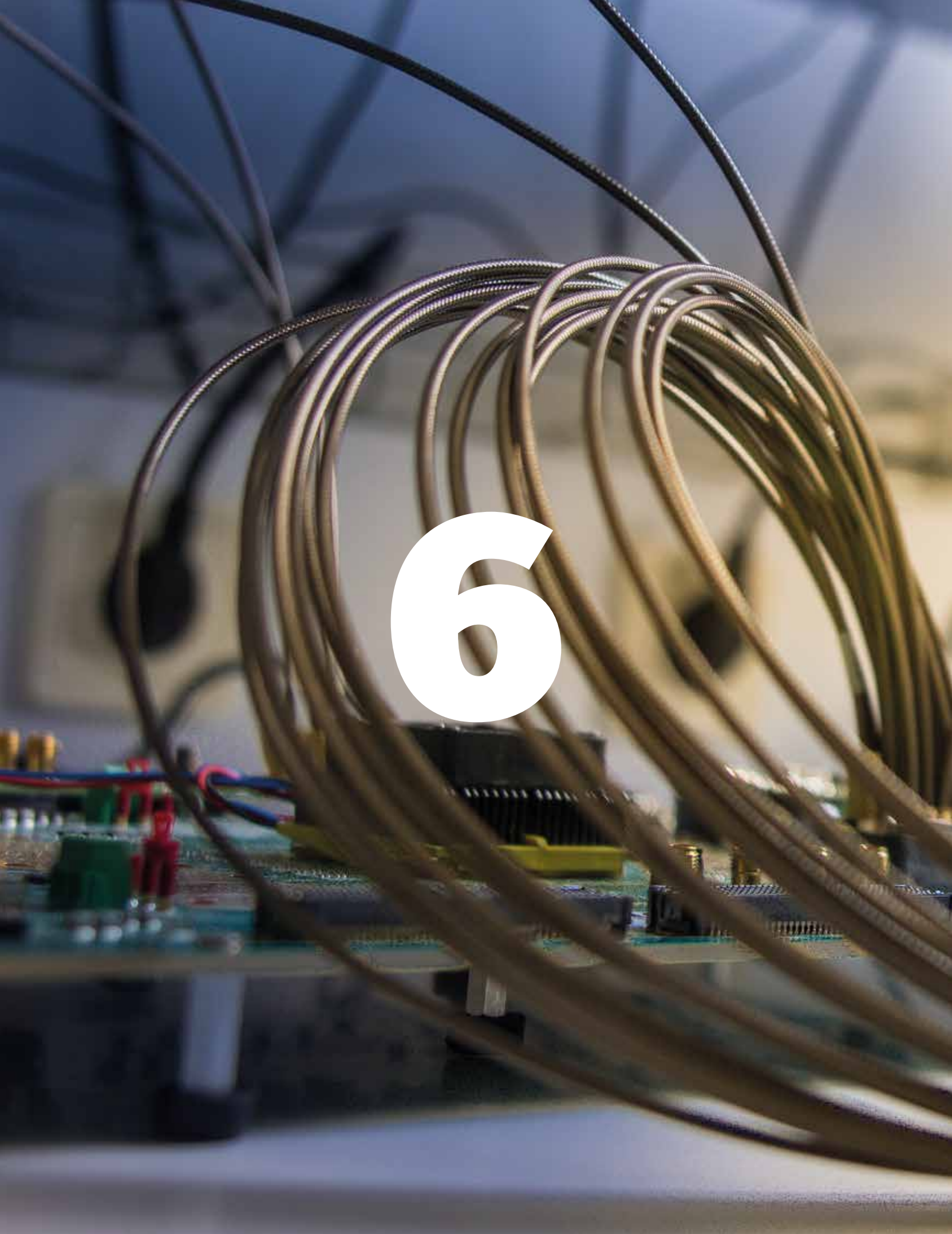


FIGURE 2
Example of the new proposal (continuous lines) and comparison to the actual Eurocode 3's method (dashed lines) and to the obtained computer results (points).

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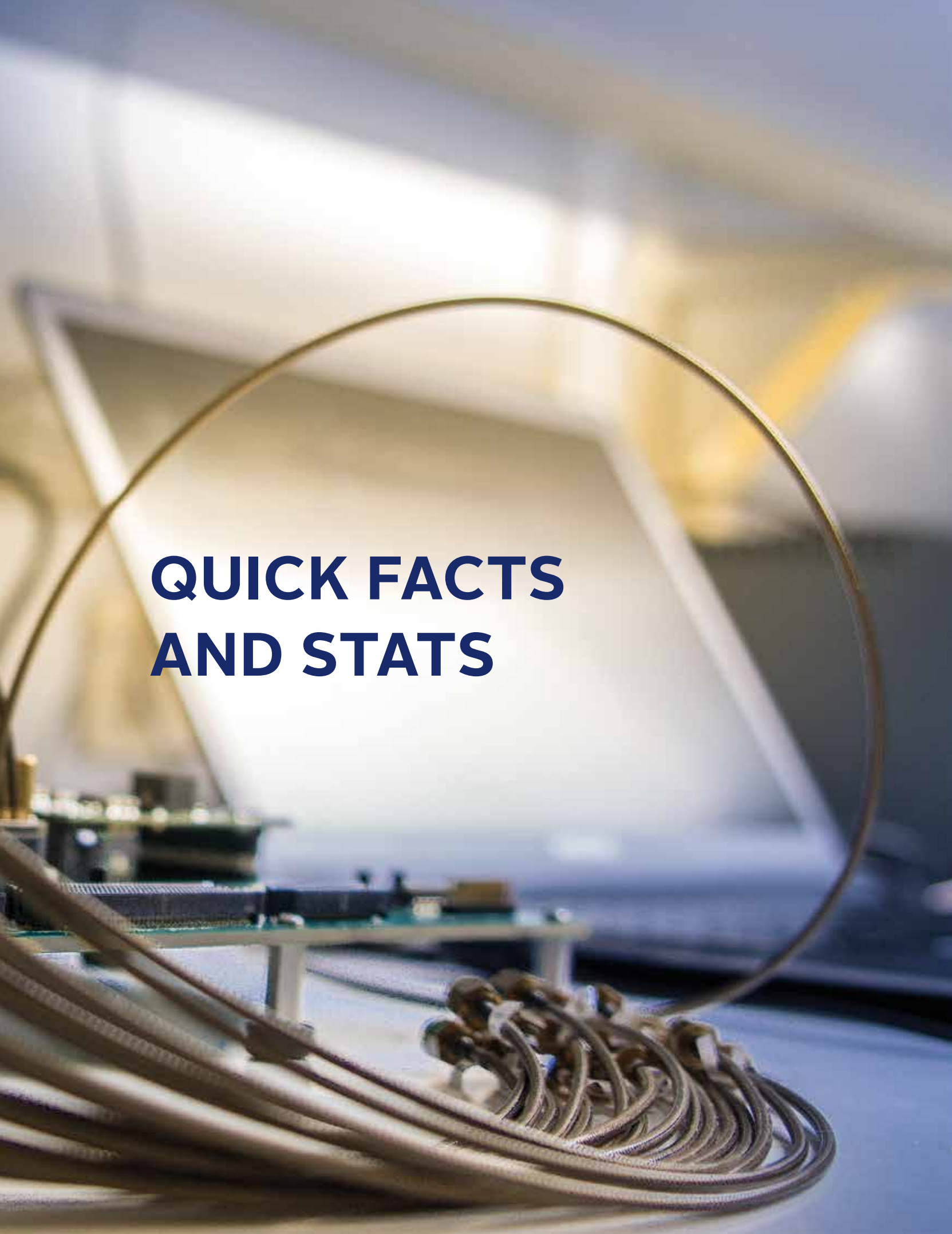


QUICK FACTS AND STATS

People

FACULTY BY DEPARTMENT

	FACULTY (FTE)			
	TOTAL	TOTAL	PERCENTAGE OF WOMEN	PERCENTAGE OF FOREIGNERS
UNIVERSITY	**2014**	**2015**		
Department of Biology	33	32,5	42%	
Department of Chemistry	45,1	44,9	52%	
Department of Civil Engineering	15,6	15,6	19%	
Department of Communication and the Arts	72,2	71,2	32%	5%
Department of Economics, Management, Industrial Engineering and Tourism	56,2	54,5	61%	4%
Department of Education and Psicology	37,8	38,7	76%	
Department of Electronics, Telecommunications and Informatics	78,3	78	8%	
Department of Environment and Planning	18	17	59%	
Department of Geosciences	13,5	13,3	38%	
Department of Languages and Cultures	44	43	63%	23%
Department of Materials Engineering and Ceramics	17,3	17,3	46%	2%
Department of Mathematics	58,6	56,6	47%	9%
Department of Mechanical Engineering	26,3	24,3	11%	
Department of Medical Sciences	15,2	16,8	65%	18%
Department of Physics	44	44	18%	7%
Department of Social Sciences, Policy and Planning	25	23,4	28%	0%
POLITECHNIC SCHOOLS				
Águeda School of Technology and Management	48,1	50,6	46%	
School of Accounting and Administration of Aveiro	69,6	67,8	51%	
School of Design, Management and Production Technologies of Aveiro North	14	15,4	29%	
School of Health of the University of Aveiro	37,2	39,1	61%	
TOTAL	769	764	42%	3%

RESEARCHERS BY DEPARTMENT

	RESEARCHERS (FTE)			
DEPARTMENT	TOTAL	TOTAL	PERCENTAGE OF WOMEN	PERCENTAGE OF FOREIGNERS
UNIVERSITY	**2014**	**2015**		
Department of Biology	87	91,00	66%	16%
Department of Chemistry	114,5	102,00	64%	22%
Department of Civil Engineering	2	3,00	67%	0%
Department of Communication and the Arts	2	3,00	33%	67%
Department of Economics, Management, Industrial Engineering and Tourism	1	1,00	0%	0%
Department of Education and Psicology	14	15,00	93%	0%
Department of Electronics, Telecommunications and Informatics	20	12,00	25%	33%
Department of Environment and Planning	28	25,60	65%	35%
Department of Geosciences	9	10,00	60%	10%
Department of Health Sciences	2	0,00		
Department of Materials Engineering and Ceramics	47,5	38,00	34%	42%
Department of Mathematics	10	10,00	40%	40%
Department of Mechanical Engineering	28,4	19,40	36%	54%
Department of Physics	49	51,00	25%	35%
Department of Social Sciences, Policy and Planning		1,00	100%	0%
TOTAL	414,4	382,00	54%	27%

STAFF BY CATEGORY

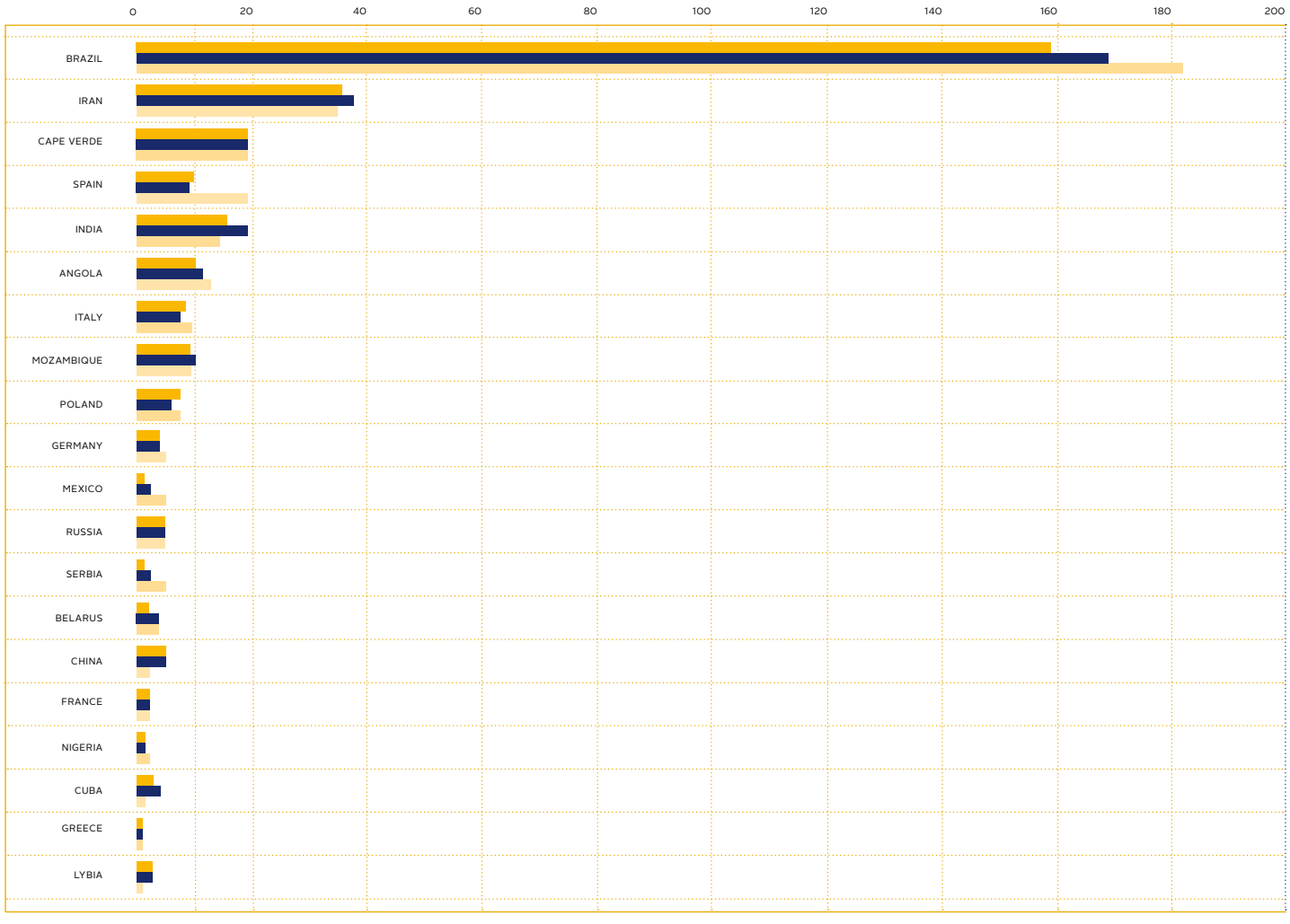
	FACULTY (FTE)			
CATEGORY	**2014**	**2015**		
UNIVERSITY	**TOTAL**	**TOTAL**	**PERCENTAGE OF WOMEN**	**PERCENTAGE OF FOREIGNERS**
Full professors	53,3	53,3	10%	4%
Assotiated professors	119,9	115,3	38%	2%
Assistant professors	371,7	375,2	44%	4%
Lecturer	65,9	61	40%	1%
Other teaching staff	16	15	73%	47%
Researchers	96,4	85	42%	28%
Post-doctoral students	318	297	57%	26%
POLITECHNIC SCHOOLS				
Coordinator professors	13,6	13,60	37%	
Adjunt professors	95	109,80	51%	
Lecturer equivalent	33,6	20,8	48%	
TOTAL	1183,4	1146	46%	11%

PHD STUDENTS BY DEPARTMENT

	PHD STUDENTS				
UNIVERSITY	**TOTAL**	**TOTAL**	**PERCENTAGE OF WOMEN**	**PERCENTAGE OF FOREIGNERS**	**PERCENTAGE OF NEW STUDENTS**
DEPARTMENT	**2013 / 2014**	**2014/2015**			
Department of Biology	169	172	75%	23%	16%
Department of Chemistry	129	109	75%	15%	26%
Department of Civil Engineering	50	45	13%	20%	18%
Department of Communication and the Arts	246	238	50%	38%	29%
Department of Economics, Management, Industrial Engineering and Tourism	200	202	51%	29%	27%
Department of Education and Psicology	235	216	74%	19%	21%
Department of Electronics, Telecommunications and Informatics	158	113	15%	24%	9%
Department of Environment and Planning	85	68	62%	34%	13%
Department of Geosciences	26	10	50%	20%	
Department of Languages and Cultures	61	62	73%	32%	32%
Department of Materials Engineering and Ceramics	84	77	39%	39%	10%
Department of Mathematics	32	19	79%	11%	11%
Department of Mechanical Engineering	72	60	33%	23%	10%
Department of Medical Sciences	94	48	67%	4%	21%
Department of Physics	119	106	40%	23%	22%
Department of Social Sciences, Policy and Planning	31	39	49%	15%	49%
TOTAL*	1605	1411	56%	26%	23%

* The students of joint doctoral studies are considered in each participating department. Therefore, the sum of the students by department is superior to the total.

FOREIGN PHD STUDENTS BY NATIONALITY*



MSc and PhD theses

FOREIGN PHD STUDENTS BY CONTINENT

- Europe (64%)
- Africa (52%)
- Asia (56%)
- America (96%)

MSC THESES IN 2015 PER AREA

- Arts and Humanities (16%)
- Social Sciences (18%)
- Exact Sciences (4%)
- Health Sciences (14%)
- Life Sciences (14%)
- Engineering and Technology (34%)

PHD THESES IN 2015 PER AREA

- Arts and Humanities (12%)
- Social Sciences (19%)
- Exact Sciences (11%)
- Health Sciences (5%)
- Life Sciences (12%)
- Engineering and Technology (41%)

Sci Papers

TOP 10 SUBJECT AREAS FOR PAPERS PUBLISHED IN 2015	RECORD COUNT	% OF 1280
CHEMISTRY	322	25.156 %
ENGINEERING	270	21.094 %
MATERIALS SCIENCE	227	17.734 %
ENVIRONMENTAL SCIENCES ECOLOGY	216	16.875 %
PHYSICS	195	15.234 %
COMPUTER SCIENCE	130	10.156 %
MATHEMATICS	99	7.734 %
SCIENCE TECHNOLOGY OTHER TOPICS	91	7.109 %
BIOCHEMISTRY MOLECULAR BIOLOGY	82	6.406 %
MARINE FRESHWATER BIOLOGY	76	5.938 %

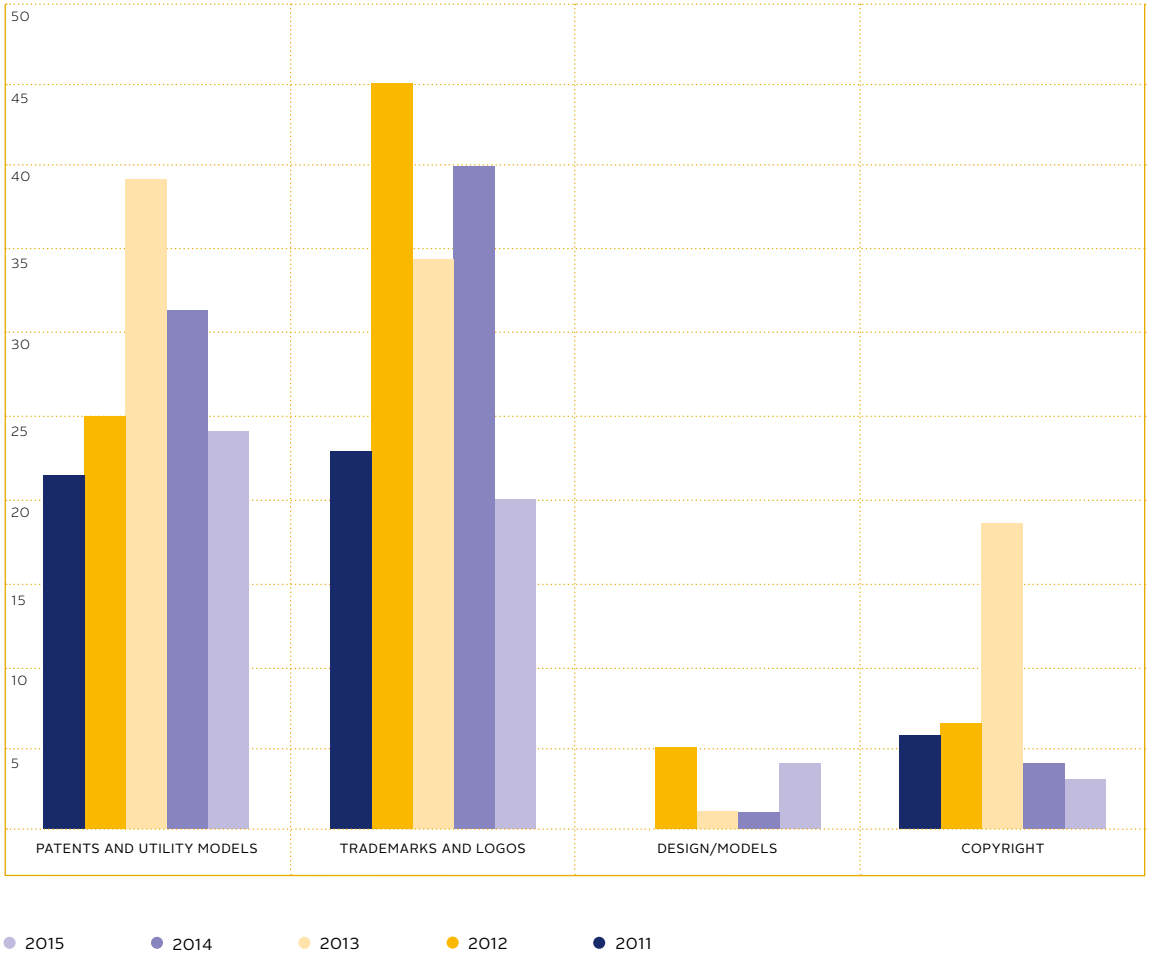
Data retrieved from ISI Web of KnowledgeSM (Thomson Reuters) in 10 april 2015

TOP 10 CITED PAPERS	TOTAL Nº CITATIONS (2011 - 2015)
Luminescent multifunctional lanthanides-based metal-organic frameworks By: Rocha, Joao; Carlos, Luis D.; Almeida Paz, Filipe A.; et al. CHEMICAL SOCIETY REVIEWS Volume: 40 Issue: 2 Pages: 926-940 Published: 2011	578
SIRT1 Is Required for AMPK Activation and the Beneficial Effects of Resveratrol on Mitochondrial Function By: Price, Nathan L.; Gomes, Ana P.; Ling, Alvin J. Y.; et al. CELL METABOLISM Volume: 15 Issue: 5 Pages: 675-690 Published: MAY 2 2012	341
A quantitative review of the effects of biochar application to soils on crop productivity using meta-analysis By: Jeffery, S.; Verheijen, F. G. A.; van der Velde, M.; et al. AGRICULTURE ECOSYSTEMS & ENVIRONMENT Volume: 144 Issue: 1 Pages: 175-187 Published: NOV 2011	301
Ligand design for functional metal-organic frameworks 281 By: Almeida Paz, Filipe A.; Klinowski, Jacek; Vilela, Sergio M. F.; et al. CHEMICAL SOCIETY REVIEWS Volume: 41 Issue: 3 Pages: 1088-1110 Published: 2012	281
Hexagonal ferrites: A review of the synthesis, properties and applications of hexaferrite ceramics By: Pullar, Robert C. PROGRESS IN MATERIALS SCIENCE Volume: 57 Issue: 7 Pages: 1191-1334 Published: SEP 2012	266
Progress on lanthanide-based organic-inorganic hybrid phosphors By: Carlos, Luis D.; Ferreira, Rute A. S.; Bermudez, Veronica de Zea; et al. CHEMICAL SOCIETY REVIEWS Volume: 40 Issue: 2 Pages: 536-549 Published: 2011	249
The irruption of polymers from renewable resources on the scene of macromolecular science and technology By: Gandini, Alessandro GREEN CHEMISTRY Volume: 13 Issue: 5 Pages: 1061-1083 Published: 2011	232
Study of polycrystalline Cu2ZnSnS4 films by Raman scattering By: Fernandes, P. A.; Salome, P. M. P.; da Cunha, A. F. JOURNAL OF ALLOYS AND COMPOUNDS Volume: 509 Issue: 28 Pages: 7600-7606 Published: JUL 14 2011	231
Thermometry at the nanoscale By: Brites, Carlos D. S.; Lima, Patricia P.; Silva, Nuno J. O.; et al. NANOSCALE Volume: 4 Issue: 16 Pages: 4799-4829 Published: 2012	200

Intellectual Property

INTELLECTUAL PROPERTY RIGHTS REGISTRATION

	2011	2012	2013	2014	2015
Patents and Utility Models	22	25	39	32	24
Trademarks and Logos	23	45	34	40	20
Design/Models	0	5	1	1	4
Copyright	6	7	18	4	3

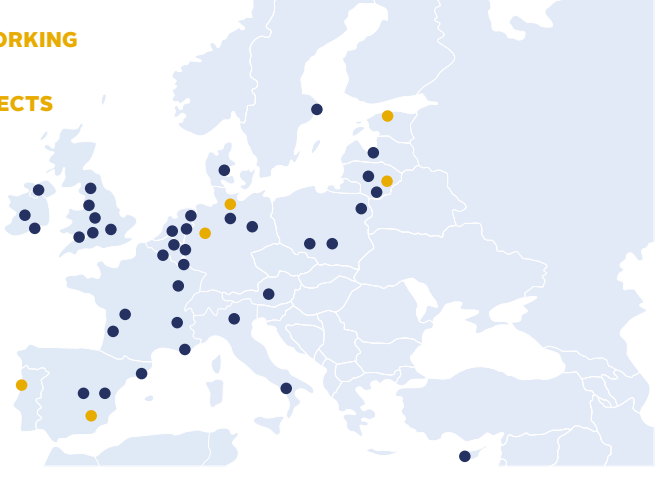


International Projects

EU-FUNDED PROJECTS STARTED IN 2014

HORIZON 2020 - PROJECTS COORDINATED BY UA	ACRONYM	PROJECT COORDINATOR
TUneable Multiferroics based on oxygen OCtahedral Structures	TUMOCS	Andrei Salak
Development of Smart Nano and Microcapsulated Sensing Coatings for improving of Material Durability/Performance	SMARCOAT	João Tedim
HORIZON 2020	**ACRONYM**	**PROJECT COORDINATOR**
MULTI - functional metallic SURFaces via active Layered Double Hydroxide treatments	MULTISURF	Andrei Salak
Knowledge, Assessment, and Management for AQUAtic Biodiversity and Ecosystem Services aCROSS EU Policies	AQUACROSS	António Nogueira
Nanomaterial FAte and Speciation in the Environment	NanoFASE	Susana Loureiro
Smart and Networking UnderWater Robots in Cooperation Meshes	SWARM's	Jonathan Gonzalez
Development of a Business Plan for establishment of The Discoveries Centre for Regenerative and Precision Medicine, a nem Centre of Excellence in Portugal	The Discoveries CTR	José Fernando Mendes
Collaboration to develop a business plan for the Centre of Agriculture and Forestry	SMARTAgriFor	José Fernando Mendes
European Joint Doctorate in Functional Materials Research	EJD-FunMat	Luís Carlos
MASS_Spectrometry TRaining network for Protein Lipid Adduct ANalysis	MASSTRPLAN	Rosário Domingues
SUSPLACE	SUSPLACE	Elisabete Figueiredo
7TH FRAMEWORK PROGRAMME	**ACRONYM**	**PROJECT COORDINATOR**
European Robotics Challenges	EUROC	José Nuno Lau
3RD HEALTH PROGRAMME	**ACRONYM**	**PROJECT COORDINATOR**
Frailty management Optimisation through EIP AHA Commitments and Utilisation of Stakeholders input	FOCUS	Silvina Santana
ERASMUS + PROJECTS COORDINATED BY UA	**ACRONYM**	**PROJECT COORDINATOR**
Imprinting an ecological compensation reasoning on society by means of young citizens	IMPRINT+	Carlos Fonseca
Craftsmanship+Fostering a New and Competitive Approach to Crafts and Semi-Industrial High Added-Value Sectors	Craftsmanship+	Marlene Amorim
ERASMUS +	**ACRONYM**	**PROJECT COORDINATOR**
European Ceramic Materials	EUCERMAT	Paula Vilarinho
Community Participation in Planning: Learning and Skills Framework		Fernando Nogueira
Catch it! Non-formal Academy of Activities	CATCH IT	Marlene Amorim
Learning Agreement Online System	LAOS	Rui Raposo
Mind Safety - Safety Matters!	MS - SM	Maria Fernanda Rodrigues
Analytical Chemistry for Life Sciences	AACLIFESCI	Pedro Domingues
EU Youth - From Theory to action.	ACTYOUTH EU	Marlene Amorim
Engineer for the Future	Engine4F	Paula Vilarinho
Strategy For Change	SFC	Teresa Franqueira
LIFE +	**ACRONYM**	**PROJECT COORDINATOR**
Linear Infrastructure Networks with Ecological Solutions	LIFE-LINES	Carlos Fonseca

NETWORK OF EU UNIVERSITIES WORKING WITH THE UA IN EUROPEAN PROJECTS STARTED IN 2015



- EU PROJECTS
- **PORTUGAL** (coordinated by ua)

AUSTRIA (AQUACROSS)
BELGIUM (EJD-FUNMAT, SUSPLACE)
CYPRUS (ENGINE4F)
DENMARK (CATCH IT)
ESTONIA (ENGINE4F)
FRANCE (EUCERMAT, LAOS, EJD-FUNMAT)
GERMANY (EUCERMAT, TUMOCS, MULTISURF, SMARCOAT, EJD-FUNMAT, MASSTRPLAN)
IRLAND (EUCERMAT, AQUACROSS)
ITALY (COMMUNITY PARTICIPATION IN PLANNING, MASSTRPLAN)
LATVIA (SMARCOAT, SUSPLACE)
LITHUANIA (LAOS, ACTYOUTH EU, TUMOCS)
LUXEMBOURG (LAOS, EJD-FUNMAT)
NETHERLANDS (MS-SM, SMARTAGRIFOR, SUSPLACE)
POLAND (LAOS, AACLIFESCI, FOCUS)
SPAIN (CRAFTSMANSHIP+, MS-SM, AACLIFESCI, FOCUS, SWARM'S)
SWEDEN (AQUACROSS)
UNITED KINGDOM (COMMUNITY PARTICIPATION IN PLANNING, SFC, AQUACROSS, FOCUS, THE DISCOVERIES CTR, MASSTRPLAN, SUSPLACE)

Budget

TOTAL BUDGET BY RESEARCH CENTRE AND FUNDING AGENCY*

RESEARCH CENTRE	EUROPEAN UNION	FOUNDATION FOR SCIENCE AND TECHNOLOGY	INNOVATION AGENCY	OTHER NATIONAL	2014	2015
CESAM	1.046.940	434.051	71.909	200.240	1.499.747	1.753.141
CIC.DIGITAL	20.688	61.243				81.931
CICECO	1.203.863	368.981	1.047.066		3.141.446	2.619.910
CIDMA		15.000			92.961	15.000
CIDTFF					62.245	
CINTESIS					38.037	
GOVCOPP	674.776		83.423		182.814	758.199
I3N					199.498	
iBi-MED					53.060	
ID+	67.324				0	67.324
IEETA	677.814	50.000			302.124	727.814
IT	722.319	561.457	846.020		2.050.848	2.129.796
Not integrated	340.042			24.500	406.220	364.542
QOPNA	620.721				412.991	620.721
RISCO	52.329					52.329
TEMA		50.000			192.970	50.000
TOTAL	**5.426.815**	**1.540.732**	**2.048.418**	**224.740**	**8.634.960**	**9.240.706**

*Contracts with industry not included

APPROVED BUDGET UNDER EU-FUNDED PROJECTS

EUROPEAN PROGRAMMES	2014	2015
FP7 - COOPERATION	632.469	403.680
FP7 - PEOPLE	226.922	
FP7 - IDEAS	1.386.020	
H2020 - TEAMING		43.923
H2020 - RESEARCHERS NIGHT	77.225	
H2020 - ITN-EJD		476.713
H2020 - ITN-ETN		953.425
H2020 - RISE		652.500
H2020 - NMP		222.560
H2020 - ICT		412.625
H2020 - ECSEL		661.453
H2020 - SC5		479.245
3RD HEALTH PROGRAMME		274.134
ERASMUS +	262.943	657.313
LIFE+	161.429	189.244
TOTAL	**2.747.008**	**5.426.815**

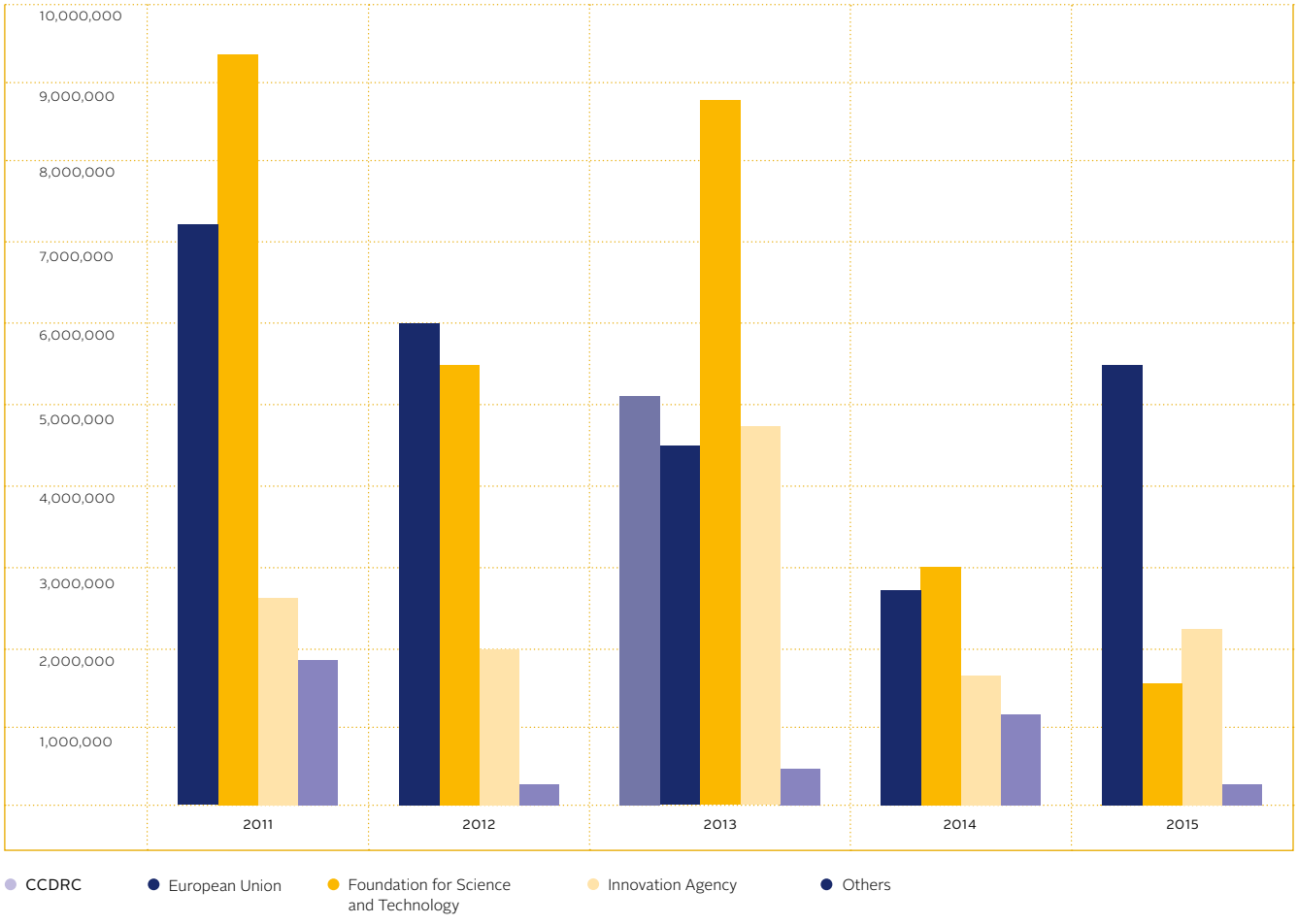
DISTRIBUTION OF RECEIVED FUNDS, BY FUNDING AGENCY*

* Contracts with industry not included

APPROVED BUDGET UNDER FCT PROJECTS

RESEARCH CENTRE	ARTS, HUMANITIES AND SOCIAL SCIENCES	ENGINEERING	SCIENCES	2014	2015
CESAM			434.051	349.301	434.051
CICECO			368.981	833.476	368.981
CIDMA			15.000	43.619	15.000
IBI-MED				53.060	
I3N				41.285	
CIC.DIGITAL	61.243				61.243
IEETA		50.000		190.717	50.000
IT		561.457		1.118.326	561.457
Not integrated				39.899	
QOPNA				168.089	
TEMA			50.000	192.970	50.000
TOTAL	**61.243**	**611.457**	**868.032**	**3.030.742**	**1.540.732**

DISTRIBUTION OF RECEIVED FUNDS, BY FUNDING AGENCY*

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RESEARCH SUPPORT

Support for researchers

Under the auspices of the Vice-Rectory for Research and Doctoral School, the Research Support Office provides UA researchers with help in the development and implementation of international research projects, either in the preparatory phase, during the submission or with the management of European research activities, working closely with the Office of Financial Management of Programs and Projects, responsible for the monitoring and economic-financial management of the projects.

It provides researchers with up-to-date information on research programs and fellowship programs. Furthermore, it continuously screens and scans specific calls and events, offers one-to-one coaching and support of proposal preparation and project management and is responsible for the organization of information events, among others. The initiative "Researcher of the Month" is also promoted by the Research Support Office, aiming at enhancing high-level research developed at UA, both internally to the academy and to an external audience via website and social networks. The edition of the Research@UA magazine is also coordinated by the Research Support Office and serves as a vehicle of promotion of the inter-disciplinary research on campus.

The Research Support Office is globally involved in the development and implementation of University research policy, procedures and systems, liaising with, and influencing funders and other stakeholders, and benchmarking and developing best-practice in the research field, through involvement in appropriate forums at national and international level.

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