

COLLABORATION  
BIST Community  
Activities

p.7

COLLABORATION  
Competive European  
Funding for ICFO Research

p.8

PEOPLE  
ICONS

p.10

THE LAST WORD  
Interview with  
María Miranda

p.12

# ICFONIANS 36

Community News Summer 2018

New collaborations and initiatives propel ICFO  
**Onward and upward**

+ ↑  
+ ↑  
+ ↑  
+ ↑

+ ↑ + ↑ +  
+ ↑ + ↑ +  
+ ↑ + ↑ +  
+ ↑ + ↑ +  
+ ↑ + ↑ +  
+ ↑ + ↑ +



## EDITOR'S CORNER

**Brook Hardwick**  
Coordinating  
Editor



# The Onward and Upward Spirit

**Launching something new is thrilling, be it a new project, a new company or a research institute. Successful founding teams tend to be committed heart and soul to common goals.**

**The collective sense of purpose, the close working conditions, and the overwhelming urge to move forward, grow and succeed- all combine to create an inspirational environment and a strong sense of shared purpose. This spirit enables start-ups to get off the ground and very clearly permeated ICFO from the start, helping the institute to weather setbacks and dedicate the human resources necessary to reach the level of excellence we have reached today.** Especially during ICFO's first formative years, ICFOnians were a cohesive unit where everyone knew each other and went the extra mile to move the institute forward. Together, this community of professionals built something big, meaningful and lasting.

Today, 1000+ ICFOnians have called ICFO home. Not only has our community grown, we are now spread out in 14.000 m<sup>2</sup>. Sixteen years since our founding, 31 ERC grants in total to date (including three new ERC Advanced Grants and one new PoC recently announced) plus a big new FET Open Innovation Action, 60+ European projects and 40+ Marie Curie Actions, all paint a picture of an institute that is well consolidated and advancing at full throttle! While perhaps no longer in start-up mode, ICFO is still an exciting place to do great science.

The big question is how do we keep the onward and upward spirit alive as we grow and advance?

This issue of *ICFOnians* offers some ideas ranging from student initiatives organized by ICONS student chapter, to larger initiatives for sharing ideas, training and expertise in our larger BIST community. Nurturing our growing community by taking time to get to know colleagues in and outside the lab helps to create a friendly ambiance where out of the box thinking thrives and where fortuitous connections are formed. It also makes ICFO a cool place to be, where we achieve the impossible and new understanding of all kinds emerge.

The newsletter committee would like for *ICFOnians* to be a reflection of this "Onward and Upward Spirit" as well as a meeting place where ICFOnians can collaborate, share experiences and join forces. **Community involvement is strongly encouraged.** Send us your suggestions and your community pictures. Like our institute, this newsletter should evolve and grow, and for that to happen, we invite all ICFOnians to get involved.

## COVER



ICFOnians are part of a dynamic community that is constantly embarking on new projects and defining novel challenges. From the push to launch new start-ups in platforms

like the European Photonics Venture Forum to research that will begin in the coming months thanks to competitive European financing, ICFOnians are persistently demonstrating their "Onward and Upward Spirit".

## INDEX

EDITOR'S CORNER	2
HAPPENINGS	3
ICFO NEWCOMERS	3
ICFO NEWS	4
LATEST ADVANCES	5
BUSINESS NEWS	6
COLLABORATION	7
ICFO COMMUNITY	7
RESEARCH	8
OUTREACH	9
PEOPLE	10
IN FOCUS	10
COMMUNITY PICTURES	10
BEYOND ICFO	11
GO & FLY	11
MYSTERY ICFONIAN	11
THE LAST WORD	12
HIGH PROFILE	12
SCIENCE QUIZ	12

**Mystery ICFonian**  
Solution Ed #35

**Sarah Keary**  
PhD Student, Single Molecule  
Biophotonics research group

**Science Quiz**  
Answers from p.12

**1. B 2.A**  
**3. C is False, Easter was**  
on 1 April

## Coordinating Editor

**Brook Hardwick**  
Corporate Communications  
Head

## Editorial Committee

**Silvia Carrasco**  
Knowledge & Technology  
Transfer Director

**Brook Hardwick**  
Corp. Communications Head

**Alina Hirschmann**  
Communications

**Dolors Mateu**  
ICFO Manager

**Laia Miralles**  
HR and Education Head

**Morgan Mitchell**  
ICREA Group Leader at ICFO

**Albert Ros**  
Alumni, Communications

**Rob Sewell**  
Academic Programs  
Coordinator

## Contributors

**Tomás Charles,**  
Visual Communication

**Federica Beduini,**  
Outreach, Knowledge and  
Technology Transfer

**Brook Hardwick,**  
Corp. Communications Head

**Alina Hirschmann,**  
Communications

**Danny Krautz**  
Senior Manager New Venture,  
Corporate Research and  
Technology, Carl Zeiss AG

**Maria Miranda**  
Mayor of Castelldefels

**Morgan Mitchell**  
ICREA Group Leader at ICFO

**Alba Rosado**  
Project Manager, Knowledge  
and Technology Transfer

## Albert Ros

Alumni, Communications

## Lydia Sanmartí

Outreach, Knowledge and  
Technology Transfer

## Rob Sewell

Academic Programs  
Coordinator

## Sandra de Vega

PhD Student and President  
of ICONS

## Pictures By

© ICFO

**Ramon Josa**  
**Salvador Ventosa**  
**Albert Mollón**

## Layout

**Comuniza**  
**Mineral Gràfics**

## Trustees:

**Generalitat  
de Catalunya**

**UNIVERSITAT POLITÈCNICA  
DE CATALUNYA  
BARCELONATECH**

Fundació Privada  
**CELLEX**

Fundació Privada  
**MIR-PUIG**

## Supported by:

**EXCELENCIA  
SEVERO  
OCHOA  
2016 - 2019**

**UNO EUROPEA**

## Member of:

**BIST** Barcelona Institute of  
Science and Technology

D.L.: B-54464-2008

ICfonians® is a registered trademark

This content is licensed under the Creative Commons Attribution-NonCommercial-No Derivs 3.0 Unported License. Except pictures that are copyrighted by ICFO.



This newsletter is printed on 100% post-consumer-waste recycled, chlorine-free, and EU eco-labeled paper.



# HAPPENINGS



**BUSINESS NEWS**  
European Photonics Venture Forum at ICFO.

p.6

**ICFO NEWCOMERS**

## Welcome to ICFO

Many of us joined ICFO or took a new position at the institute between April and June



**Clara Vilches**  
Postdoctoral Researcher



**Esteban Gerbino**  
Visiting Scientist



**Varma Pusapati**  
Student



**Marta Dies**  
Postdoctoral Researcher



**Manon Ballu**  
Student



**Salim Benadouda**  
Student



**Anna Bartomeu**  
Student



**Xavier Valcarce**  
Student



**Laura Val Ibort**  
Project Management



**Céline Van Valkenhoef**  
Student



**Raju Venkata Ramana**  
Postdoctoral Researcher



**Guillem Guigó**  
Student



**Quan Liu**  
Visiting Scientist



**Willemijn Remmerswaal**  
Student



**Adrien Lecornu**  
Student



**Hani Awwad**  
PhD Student



**Maurizio Reduzzi**  
Postdoctoral Researcher



**Piergiacomo Fonseca**  
Postdoctoral Researcher



**Guifré Sánchez**  
Student



**Pablo Mobili**  
Visiting Scientist



**Antoine Raffray**  
Student



**Francisco J. Prieto**  
Mechanical Technician



**Craig Chisholm**  
PhD



**Avinash Kumar**  
Student



**Oscar Alcaine**  
Electronics



**Laura Figueras**  
Project management



**Roger Ponce Sigüenza**  
Business Developer



**Christina Graham**  
Student



**Juan Sánchez Benítez**  
Information Technologies



**Kevin Schädler**  
Postdoctoral Researcher



**Dorilian López**  
Visiting Scientist



**Piotr Węgrzyn**  
Student



**Juan Rafael Álvarez**  
Student



**Daniel Sevilla**  
Student



**Felix Huber**  
Postdoctoral Researcher



**Lisa Kobayashi**  
PhD Student



**Gernot Gruber**  
Postdoctoral Researcher



**Md Masudur Rahman**  
Student



**Saumey Jain**  
Student



**Michael Chen**  
Student



**Isael Alejandro Herrera**  
Student



**Miriam Marchena**  
Postdoctoral Researcher



**Victoria Ridruejo**  
Recruiting & Hiring



**Pawel Wozniak**  
Postdoctoral Researcher



**Lynn Lin**  
PhD Student



**Irene Melgarejo**  
Student



**Jessica Nathalia Sierra**  
Student



**Adam Teixidó Bonfill**  
Student



**Joan Solà Porta**  
Student



**Pau Blanco Dorca**  
Student



**Carlos Ramos Marimón**  
Student



**Mariona Colomer**  
Student



**Ana María Pérez**  
Postdoctoral Researcher



**Pawel Wojcik**  
Student



**Karuppasamy Soundarapandian**  
Research Engineer



**Marc Torrent**  
PhD Student



**Adrian Nogales**  
Student

## HAPPENINGS

## ICFO NEWS

## 2nd place finish in the Vanguard Award for Science



The “*Vanguardia de la Ciencia Award*” (Vanguard of Science Award) is a joint initiative between the Godó Group and Fundació Catalunya- La Pedrera, which aims to give increased visibility to cutting edge research being carried out in Spain. Readers of the newspaper *La Vanguardia* are asked to vote for what they consider to be the most important work carried out in the country over the past year. The results of this popular vote count for 50%, while the vote of a panel of experts counts for the other 50%.

**This year, for the first time in the seven-year history of the award, the two most voted works were in the field of physics.** The work led by **ICREA Prof. at ICFO Hugues de Riedmatten** on the achievement of an elementary “hybrid” quantum network link received 17.7% of the votes, just behind Prof. José Luis Ortiz at the Instituto de Astrofísica de Andalucía (CSIC) who received 17.9% for his work revealing an orbiting ring around the dwarf planet Haumea.

## US-Funding Opportunities

**ICFO and CRG organized the TOUR EUROPE Workshop on US-Funding Opportunities, a full-day workshop promoting various cooperation and funding opportunities between Europe and the USA, within the NIH remit.** Topics covered in the workshop included, amongst others, identifying funding possibilities, understanding rules and regulations, proposal development and submission including financial issues, managing projects, and ensuring compliance.

The workshop took place within the BILAT USA 4.0 project, funded by the European Union, with the overall aim to enhance, support and further develop the research and innovation cooperation between the European Union and the United States of America.

## BIST MSc of Multidisciplinary Research in Experimental Sciences



The Master of Multidisciplinary Research in Experimental Sciences (MMRES), a joint program offered by the Barcelona Institute of Science and Technology (BIST) and the Department of Experimental Sciences of the Universidad Pompeu Fabra (DCEXS-UPF), has doubled the number of places (now 30) for its second edition in response to the increased demand from candidates. Indicators that reinforce the positive direction for this second intake include an increase in the average GPA of the students that have already been selected, as well as over double the total number of applications for the program.

The MMRES is the first Master of its kind in Spain. Taught entirely in English, it aims to **provide students with the skills to ensure their integration into the research community** in an increasingly complex and competitive environment. What makes it unique is the weight of the research element of the training (40 of the 60 credits of the master’s degree) and its multidisciplinary approach (each student participates in two research projects —lasting six months and 10 weeks, respectively—, which are carried out in two different research centers and which allow for collaborative approaches to the same coherent line of research).

## ICFOnians awarded BIST ‘Mothers of Science’ Grants



A total of twelve winners of the **BIST Mothers of Science supporting grant**, all exceptional scientists who are also mothers, were announced on May 10<sup>th</sup>. **Two ICFOnians were in this group: Kyra Borgman, PhD student in the Single Molecule Biophotonics research group led by ICREA Prof. at ICFO Maria Garcia Parajo, and María Marsal, Postdoctoral researcher in the SLN Research Facility in the team led by Dr. Pablo Loza**

The Mothers of Science supporting grant was launched in February 11, 2018 – the International Day of Women and Girls in Science – as an initiative to address the gap that exists between the number of women in the BIST Community who are research associates or senior postdoctoral researchers and the percentage of women who are group leaders. The grants are an illustration of the commitment of BIST centers to recognizing the value and excellent research done by female scientists and support them in their career transition.

In addition to a supportive financial stipend over the course of one year, the twelve winners, plus seven finalists in the selection process, will have the opportunity to participate in a series of group and individual coaching sessions.



María Marsal



Kyra Borgman

## Women in Science Seminars



In keeping with the goal of **empowering women in science, ICFO has launched a series of “Women in Science Seminars” that aim to increase the visibility of female researchers at the institute, establish a discussion forum on specific topics of interest, and create an informal space for networking.**

The events will be held on a monthly basis and will target all women researchers at ICFO, as well as allies. The events will combine speakers from the ICFO community as well as invited lectures from female scientists around the world actively involved in Women in Science actions. In addition to a topical discussion on career progression for women in science, participants have the opportunity to network over a light lunch.

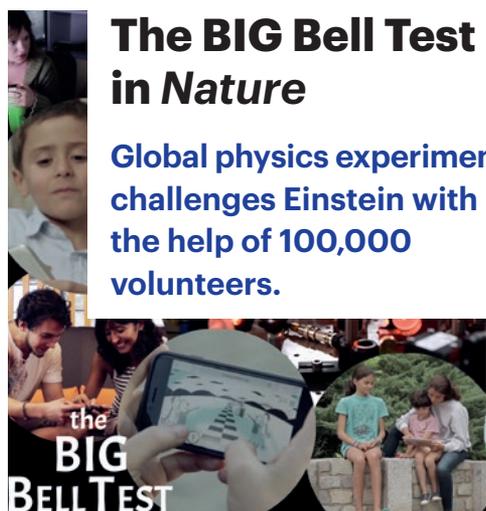
**Events to date have included:**

**May 2<sup>nd</sup>** - Dr. Ana Asenjo, postdoctoral researcher in the research group led by ICREA Prof at ICFO Darrick Chang.

**May 30<sup>th</sup>**- Prof. Caroline Champenois, Leader of the Physics of Ionic and Molecular Interactions research group, CNRS (France)

**July 2<sup>nd</sup>** - Profs. Jenny Nelson , Professor of Physics at Imperial College London, Maria Antoinetta Loi, Professor of Photophysics and Optoelectronics at the Zernike Institute for Advanced Materials of the University of Groningen, and Maryellen Giger, Professor of Radiology at the University of Chicago and SPIE President.

## LATEST ADVANCES



## The BIG Bell Test in Nature

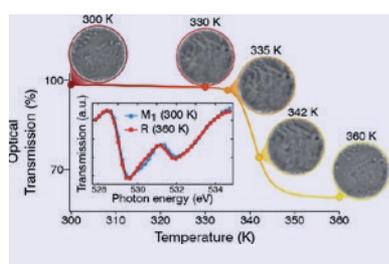
Global physics experiment challenges Einstein with the help of 100,000 volunteers.

On November 30<sup>th</sup>, 2016, more than 100,000 people around the world contributed to a suite of first-of-a-kind quantum physics experiments known as The BIG Bell Test. Using smartphones and other internet-connected devices, participants contributed unpredictable sequences of zeros and ones (bits) through an online video game, which determined how entangled atoms, photons, and superconducting devices were measured in twelve laboratories around the world: Brisbane, Shanghai, Vienna, Rome, Munich, Zurich, Nice, Barcelona, Buenos Aires, Concepción Chile and Boulder Colorado.

Coordinated by ICFO, led by ICREA Prof. at ICFO Morgan Mitchell and Dr. Carlos Abellan, the BIG Bell Test experiment asked human volunteers, known as Bellsters, to choose the measurements, in order to close the so-called "freedom-of-choice loophole" – the possibility that the particles themselves influence the choice of measurement.

*Nature* published the results of the experiment, which have shown to contradict Einstein's worldview, close the freedom-of-choice loophole for the first time, and demonstrate several new methods in the study of entanglement and local realism.

Aside from coordinating the initiative, ICFO contributed with two experiments: the first (Pau Farrera and Dr. Georg Heinze, led by ICREA Prof. at ICFO Hugues de Riedmatten), performed a Bell test using entanglement between two very different objects: a single photon and a trapped cloud with millions of atoms. The second (Dr. Andreas Lenhard, Alessandro Seri, Dr. Daniel Rieländer, and Dr. Margherita Mazzera, led by ICREA Prof. Hugues de Riedmatten) performed a Bell test using entanglement between two single photons of different colors generated with a solid-state photon pair source.



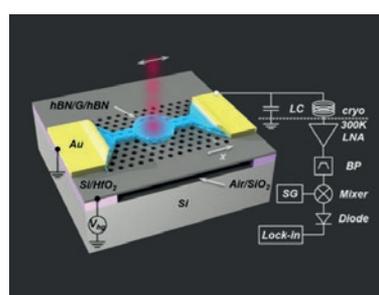
## Insulator-metal transition at the nanoscale

Researchers probe phase transitions in thin films of Vanadium Dioxide using resonant soft X-ray holography.

Electrical properties of a material are determined when the material is fabricated and cannot be changed without altering it. However, there are materials that can exhibit metal or insulator behavior depending on their temperature. Materials that are capable of switching their properties could lead to a new generation of electronic devices.

One of the challenges in understanding why and how this switch occurs stems from a process called phase separation. X-rays are a key tool for understanding these processes, but it has been hard to use them to probe materials on the nanoscale due to difficulties in building lenses for microscopes that can detect them. However, in a recent study published in *Nano Letters*, ICFO Group Leader Prof. Simon Wall, along with researchers from ALBA in Barcelona, the Technische Universität and Max-Born Institute in Berlin, and Vanderbilt University in Tennessee, have finally been able to probe the phase transitions that occur in thin films of Vanadium Dioxide (VO<sub>2</sub>) using resonant soft X-ray holography. This technique is capable of imaging the electronic and structural changes in this material with an unprecedented resolution at the nanoscale without the need of a lens.

In addition to the results obtained on the phase transition in VO<sub>2</sub>, the work also highlights the possibilities that X-ray holography can bring for studying materials on the nanoscale. The technique is the only method that can image real-time nanoscale dynamics and is now being used to study the properties of other intriguing materials such as high temperature superconductors.



## Graphene Bolometers in Nature Nanotechnology

Researchers overcome limitations through fabrication of a hot-electron bolometer based on graphene.

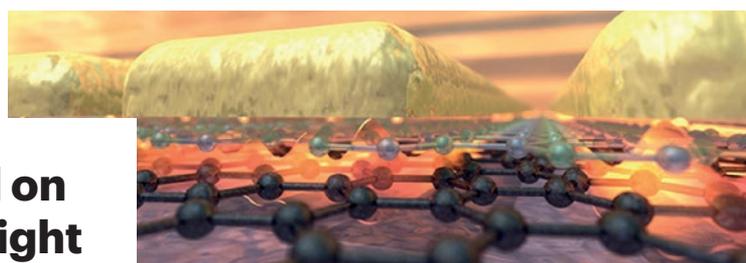
Bolometers are devices used for measuring the power of incident electromagnetic radiation through the heating of materials that exhibit a temperature-electric resistance

dependence. Even though they are to date the most sensitive detectors, they still present certain drawbacks: very low detection bandwidths, fragile architectures and ultra-low operation temperatures.

To overcome these limitations, a team of researchers, including ICFO Group Leader Prof. Dmitri Efetov with colleagues from MIT, Columbia University, and Raytheon BBN Technologies, has recently published a study in *Nature Nanotechnology* reporting on the fabrication of a hot-electron bolometer based on graphene. Graphene was utilized because it has proven to have the smallest electronic heat capacity known today and an extremely weak electron-phonon coupling. In this study, researchers describe the operational principle of the device, which is based on Johnson noise readout of the hot electrons in graphene and their critical light coupling to a photonic nano-cavity. The creation of this unique device, with improved light absorption, high sensitivity, ultrafast thermal relaxation time and no limitations on its operating temperature, opens a new window for bolometers with entirely new functionalities that could radically improve thermal imaging, observational astronomy, quantum information, and quantum sensing, among others.

## New record on squeezing light to one atom

A study published in *Science* reports on confining and guiding light down to a space 1-atom thick.



In a recent study published in *Science*, ICFO researchers have been able to reach the ultimate level of confinement of light, narrowing it down to a space down to a space one atom thick, the smallest confinement ever achieved. The work was led by ICREA Prof. at ICFO Frank Koppens and carried out by David Alcaraz, Sebastien Nanot, Itai Epstein, Prof. Dmitri Efetov, Mark Lundberg, Romain Parret, and Johann Osmond from ICFO, and performed in collaboration with University of Minho (Portugal) and MIT (USA).

The team took a graphene monolayer (semi-metal), and stacked onto it a hexagonal boron nitride (hBN) monolayer (insulator), and on top of this deposited an array of metallic rods. Graphene was used because it is capable of guiding light in the form of "plasmons", oscillations of the electrons that interact strongly with light.

They sent infrared light through the device and observed how the plasmons propagated in between the metal and the graphene. They reduced as much as possible the gap between the metal and the graphene to see if the confinement of light showed no additional energy losses. Notably, when a monolayer of hBN was used as a spacer, the plasmons were still excited by the light, and could propagate freely while being confined to a channel just one atom thick. They switched the plasmon propagation on and off, simply by applying an electrical voltage, and showed that they were able to control the guidance of light in channels smaller than one nanometer high.

## HAPPENINGS

## BUSINESS NEWS



# European Photonics Venture Forum at ICFO

**Photonics entrepreneurs engage with Venture Capital and Corporate Investor Communities.**

Photonics is playing a crucial role in exciting transformations of our times, providing tools and solutions across industries to tackle Europe's societal challenges. In an effort to help facilitate an increasing rate of advancement, the European Photonics Venture Forum (EPVF), a space for photonics entrepreneurship to showcase technologies and ideas to the specialized investor community, celebrated its fourth edition at ICFO.

This event offers an avenue for photonics entrepreneurs to engage with European and International stakeholders from across the Venture Capital and Corporate Investor Communities. Furthermore, by bringing together entrepreneurs, investors, corporations and policy makers in a focused program of pitching, idea sharing and networking, the Forum aims to help shape the future direction of the European Photonics sector.

ICFO, together with SECPHO and Fotónica21, was proud to host the 2018 Forum in Barcelona, a city that hosts many R&D and science centers of excellence that have grown in importance and size over recent years, to become a vigorous start-up and innovation European hub. Barcelona has a long tradition of pioneering industrial, social and economic projects backed by a genuine scientific and technology dynamism. It boasts a diversified industrial landscape, and a strong international investment profile. Initiatives such as the EPVF are especially important for nurturing strategic partnerships crucial to



**This Forum aims to help shape the future direction of the European Photonics sector.**

maintaining Europe at the global forefront of photonics.

The event was made possible thanks to the work of the members of the outstanding organizing committee, under the guidance of Tech Tour. Through their efforts, thirty-two entrepreneurs from fifteen countries across Europe fully benefited from the opportunity to pitch their innovative ideas to industry experts.

## ICFO Teams up with Industry



**The alliance has identified projects of mutual interest related to water and construction.**

### ICFO and Sorigué sign an agreement for collaborative research

As part of Sorigué's commitment to innovation as a strategic axis for the growth and differentiation of its business, the group has signed an agreement with ICFO to develop joint research projects where the use of photonic based technologies may have a positive impact on the Sorigué business sectors.

In particular, the alliance has identified projects of mutual interest related to water and construction. Photonics, which maximizes the use of new high-performance materials, has a multitude of applications, including for example in buildings, making them energy-efficient, or in desalination plants, improving efficiency and reducing costs, thus increasing access to potable water.

In addition, the agreement promotes the development and implementation of R + D + i activities and programs, as well as the promotion of research in areas of mutual interest.



**ZEISS and ICFO signed a cooperation agreement to promote collaborative research.**

### ZEISS joins ICFO's Corporate Liaison Program

ZEISS is an international leader in the fields of optics and optoelectronics and has been contributing to technological progress for 170 years – with solutions for the semiconductor, automotive and mechanical engineering industries, biomedical research and medical technology, as well as eyeglass lenses, camera and cinema lenses, binoculars and planetariums.

On Wednesday, 30 May, ZEISS and ICFO signed a cooperation agreement to promote collaborative research projects of mutual interest. Dr. Andreu Llobera, Team Leader of Disruptive Technologies at CARL ZEISS VISION, will lead activities within this agreement related to shared research, while Dr. Danny Krautz, Senior Manager for New Ventures at CARL ZEISS AG, will be in charge for elaborating new business opportunities and support within spin-off activities.

ZEISS joins ICFO's Corporate Liaison Program with the aim of establishing a long-lasting relationship with ICFO, building mutual knowledge and trust, and boosting mutual benefits.

# COLLABORATION



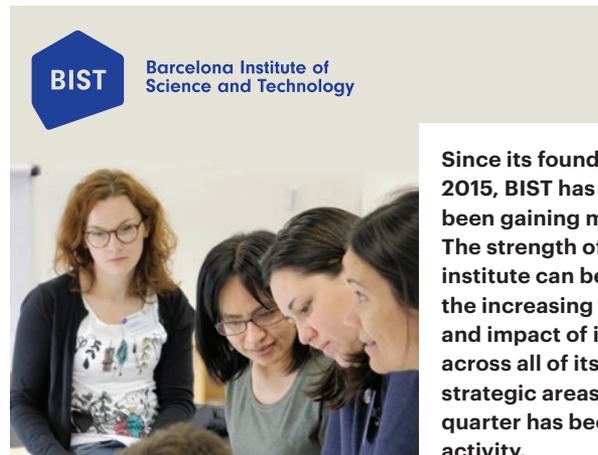
**EUROPEAN FUNDING FOR RESEARCH**  
ICFO researchers attain highly competitive Horizon 2020 funding

p. 8

## COMMUNITY

# Barcelona Institute of Science and Technology

The Barcelona Institute of Science and Technology is a community defined by a shared focus on research excellence, a predisposition for strong interdisciplinary collaborations and a focus on the training of the next generation of leaders for research and industry.



Since its founding in 2015, BIST has steadily been gaining momentum. The strength of the institute can be seen in the increasing frequency and impact of initiatives across all of its key strategic areas. This quarter has been full of activity.

## INTERDISCIPLINARY RESEARCH



**May 16**  
**BIST GRAPHENE OPEN DAY @ ICFO**  
*Researchers gathered to create synergies and future collaborations in the field of Graphene and 2D materials.*

This BIST organized event hosted by ICFO aimed to expose researchers to the world of Graphene and 2D materials and create synergies, building upon and strengthening cross-disciplinary collaborations of research lines in this field through BIST Initiatives.

The event gathered all researchers who are either already working in this area or are interested in finding out more about how they could contribute to this area of research and/or how graphene and 2D materials could provide a benefit for their work.

The event was opened by BIST Director Gabby Silberman with ICREA Prof. at ICFO Frank Koppens following with a welcome speech. The all-day program included an introduction to the field with goals and challenges brought forward by the community, a networking lunch, visits to the ICFO labs and finally, a session of parallel workshop to propose ideas on how to galvanize research from the BIST institutions in this area.



**June 27**  
**BIST ANNUAL CONFERENCE**  
*A space for researchers to meet, get to know each other's science, and spark new collaborations.*

In 2017, BIST held its first international scientific meeting- a Founding Conference- aimed at promoting debate on multidisciplinary scientific research and its impact on advancing the frontiers of knowledge. This year BIST held what is now its Annual Conference at CosmoCaixa, allowing the BIST research community to showcase and discuss the science carried out at the BIST centers with an emphasis on transversal and multidisciplinary topics.

To build BIST visibility, both at the local level and at a more international level, the conference brought together a wide variety of local and international speakers in **Dialogues on the boundaries of knowledge**, and started off with a Keynote speech by **Barry Barish** from the California Institute of Technology, 2017 Nobel Prize in Physics.

## BIST TALENT PROGRAM



**April 11-13**  
**LEADERSHIP IN ACTION**  
*A training program focusing on the very specific needs of postdoctoral researchers*

This three-day interactive program exclusively designed for postdoctoral researchers at BIST institutes by VITAE granted researchers the opportunity to focus on developing those skills that are essential for successful self-management and development in order to progress in a professional career.

The course is part of the BIST Talent program, which aims to attract, retain, and develop the brightest researchers and professionals by providing career development activities that meet their needs at all stages of their professional growth.

*"The course was very hands-on in various leadership situations, from getting results to leading in a crisis... This was very useful for anyone who will ever be tasked with leading a group of people."*

**Silvana Palacios**  
Postdoctoral researcher in the Atomic Quantum Optics group led by ICREA Prof. at ICFO Morgan Mitchell.

**June 12-14**  
**SCIENCE TO BUSINESS**  
*Researchers learn to evaluate opportunities for new business ventures*

Once a successful ICFO+ program created through an ongoing partnership with ESADE Business School, the intensive From Science to Business program evolves yearly to assure that its contents are suited to the needs of today's researchers in an ever-changing business landscape. Now a BIST operated training program open to senior researchers, postdoctoral fellows and last year doctoral students from the seven different research centers that comprise BIST, this program took place on the ESADECREAPOLIS campus in Sant Cugat.

The program, with a strong emphasis on entrepreneurship, focuses on helping professionals in academia get acquainted with the business world, increasing their understanding of how companies work and create value in a competitive environment. Through this three-day program, BIST scientists become familiar with the new venture creation process and the role that science and technology plays in it.

*"This course was a great opportunity to have a window into the world of business. In three intense days, we covered the importance of innovation for business strategy, the basics of business plans and corporate finance, and different strategies for attracting investors and growing a startup."*

**Alexander Powell**  
Postdoctoral research in the Plasmon Nano-Optics research group led by ICREA Prof. at ICFO Romain Quident

### BIST Member Institutes



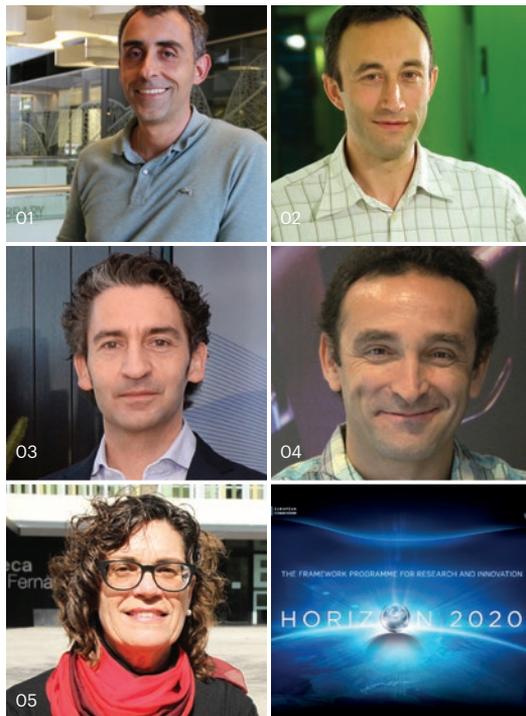
## COLLABORATION

## RESEARCH

# European Funding for Research

ICFO researchers attain five highly competitive Horizon 2020 funded projects.

Innovative research proposals from ICFO Group Leaders for ERC Advanced Grants and Proof-of-Concept awards and the FET-Open Actions, all within the H2020 program of the European Commission, have brought five new highly competitive research grants to ICFO.



## PROOF OF CONCEPT GRANT

The European Research Council, in its efforts to help ERC grant-holders to bridge the gap between their research and the earliest stage of a marketable innovation, created the Proof of Concept (PoC) funding scheme for researchers who have already been awarded an ERC grant. Not only does this program help ERC grantees to explore the innovation potential of their research and/or commercialize the results of their ERC-funded research, it also complements the efforts of ICFO's Knowledge and Technology Transfer Unit (KTT), which proactively searches for ways to translate newly generated knowledge into new technologies.

### 01. ICREA Prof. at ICFO Gerasimos

**Konstantatos** has been awarded his second PoC to date, the ninth award of this kind for ICFO in the past six years, for the project titled SPECTRODOT. The main goal of this project is to develop a low-cost, hand-held spectrometer prototype with broadband range from 400 to 2500 nanometres. Optical Spectrometry is a powerful non-destructive, high throughput technique used extensively for threat and hazardous substance detection, food inspection, process and environmental monitoring and quality control amongst others. This large market however is fragmented into many niche markets, mainly due to the different wavelength ranges of interest and the lack of adequate photodetector technologies to cover those various spectral regimes, all at once. Hybrid graphene-quantum dot photodetectors can enable versatile spectrometers covering the whole spectral range from UV to mid-IR.

The Functional Optoelectronic Nanomaterials group, led by Prof. Konstantatos, in collaboration with prototype developer Dr. Stijn Goossens and researchers in the Quantum Nano-Optoelectronics group led by ICREA Prof. at ICFO Frank Koppens, will use hybrid Quantum Dot – Graphene photodetectors in this new technology.

## FET-OPEN RESEARCH AND INNOVATION ACTIONS

FET Open is a Future and Emerging Technologies scheme covering all topics and research areas. It aims at bringing together the brightest European minds at an early stage of research to pave the way for innovations, radical new ideas and novel technologies that challenge current thinking.

**02. ICREA Prof. at ICFO Valerio Pruneri** will coordinate a FET Open award for his project entitled Q-MIC. This is a highly ambitious and interdisciplinary project that aims at developing a new on-chip differential interference contrast microscope based on an unconventional birefringence lens-free configuration, the latest quantum sources and single-photon image sensors. This unique combination of features will allow, on the one hand, the first demonstration of a practical quantum device for imaging, while providing, on the other hand, a platform for fundamentally new lines of research in quantum metrology, including the interaction of quantum states and bio-species.

Collaborating with ICFO in this project will be four internationally recognized institutes including The Austrian Academy of Sciences (AT), Politecnico di Milano (IT), and University of Glasgow (UK) and three leading companies, Micro Photon Devices S.R.L (IT), Carl Zeiss AG (DE) and Fraunhofer-Gesellschaft (DE).

## ADVANCED GRANTS

Three ICFO Group Leaders have received the ERC Advanced Grant (AdG) which is aimed at active researchers who have a track-record of significant research achievements in the last 10 years. The AdG enables scientists to carry out frontier research with potentially ground-breaking impact on science and society beyond. Project grants are for five years and allow the recipient to pursue frontier science.

### 03. ICREA Prof. at ICFO Jens Biegert: "Structural transformations and phase transitions in real-time" (TRANSFORMER)

This project will provide unprecedented insight into the real-time electronic and nuclear dynamics of molecular transformations and phase transitions with advanced new methodologies and a multi-faceted approach to the investigation.

*"TRANSFORMER will exploit our pioneering achievements in attosecond soft X-ray spectroscopy (XAFS) and laser-induced electron diffraction (LIED) to pinpoint in real-time which electronic states participate at which nuclear configuration. If successful, TRANSFORMER would undoubtedly provide an unprecedented view into electronic and nuclear dynamics, surpassing current limits in molecular and material sciences."*

### 04. ICREA Prof. at ICFO Javier Garcia de Abajo: "Free electrons as ultrafast nanoscale probes" (eNANO)

The project intends to inaugurate the field of free-electron nanoelectronics, whereby electrons evolving in the vacuum regions defined by nanostructures will act as probes to excite, detect, image, and spectrally resolve polaritonic modes with atomic precision over sub-femtosecond timescales.

*"With eNANO I will introduce a disruptive approach toward controlling and understanding the dynamical response of material nanostructures, expanding nanoscience and nanotechnology in unprecedented directions."*

### 05. ICREA Prof. at ICFO Maria García-Parajo: "Membrane-based nano-mechanobiology: Role of mechanical forces in remodeling the spatiotemporal nanoarchitecture of the plasma membrane" (NANO-MEMEC)

Nano-MEMEC will provide understanding on the role of mechanical and biochemical stimuli in the remodelling of adhesion mechanisms at the cell membrane.

*"Using cutting edge-biophysical tools exclusively developed in my lab that combine super-resolution optical nanoscopy and single molecule dynamic techniques, the project will open new research frontiers by establishing membrane-based nano-mechanobiology as a novel mechanism that decisively contributes to signal transduction regulation and cellular response."*



Horizon 2020  
European Union Funding  
for Research & Innovation

OUTREACH



# International Day of Light

May 16th is the global recognition day for the central role that light and light-based technologies play in the lives of us all.

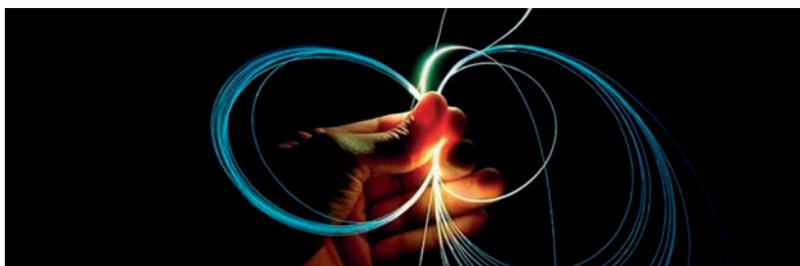
The International Day of Light is a global initiative that provides an annual focal point for the continued appreciation of light and the role it plays in science, culture and art, education, and sustainable development, and in fields as diverse as medicine, communications, and energy. The broad theme of light will allow many different sectors of society worldwide to participate in activities that demonstrate how science, technology, art and culture can help achieve the goals of UNESCO – education, equality, and peace.



International Day of Light

16 May

Partners worldwide conducted a series of outreach and education activities on this day and throughout the month, with a special focus on students, young people and the public at large. In addition, a flagship inauguration featuring Nobel Laureates and leaders in areas of education, industry, design and lighting took place at UNESCO headquarters in Paris.



OUTREACH

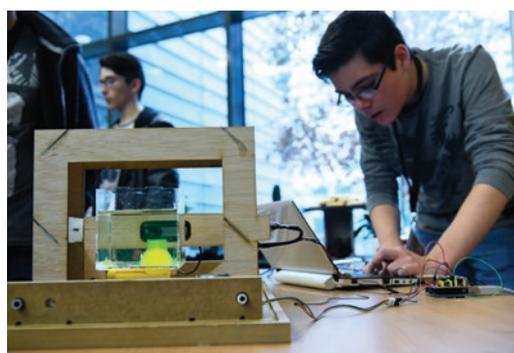


# Young Photonic Congress 2018

Over one hundred secondary school students present light related research studies.

On Friday 13 April, ICFO celebrated the 3rd edition of the Young Photonics Congress. Organized and hosted by the institute and supported by the Fundació Catalunya – La Pedrera • Ignacio Cirac Program Chair, this year more than 100 students from all over Catalonia attended the conference, which included a total of 32 authors and 21 posters.

The Young Photonic Congress is an initiative that allows students to live the experience of a real scientific congress. Previous to the event, the participants of the conference collected and presented their experiences and learnings in a scientific poster format. They then submitted an abstract of their research or experience along with a formal scientific poster, which was evaluated by a scientific committee.



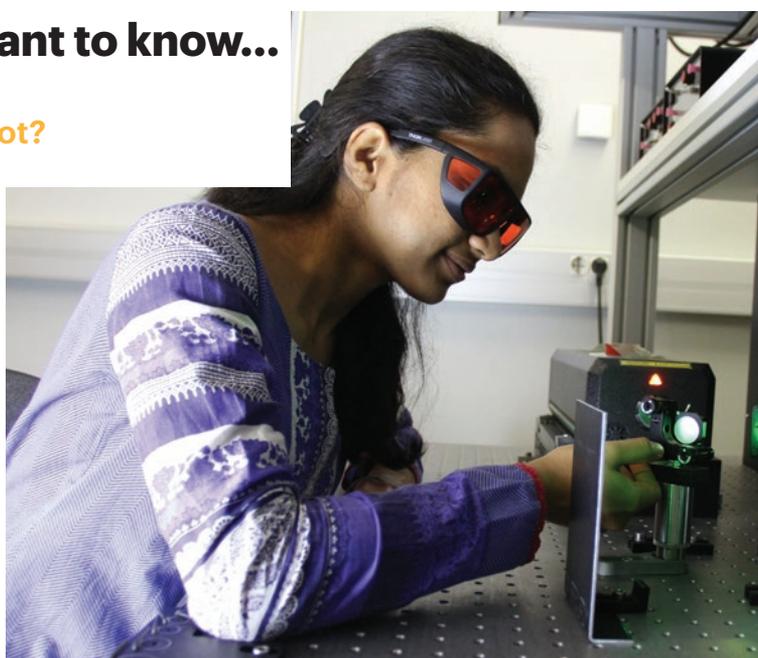
As part of the event, researchers at ICFO gave flash talks to explain the type of research they were carrying out at ICFO. Subsequently, the students had the opportunity to take part in a formal scientific poster session in which they gave 3-4 minute group presentations on the contents of their work.

OUTREACH

## YOUNG MINDS want to know...

Why do some lasers cut and some other do not?

The Outreach team at ICFO welcomes school groups to the institute, allowing them to explore the facility and encouraging them to ask questions and develop a mindset based on the scientific discovery and process. Seemingly simple questions pave the way for insightful conversations that introduce some basic concepts behind the science of light.



3rd grade students at Istituto Italiano Statale Comprensivo, Barcelona ask: **Why do some lasers cut while other do not?**

Anuja Padhye, PhD student in the Optical Parametric Oscillators research group responds:

The kind of laser light you shine at a certain material is what determines whether or not the laser will cut. Every material absorbs radiation of specific energy, either transmitting or reflecting what it does not absorb. A laser barcode scanner that we see in supermarket uses the laser light reflected from a packet to read the barcode. This laser has different energy than that required to cut the same packet. If we used another high power laser with the same energy needed to excite the molecules of that packet and break their bonds, then the laser beam would cut through the packet by vaporizing the material in the beam's path. If the laser does not generate enough heat to vaporize, the material melts or catches fire.

# PEOPLE

## IN FOCUS



# ICONS

**ICONS, the ICFO Organization and Network of Students, is a student chapter that belongs to the SPIE, OSA and EPS societies.**

**Certainly, you have seen some of us in action during a student event, noticed our names popping up in emails, or spotted us snapping pictures in the PhD Seminars, followed by Social Friday, organized by some of our more active members, but ICONS involves much more! Scientific, social and career development activities are our main focus.**

Since the beginning of this academic year, we have invited a variety of impressive speakers to give ICONS Seminars whose topics even go beyond research. Two examples are Dr. Joe Bowles, postdoc in the Quantum Information Theory group, who introduced the world of Bitcoin, and Dr. Silvia Carrasco, KTT director, who presented the role of the Technology Transfer unit at ICFO. Furthermore, thanks to the OSAs Travel Lecturer program, Prof. Chris Dainty paid us a visit.

He discussed the *Technology and fundamental limits of mobile phone cameras* and took the time to have an informal coffee and round table discussion.

To promote knowledge exchange among scientific fields, we took advantage of our BIST community to organize a first ever joint **Cool-Off event with IRB Barcelona** sponsored by BIST. At its headquarters in Barcelona, four mixed PhD couples from the two institutes competed to try to first guess and then explain

### ICONS BOARD MEMBERS

**Sandra de Vega**  
President

**Juan Miguel Pérez Rosas**  
Vice-president

**Sarah Keary**  
Treasurer

**Pamina Winkler**  
Secretary

ICONS is backed by engaged members from the ICFO student community.

We are always open to fresh new ideas!

each other's research projects in a flash-talk format. The audience voted for their favorite talk, and enjoyed the informal networking opportunity.

We have arranged two new and stimulating career development workshops. In July, 2018, we will run the ICONS-KTT Ignite, with workshops to delve into entrepreneurship and learn different hands-on techniques on how to turn an idea into a marketable product. Later, on October 5th, we will host *A day with Alaina Levine*, a specialist in career consulting and president of *Quantum Success Solutions*. During this full day workshop, she will share her expertise on topics such as networking, recognizing your potential, professional etiquette and job search.

Other exciting activities on the horizon include one of our best-loved social activities - the annual **International Food Festival**. In October every year, ICFOnians cook and share delicacies from around the world with the ICFO community. Further ahead, one of the main highlights for 2019 will include our hosting of the student conference **IONS-BCN '19**. The event will take place in June so mark the date and stay tuned for more information.

**Being part of ICONS involves teamwork, provides the opportunity to meet and bring interesting people together, develop soft skills, do science from a broader perspective and provides a platform to promote your initiatives.**

**+INFO**  
icons.icfo.eu  
facebook.com/iconsicfo

## COMMUNITY PICTURES



**Auxiliadora Padron was one of many ICFOnians that participated in Pint of Science events around Barcelona.**



**Celebrating the Publication of the Big Bell Test paper in Nature. Thank you Bellsters!**



**Showing support for our friend and ICFO Alumnus Dani Infante, on 14 April ICFOnians Valerio Pruneri, Noelia Cuesta, Domenico Tulli, Carlos Abellan, Giorgio Colangelo and Kavitha Kavaloor ran the Cursa Nocturna de l'Hospitalet (with Dani & Natalia, friends and family). Together with contributions from all over ICFO, they helped raise funds for la Fundació Alba to fight childhood cancer.**



## BEYOND ICFO

# Danny Krautz



Now part of the corporate investor team at ZEISS, Danny Krautz has been very active in the ICFO Alumni Network and shares his “beyond ICFO” experience with ICFOnians.

We have a small family and are expecting our second child.

It is very nice to be part of the ICFO community and to be asked to contribute my experience to ICFOnians. My life has changed a lot since I left ICFO 8 years ago. I went through ups and downs, professionally and personally. Now, I have a small family and we are expecting our second child. My wife is from Brazil, and therefore I am still traveling and also open to new cultures. I guess the diverse cultural background is one of the main attributes at ICFO. It is truly international; I made friends and worked with people from many different cultures and nationalities.

ICFO was very different when I started more than 12 years ago. I had just finished my Diploma and Masters and had to decide where to go. I remember getting a great offer from the TU Dresden to work on organic electronics: a well-established group, excellent track record, industry collaboration, and, and, and... But I decided to stay at ICFO. Certainly, Barcelona played an important role, the climate as well as the city. However, most of all, **I was fascinated by the entrepreneurial, slightly crazy mindset at ICFO which preached ‘let’s establish together the best institute in Photonics.’ This decision to stay influenced my future and the job I am doing today.**

After leaving ICFO, I went to the Fraunhofer Society in Germany. My projects were driven by industrial applications and new markets. Among other things, I learned that excellent technology alone is not a guarantee for a successful business. After 3 years, I left and went on as a business and innovation consultant for the state of Berlin. In this period, I was acquainted with different innovation strategies and business models from companies of all sizes. I learned at Fraunhofer that creating a successful business includes many factors, such as (and only to name a few) differentiation, technology, diversity, a well-balanced team, a good understanding of markets, risk management, financials and, of course, luck.

Now, I am part of the corporate investor team at ZEISS dealing with technologies and new business fields in Manufacturing and Healthcare with a focus on Artificial Intelligence and Image Data, Digital Twins and Simulations and Mobile Technologies for the Visual Sense. We invest in internal and external startups, usually between 500K€ and 5M €. We provide support that helps them grow and achieve market success. I am amazed every day by the technologies at ZEISS and the capabilities of people working there. And ZEISS means much more than optics: it means digital business fields, data science, AI, machine learning, image recognition, etc. **One can find all “new” technologies at the highest level at ZEISS. And that’s the reason why ZEISS and ICFO have just established a partnership, joining the CLP program.**

**What can I recommend?** Try to follow the things you like, and take risks. Maybe you will fail, but at least you tried something new. Talk to lots of ICFOnians, build your network, enjoy your time there and don’t bury yourself in the labs. Ask experienced researchers and don’t get stopped by hierarchy. I am glad that I had the chance to work at ICFO and I am glad that we, as ZEISS, joined the CLP program. Please come and talk to me any time regarding opportunities at ZEISS or something else. Maybe I can give you a helping hand in your career, as many others did for me.

## GO &amp; FLY

# 155 Women and Men

have successfully defended their theses at ICFO since its founding in 2002.

Together they have helped us measure what we have learned, how far we have come, and how much we have yet to learn. The following ICFOnians have recently succeeded in defending their PhD theses. Honoring ICFO’s tradition, ICFOnians gather to celebrate your accomplishments and encourage you to Go & Fly! Remember that wherever you go, you will always be a part of the ICFO community.



## 153

May 22, 2018

**KEVIN SCHÄDLER**

*“Single Quantum Emitter Manipulation with 2D Materials”*

**TD: ICREA Prof. Dr. Frank Koppens and Prof. Dr. Constanza Toninelli (LENS)**



## 154

June 14, 2018

**MIRIAM MARCHENA**

*“Scalable Techniques for Graphene on Glass”*

**TD: ICREA Prof. Dr. Valerio Pruneri**



## 152

April 3, 2018

**GUILLAUME CORDIER**

*“Unravelling Motor Protein Organization on Lysosomal Membranes with Super-Resolution Microscopy”*

**TD: Prof. Dr. Melike Lakadamyali**



## 155

June 19, 2018

**CARLOS ABELLAN**

*“Quantum Random Number Generators for Industrial Applications”*

**TD: ICREA Prof. Dr. Valerio Pruneri**

## Mystery ICFonian

**How much do you know about the people you work with?**

ICFOnians are a fascinating group, with hobbies, interests and talents that may surprise you. Have a look around and see if you can guess who this edition’s Mystery ICFonian is! Look for the answer in the next edition of ICFOnians.

1. She is a “super freak” about all things related to mortgages.
2. She dances Salsa in her free time.
3. As a child, she had a passion for chess and even took classes
4. She is a Cactus lover.
5. She is a veteran ICFonian.

# THE LAST WORD

## HIGH PROFILE

# María Miranda Cuervas

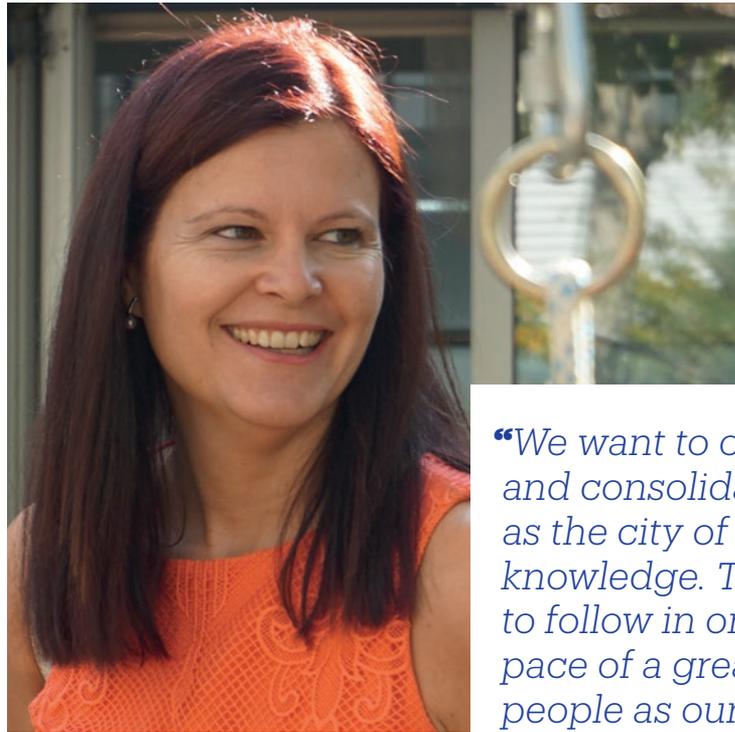
Mayor of the city of Castelldefels.

### What is the image that Castelldefels aim to present to the world?

I love Castelldefels. I was lucky to be born in this city and to have memories in each of its neighborhoods. It is a unique municipality; with five kilometers of beach and surroundings, gastronomy, active commerce, the Castle which is the most emblematic building in the city... We want to continue growing and consolidating Castelldefels as the city of innovation and knowledge. This is the line we aim to follow in order to grow at the pace of a great city- always with people as our main focus.

### How does the PMT campus where ICFO is located fit into this image?

If we want Castelldefels to grow hand in hand with innovation, responding to the needs of its citizens, we must all grow together, leaving no one behind. The PMT Campus (Mediterranean Technology Park) home to ICFO and the UPC, plays a fundamental role in this process: It must be the reference point for innovation and technology for the business sectors. We have recently held the ON Innovem days, where we debated with companies the best ways to apply new technologies to daily challenges. We are investing in the creation of a new Local Office of Technology Transfer, a platform based on business networking so that companies and businesses, without exception, can exchange ideas and evolve through innovation.



*“We want to continue growing and consolidating Castelldefels as the city of innovation and knowledge. This is the line we aim to follow in order to grow at the pace of a great city- always with people as our main focus.”*

### Castelldefels City government has shown its support for ICFO's work in many ways including, since 2016, the Photonics Incubator initiative. Why is ICFO's work important for the city?

It is essential that institutions such as ICFO participate in the day-to-day life of the city. It is an institute with a strong international reputation, whose purpose is to expand knowledge in the field of photonics alongside the best in the world. Castelldefels is privileged to be the home of such a prestigious institute that seeks to develop research projects that will provide solutions to current and future problems related to health, energy, information, and environmental protection. ICFO provides extra incentive and tools for Castelldefels to grow a little more every day.

### Not only do ICFOnians work in Castelldefels, a third of us have made our homes here. Can you comment, in general, on this impact for the local community?

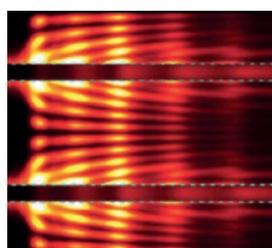
It is an honor for the people of Castelldefels that many ICFOnians choose to live here. We are a unique city, with a great gastronomic offer, as well as other services, the beach, the Garraf Natural Park... The municipality has grown in number of inhabitants in recent years, and today we are 65,000 neighbors who share the city. I have lived all my life in Castelldefels and I am convinced that there is no better city to live and share experiences. As Mayor of this great city, I send a strong message to all our neighbors: If we join forces, together we will make Castelldefels an unstoppable city.

## Science Quiz

These two articles appeared back-to-back in *Science*, both by ICFO authors. Match the image with the corresponding publication.

- A) "Multidimensional quantum entanglement with large-scale integrated optics". Wang et al., *Science* 360, 285-291 (2018)
- B) "Probing the ultimate plasmon confinement limits with a van der Waals heterostructure". Alcaraz Iranzo et al., *Science* 360, 291-295 (2018)

1.



2.



3. Which of these statements is not true:

- A) Was submitted on 8 Dec (Immaculate Conception)
- B) Was submitted on 25 December (Christmas)
- C) Both were published on 20 April (Easter).

Want to subscribe?  
Have you got news  
to share?

Whether you'd like to subscribe to ICFOnians, change your email address, or have some comments and ideas for future content, we'd love to hear from you!

To subscribe or to read back issues of ICFOnians, please visit the ICFO Website [www.icfo.eu](http://www.icfo.eu)

To get in touch, please send us an email to: [communications@icfo.eu](mailto:communications@icfo.eu) indicating your name, email address, and institution.

Follow us on:

 [twitter.com/ICFOnians](https://twitter.com/ICFOnians)

 [facebook.com/ICFOnians](https://facebook.com/ICFOnians)

 [youtube.com/user/ICFOnians](https://youtube.com/user/ICFOnians)