ICFO

Community News
Spring 2022
48

ICFONIANS

Women in Science We Admire

INDEX

Mystery ICFONian
Solution Ed #47

Morgan Mitchell
ICREA Group Leader,
Atomic Quantum Optics

Science Quiz
Answers from p.12

1:A **2**:B **3**:C **4**:B

ON THE COVER

Women in Science We Admire

Throughout *ICFOnians for Women in Science month* ICFOnians were invited to nominate a woman scientist that inspired them and/or who they believe has had a significant impact on science through her discoveries, enthusiasm, advocacy, and/or leadership. The "Women in Science We Admire" campaign aims to draw attention to the need for equal opportunities for women's participation and leadership in STEM while encouraging us all to purposely recognize high impact work by women, further enabling it to resonate throughout the scientific community.
womeninscienceweadmire.icfo.eu
(Read more pg 7)

EDITOR'S CORNER

Priorities

Incorporating diversity into our daily agendas

Brook Hardwick
Contributing Editor

Most ICFOnians believe that with hard work and ambition, there is no limit to what they can accomplish. But science is a community activity and in order for us to reach our full potential, it is vital that achievements and contributions be recognized and celebrated by our peers.

For the past several years, we have been reflecting on the "face" of scientific leadership and asking ourselves what it takes to make it more diverse in terms of gender, culture, socio-economic background, sexual orientation, physical capabilities or disabilities. ICFO's Focus programs on diversity, like the *ICFOnians for Women in Science Month*, aim to expand the range of "faces" and attributes that come to mind when we imagine our leaders. We do this to check our own personal biases and to make adjustments that will help us to recognize the leaders among us who may not fit the traditional molds, but who are none the less remarkable as thought leaders and inspirational role models.

ICFOnians for Women in Science Month is an annual reminder that we can and should train ourselves to recognize talent regardless of its shape, size, color or gender. This year we launched an exhibit of "Women in Science We Admire" and asked ICFOnians to submit nominations. The successful initiative provided a short-list of women who are having a formative impact on our fields and proved that the task of recognizing them requires only that we open our eyes and decide to do so.

If recognition of contributions is important for advancing scientific careers, by regularly drawing attention to lesser represented members of our community, we may one day help to make STEM as diverse as the society we live in.

As I look back on this 5th edition of *Women in Science Month*, I wonder what other affirmative actions we could all incorporate into our daily agendas to bring us closer to the diversity of perspectives in scientific leadership we all agree would be ideal. Is gender parity a realistic goal that we should aim to achieve? What would happen if we chose to think creatively when we extend invitations for scientific gatherings, to ensure that women and other minorities are reasonably represented as experts in our panels and as invited speakers? What if we refused to take part in events that do not meet reasonable levels of diversity? In research areas where there are the most pronounced imbalances, what if we made concerted efforts to give opportunities to junior scientists from underrepresented groups, thus giving them visibility to help them move into leadership roles? What other solutions might we devise in order to overcome traditional barriers to participation in science at the highest level.

Until we meet again for *ICFOnians for Women in Science Month* next year, let us all remember that the ball is in our court and we can all make the conscious decision to make diversity a priority.

Coordinating Editor
Brook Hardwick
Corporate Communications Head

Editorial Committee
Silvia Carrasco
Knowledge & Technology Transfer Director
Brook Hardwick
Corp. Communications Head
Dolors Mateu
ICFO Manager
Laia Miralles
HR and Education Head
Morgan Mitchell
ICREA Group Leader, Atomic Quantum Optics
Andrea Morales
Alumni, Communications
Robert Sewell
Academic Affairs Head

Contributors
Tomás Charles
Visual Communications
Elena Enrique
Corporate Communications
Brook Hardwick
Corporate Communications Head
Alina Hirschmann
Communications
Morgan Mitchell
ICREA Group Leader, Atomic Quantum Optics
Tanya Monro
Australian Department of Defense
Robert Sewell
Academic Affairs Head
Silvia Tognetti
Outreach, Knowledge and Technology Transfer

Pictures By
© ICFO
Vanessa Montero
Ramon Josa
Matteo Ceccanti

Layout
Bogart & Bacall

D.L.: B-54464-2008
Icfonians® is a registered trademark

Trustees:
Generalitat de Catalunya · Fundació Privada CELLEX · Universitat Politècnica de Catalunya BARCELONATECH · Fundació Privada MIR-PUIG

Cerca center:
Institució CERCA Centres de Recerca de Catalunya

Member of:
BIST Barcelona Institute of Science and Technology

Supported by:
Excelencia Severo Ochoa 2020 - 2023 · Unió Europea Fons europeu de desenvolupament regional Una manera de fer Europa

Happenings

ICFO NEWCOMERS

Welcome to ICFO

Many of us joined ICFO or took a new position at the institute between January and March

Núria Urgell
Student

Jacqueline Martínez
Student

Daniel Centeno
Student

María Ciudad
Student

Alejandro Andrés
Student

Cristina Sastre
Student

Oriol Vidal
Student

José Alejandro Fierro
Student

Serni Toda Cosi
Student

Bilal Benazout
Student

Egle Pagliaro
Student

Eric Gil Portal
Student

Sabhyata Gupta
Student

María Recasens
Student

Alberto Rodríguez-Moldes
Student

Erik Recio
Student

Fernando Martín
Student

Ana Blazquez
Student

Pau Colomer
Student

Giacomo Paganini
Student

Lucero Mescli Hernández
Student

Rajdeep Mukherjee
Student

Roland Finance
Student

Alejandro del Bosque
Student

Anna Graf
Student

Alessandro Ippoliti
Student

Valeria Rocio País
Student

Valentina Gacha
PhD Student

Claudio Iacovelli
PhD Student

Miguel Dosil
PhD Student

Rebecca Hoffman
PhD Student

Carlos Luís Alarcon
PhD Student

Leila Rocio Prélat
PhD Student

Marinos Dimitropoulos
Visiting PhD Student

Sara Pizzurro
Visiting PhD Student

Lorena Bianchet
Postdoctoral Researcher

Sebastian Castilla
Postdoctoral Researcher

Sarah Keary
Postdoctoral Researcher

Sukeert
Postdoctoral Researcher

Stefan Forstner
Postdoctoral Researcher

Grzegorz Rajchel-Mieldzioc
Postdoctoral Researcher

Lin Zhang
Postdoctoral Researcher

Javier Vera
Postdoctoral Researcher

Federico Centrone
Postdoctoral Researcher

Sergey Ivanov
Postdoctoral Researcher

Andrés Quiroga
Postdoctoral Researcher

Maxime Giteau
Postdoctoral Researcher

Simone Marconi
Postdoctoral Researcher

Michela Picardi
Postdoctoral Researcher

Dimitrios Raptis
Postdoctoral Researcher

Félicien Appas
Postdoctoral Researcher

Guillermo D. Brinatti
Postdoctoral Researcher

Saeid Asgarnezhad
Postdoctoral Researcher

Joaquim Torra
Postdoctoral Researcher

Lorenzo Castelvero
Research Engineer

Nelson Romano
Visiting Scientist

Joan Gené
Visiting Scientist

Jakub Borkala
Visiting Scientist

Lydia Bouchara
Visiting Scientist

Natalia García
Academic Affairs Officer

Manuel Forcales
KTT Business Developer

Miguel Ángel Moreno
KTT Project Manager

Not pictured

Enric Pérez
Student

Laura Gerónimo
Student

Lander Gyssels
Student

Carles Roch i Carceller
Visiting PhD Student

Yuma Watanabe
Visiting PhD Student

Anne Dahse
Visiting PhD Student

Happenings

ICFO NEWS

20 years, 2000+ ICFOnians

On March 6th, 2002, ICFO was founded as a non-profit institution by the Generalitat de Catalunya and the Universitat Politècnica de Catalunya - Barcelona Tech. The formal creation of the legal entity culminated intense efforts over the previous years and made it possible to bring together an impressive group of dedicated, curious and forwarding thinking scientists and professionals from all over the world. Twenty years later, our institution reaffirms its aspiration to be a force for positive change, to contribute to solving challenges faced by society and to give outstanding training and career opportunities to motivated researchers and professionals.

BIST Ignite Awards 2021

The Barcelona Institute of Science and Technology's Ignite Program promotes the initiation of new collaborations among BIST researchers, facilitating the exchange of knowledge among different scientific fields and exploring new approaches to address complex questions.

Multidisciplinary projects that received "seed" funding in 2019 were eligible to apply for the second phase of funding to begin a second research phase. **Two outstanding multidisciplinary projects from this group have now been awarded grants to continue their work. ICFO participates in one of these projects.**

- **"QEE2DUP"**: *aims to design a new material based on atomically precise graphene nanostructures that could increase communications security and amp up quantum computing capabilities through a new way of designing "quantum chips".*
  Roshan Krishna Kumar, ICFO and **José Ramon Durán**, ICN2.
- **"MAKI"**: *aims to develop a device capable of detecting two combined biomarkers of acute kidney injury (AKI) quickly and effectively.*
  Gemma Aragay, ICIQ and **Ruslan Álvarez**, ICN2.

EPS Emmy Noether Distinction plaque and medal

ICREA Professor at ICFO Dr María García-Parajo was named the 2020 recipient of the European Physical Society's (EPS) **Emmy Noether Distinction**, an award that aims to bring noteworthy women physicists to the wider attention of the scientific community, policy makers and the general public and to identify role models that will help to attract women to a career in physics.

Prof Garcia-Parajo's award cited "*her outstanding contributions to nano-biophysics and to numerous programs to support women in physics*".

Dr. Kees van der Beek (CNRS) member of the EPS Executive Board responsible for the EPS Equal Opportunities Committee travelled to ICFO to personally present the award on Monday, March 28.

SPIE Translational Research Award

At this year's SPIE Photonics West event, ICFO postdoctoral researcher **Dr Lorenzo Cortese** in the Medical Optics group led by ICREA **Prof Dr Turgut Durduran**, presented a paper entitled ***"Non-invasive bedside assessment of microvascular and endothelial health in severe Covid-19 patients"***. This multi-center study, involving more than 50 co-authors, details work on the HEMOCOVID-19 and VASCOVID projects that aim to introduce and test clinically a portable, non-invasive and real-time health monitoring platform for the stratification of COVID-19 patients according to the urgency of their need for aggressive respiratory therapy, and to prognose further unexpected deterioration of their respiratory status. He was awarded the **SPIE Translational Research Award, recognizing outcomes-based studies that can change the lives of patients**.

Postdoctoral Junior Leader "la Caixa" Fellowships

The "la Caixa" Foundation has announced and awarded fellowships for the 2021 call of their prestigious *Postdoctoral Junior Leader Program*. Of the forty-five fellowships awarded this year, three are for ICFO Research Fellows, and two for ICFO Group Leaders who have recently started their own group at the institute.

The objectives of this program are to foster high-quality, innovative research in Spain and Portugal and to support the best scientific talent by providing them with an attractive, competitive environment in which to conduct excellent research.

- **ICFO Prof Dr Pelayo García de Arquer**, leader of the CO_2 Mitigation Accelerated by Photons research group.
- **Dr Manuel Gessner**, Research Fellow in the Quantum Information Theory group led by ICREA Prof Antonio Acín.
- **Dr Allan Johnson**, Research Fellows in the Quantum Optics Theory group led by ICREA Prof Maciej Lewenstein.
- **ICFO Prof Dr Georgia Papadakis**, leader of the Thermal Photonics group.
- **Dr Alejandro Turpín Avilés**, Research Fellow in the Optoelectronics group led by ICREA Prof Valerio Pruneri.

www.icfo.eu

ICFO has a new web!
Designed to present our activities and accomplishments in a way that is easy to navigate and intuitive, the new site greatly improves ICFO's image and amplifies the information that is available to online visitors. Importantly, the new structure will allow our web presence to evolve in pace with our dynamic and growing institute. Check it out!

ICFO Distinguished Invited Professors

Dr Guifré Vidal Bonafont
Research Scientist at Google

A world-renowned scientist in Quantum Physics and Quantum Information, fields in which some of his published work is among the most cited and influential in the world, Prof Vidal is one of the pioneers and leading experts in the techniques of tensor networks (MPS, PEPS, MERA) to study many-body quantum systems. As a DIP, he will facilitate visits and collaborations with the institute.

Prof Pablo Jarillo-Herrero
MIT Professor of Physics

A world renown expert in the area of experimental condensed matter physics, in particular quantum electronic transport and optoelectronics in novel low dimensional materials, he is well-known for his pioneering research on twisted bilayer graphene. Having participated in many fruitful collaborations with ICFO over the years, this appointment will facilitate further interactions and visits, participation in joint ICFO-MIT research workshops and conferences, joint participation in international projects, and collaborative research activities.

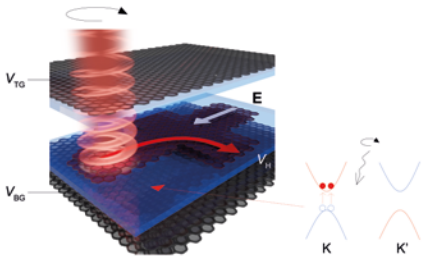
Happenings

LATEST ADVANCES

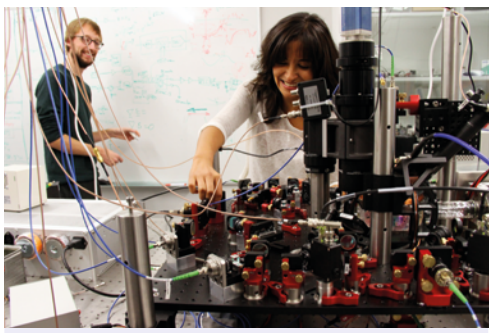
Light derails electrons through graphene

In a study published in ***Science***, an international team of researchers report that circularly polarized light can induce bent electronic flows in bilayer graphene. The study was carried out by ICFO scientists **Jianbo Yin, David Barcons, Iacopo Torre,** led by **ICREA Prof at ICFO Dr Frank Koppens**, in collaboration with researchers from Columbia University (USA), NIMS (Japan), and Nanyang Technological University (Singapore).

In their study, scientists found that by applying circular polarized infrared light onto the novel bilayer graphene device, they were able to selectively excite one specific valley population of electrons in the material, which generated a photovoltage perpendicular to the usual electron flow. The device and set-up was engineered so that current could only flow with light illumination, **thus avoiding the background noise that hampers measurements and achieving a sensitivity in the detection**



several orders of magnitude better than any other 2D material. This development is significant because conventional photodetectors often require large voltage biases that can lead to "dark currents" that flow even when there is no light.



Measuring the world's tiniest magnetic fields

In a study published in ***PNAS***, ICFO researchers **Silvana Palacios, Pau Gómez, Simon Coop** and **Chiara Mazzinghi,** led by **ICREA Prof at ICFO Dr Morgan Mitchell**, in collaboration with Roberto Zamora from Aalto University, report a novel magnetometer that for the first time **achieves an energy resolution per energy bandwidth that goes far beyond levels previously established for superconducting magnetic sensors**.

In the study, the team used a single-domain Bose-Einstein condensate to create this exotic sensor. This condensate was made of rubidium atoms, cooled to nano-Kelvin temperatures by evaporative cooling in a near-perfect vacuum, and held against gravity by an optical trap. At these ultracold temperatures, the atoms form a magnetic superfluid that responds to magnetic fields in the same way as an ordinary compass needle, but can reorient itself with zero friction or viscosity. Because of this, a truly tiny magnetic field can cause the condensate to reorient, making the tiny field detectable. The researchers showed that their **Bose condensate magnetometer has achieves an energy resolution per bandwidth of ER= 0.075 ħ, 17 times better than any previous technology.**

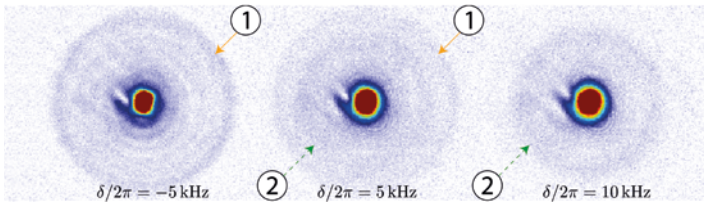
Most importantly, the finding shows that **ħ is not an unpassable limit**, and this opens the door to other extremely-sensitive magnetometers for many applications.

Using radio waves to control interactions in Bose-Einstein condensates

In a recent study published in ***Physical Review Letters***, researchers researchers **Julio Sanz, Anika Frolian, Craig S. Chisholm** and **Cesar R. Cabrera,** led by **ICREA Prof at ICFO Dr Leticia Tarruell**, have demonstrated a new method to control the interaction properties of Bose-Einstein condensates using a radio-frequency field. They created synthetic atomic states which combine a radio-frequency photon and two internal states of an atom, forming a coherent superposition. When the original atomic states have different interactions, the new states dressed by the radio-frequency field acquire **new collisional properties, which can be flexibly adjusted by controlling the field's frequency and intensity**.

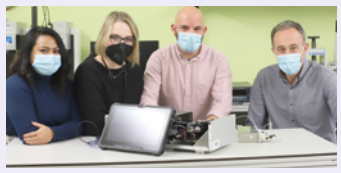
Researchers, for example, can show how to completely cancel the interactions of the condensate, to rapidly switch their sign from repulsive to attractive values, or to trigger an inelastic collision process in a controlled manner. This allows them to **form new types of solitons, to investigate the formation of soliton trains, and to form correlated pairs of atoms with adjustable properties.**

The demonstration of this new interaction control method sets the ground for the engineering of more complex interactions in Bose-Einstein condensates using optical fields, enlarging the toolbox of quantum simulators, and provides a new source of correlated atom pairs for quantum atom optics experiments.



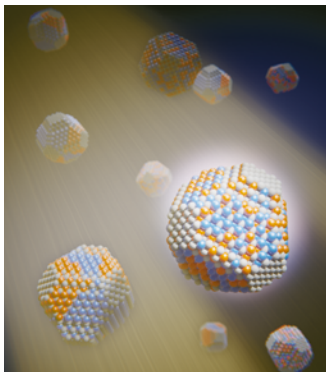
Light-based device to effectively test Covid-19 patients

A study published in ***Biomedical Optical Express*** by ICFO researchers **Rubaiya Hussain, Alfredo E. Ongaro, Ewelina Wajs,** led by **ICREA Prof Valerio Pruneri,** in collaboration with researchers from IrsiCaixa AIDS Research Institute, reports on the **development of a low-cost, portable, non-invasive flow virometer device that uses light and saliva to test Covid-19 patients in less than 30 min**. The results have shown that the device can detect very low concentrations of SARS-CoV-2 with a sensitivity of 91.2% and a specificity of 90%, similar to that of PCR but as fast as an antigen test.



By selecting proper antibodies, this technology could also be adapted for the detection of other viruses or even microorganisms in water. Other benefits of this device include its low-cost, scalability, and simple operational design which do not required operation by specialized staff or in a specialized lab. It could be an excellent solution for diagnosis and spread control in low-income countries where there is limited access to healthcare and vaccines for all the population and/or for mass screening of the population in crowded places such as restaurants, schools, offices, theatres, and cinemas.

Disorder-engineered inorganic nanocrystals set a new efficiency record for ultrathin solar cells



ICFO researchers **Yongjie Wang, Ignasi Burgues-Ceballos**, in collaboration with Prof David Scanlon from University College London, Prof Aron Walsh from Imperial College London and Seán Kavanagh (UCL & Imperial), led by **ICREA Prof at ICFO Dr Gerasimos Konstantatos** published groundbreaking results in ***Nature Photonics*** on a completely **new approach towards the fabrication of solar cells based on AgBiS2.**

The devices reported in this study **set a record among low-temperature and solution processed, environmentally friendly inorganic solar cells in terms of stability, form factor and performance**. The engineering of the multinary systems with cation disordered AgBiS2 colloidal nanocrystals has proven to offer an absorption coefficient higher than any other photovoltaic material used to date, enabling highly efficient extremely thin absorber photovoltaic devices, paving the way for further studies to exploit their intriguing properties in photovoltaics as well as other optoelectronic devices.

Happenings

BUSINESS NEWS

VITSOLC becomes ICFO's 11th Spin-off

New spin-off to produce transparent photovoltaic modules for the electric vehicle

ICFO has transferred to **VITSOLC**, ICFO's 11th spin-off company, patented technology **for transparent PV devices that combines a greater than 10% energy conversion efficiency with a larger than 50% colorless transparency**. This technology was developed in the Organic Nanostructured Photovoltaics (ONPV) group led by UPC Professor at ICFO Dr Jordi Martorell.

Director of ICFO KTT, Silvia Carrasco comments, *"We are extremely excited to see VITSOLC move forward with the development and commercialization of exciting PV technology that will contribute to a more sustainable society. After many years of research, development and business efforts, VITSOLC's exceptional team is prepared to take this technology to the next step where it can have a positive impact on different sectors."*

Aspects that determine the transparent photovoltaic technology performance were addressed by ICFO, in collaboration with many different industrial partners and research centers across Europe, implementing several competitive funding research and development projects funded by ACCIO (projects CySOLC, NanoPro and INTREPID), MINECO (projects TRANSOLC and ECOBUILDING) and the European Commission (SOLPROCEL).

VITSOLC incubated in the ICFO Launchpad with the support of the Barcelona and Castelldefels City Councils, the "la Caixa" Foundation, and the PECT-InnoDelta project for Specialization and Territorial Competitivity, co-financed by the European Regional Development Funds (ERDF) allocated to the Programa operatiu FEDER de Catalunya 2014-2020.

We have a winner PV technology to be integrated in windows or any kind of element that require transparency. Where electrical energy must be combined with transparency, VITSOLC will provide a solution. At VITSOLC we will focus on the industrial up-scaling of such technology to produce transparent PV modules. We see an enormous potential for integration of our transparent technology in the electrical vehicle. The transition from gasoline to electricity powered vehicles is slowed down by the lack of a reliable charging infrastructure. VITSOLC's transparent photovoltaic technology installed in the sunroof or the lateral windows will provide to many EV drivers an infrastructure independent mobility.

Oscar Aceves
CEO of VITSOLC

Proof of Concept Grant

ERC Funding to develop high performance low-cost SWIR optical sources

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, the program 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. **ICREA Prof at ICFO Dr Gerasimos Konstantatos** has been awarded his third PoC to date, the twelfth award of this kind for ICFO since the launch of the program, for the project titled **SWIRL**. The main goal of this project is to develop high performance, low-cost SWIR optical sources based on colloidal quantum dot technology.

Quantum Technologies at Mobile World Congress 2022

The European Quantum Flagship hosted the *European Quantum Space*, curated by ICFO, showcasing recent advances attained in quantum technologies and the emerging tangible products and services for the telecommunications market

This year, from February 28th to March 3rd, the Mobile World Congress 2022 (MWC) was back in force in Barcelona, attracting over 70,000 attendees to the conference. Within this massive mobile industry event, the *European Quantum Space*, **curated by ICFO**, showcased the innovation and development in Quantum Technologies that Europe is driving forward. The space presented the latest achievements and advances in the field of quantum technologies, mainly focusing on quantum communication and computing, two of the areas of major interest within the field.

The 70m² space was located in the **4 Years from Now Hall** (4YFN), a space devoted primarily to showcasing start-ups, investors, companies and institutions to connect and launch new business ventures together.

The *European Quantum Space* included three main areas:

The Quantum Flagship: exhibitions of the latest achievements in quantum technologies from its 21 projects in 5 major areas (Communications, Sensing, Simulations, Computing and Basic Science)

Regional Initiatives: presentations of the quantum program's European regions to gain visibility for advances and to help position themselves as leaders in the field within the mobile ecosystems.

- *QuantumCAT*, a hub of leading research institutions and industrial actors in Catalonia that have come together to promote quantum tech transfer projects and innovation with a short-term or mid-term industrial and social impact.
- *Quantum Valley Lower Saxony* (QVLS) a leading German ecosystem promoting excellent research, international visibility and local value creation.

Start-ups: Four start-up companies, members of the Quantum Flagship, had space in the stand to showcase their products and technologies, meet with potential investors and build relationships and future collaborations with the industrial networks of visitors.

- LuxQuanta (spun out of ICFO 2021)
- Qilimanjaro Quantum Tech
- Quside (spun out of ICFO in 2017)
- IQM quantum computers

Quantum Flagship institutional and industrial partners participated in a series of panel discussion that offered platforms for discussions on what can be done to embed security into the 5G networks and prevent the opportunities for malicious attacks, the ways that quantum physics is driving a paradigm shift in technological development, prospects of quantum computing and cybersecurity, as well as the tangible benefits of quantum computing and the unprecedented disruption it will usher in across multiple sectors.

Collaboration

COMMUNITY

Diversity Focus: ICFOnians for Women in Science

ICFOnians celebrate the 5th edition of this initiative in support of the positive future for women in science that we all hope to be part of

2022 Agenda

February 8. Wikimarathon
A few days before the official start of the ICFO celebration, members of our institute joined twenty research institutions in Catalonia in an online Wikimarathon organized by the Barcelona Biomedical Research Park (PRBB), strengthening the presence of women scientists in Wikipedia.

February 11. Focus on the Future
ICFOnians participated in two separate Outreach activities that aim to offer girls and young women positive female role-models in science. *(Learn more on pg 10 in the Outreach section of this newsletter)*

February 14. Keynote Speaker
Prof Tanya Monro: Chief Defense Scientist, Australian Department of Defense. "Increasing representation of women in leadership positions in STEM". As a leading scientist in academia through to her current role in Australia's Department of Defense, Prof Monro shared her experiences in STEM and the valuable perspectives she has garnered as to what can be done to provide more opportunities for women in scientific leadership. *(Meet Prof Monro in the High Profile interview on pg 12)*

February 25. ICONS Activity "Roundtable Discussion About Parenthood in Academia"

March 8-9. "Empowering women in the workplace- a workshop for women and men"

Feb 11-March 8. Women in Science We Admire
Throughout the month, ICFOnians submitted nomination of women scientists who had inspired them through their discoveries, enthusiasm, advocacy and leadership. An exhibit of the nominated scientists was on display in the Nest Hall through the end of March and the online version can be accessed at **womeninscienceweadmire.icfo.eu**

ICFO's institution-wide tradition of celebrating the ***International Day of Women and Girls in Science*** began in 2016, the same year that the UN declared the International Day. In 2018, we extended the celebration all the way to March 8th, ***International Women's Day***, in order to dedicate an entire month to related discussions and activities.

While there is a concentration of events that take place during this month, ICFO's commitment to supporting and increasing diversity in all its forms is a year-round activity. Diversity, along with respect for others and scientific rigor, is one of ICFO's core values which is why it is important that every day we work to create an inclusive environment where all staff and students can thrive and fully participate.

By providing support and access to opportunities as well as increasing the visibility of positive female role-models in science, we aim to encourage even more girls in the next generation to pursue careers in STEM, and more women to become leaders in their fields.

IN FOCUS

Women for Africa Foundation

Contributing to sustainable development in Africa through the drive of female scientists like Dr Lydia Bouchara

Since 2016, ICFO has had the honor of participating in the "Science by Women" program of the Women for Africa Foundation, welcoming senior women scientists to our center for six-month sabbatical stays. ICFO benefits from the expertise and perspectives of senior African women scientists, while making their achievements more visible in the international scientific community, thus promoting their access to research activities.

This year, Dr Bouchara joins the Quantum Optics Theory group led by ICREA Prof Dr Maciej Lewenstein. She holds a PhD from the Bejaia University (Algeria) and at ICFO will focus on non-linear photonics. The intention is to exploit the interaction of light with matter to elucidate new strategies for manipulating, controlling, shaping, and processing light beams and signals. Her project aims to lead to discoveries regarding the behavior of light and the possibility of controlling it for useful purposes for industry, especially health.

Tell us about your research interests

Before, I worked on particle transport, chaos in Hamiltonian systems. It is a field very rich in knowledge but it did not satisfy my curiosity to see concretely what happens if we have a real situation inside the human body, more specifically in the brain or blood. I am also interested in Machine Learning.

What do you hope to get out of the Visiting Senior program?

I would like to learn new things in my field and leave at the end with satisfactory results that might event start a collaboration between ICFO and my home university in order to create a dynamic of sharing knowledge and advances in science.

Are there any obstacles that make it more difficult for women to access scientific careers in Algeria?

Algerian women are as present as men in the field of science. We have the same salary and can progress in our careers. Sexist behavior is perceived negatively as a way of settling scores between colleague or jealousy.

In Algeria, Amazigh women have always been free. We have had great and inspirational role models, from the queen and military leader Dyhia (known as al Kahina), to activists Lala Fatma n'soumer, Djamila Boupacha and Hassiba Benbouali... In my opinion women are very strong and have nothing to prove.

Collaboration

TRAINING

SPIE@ICFO Chair Fellowships

Undertaking a challenging research project is vital for launching an ambitious research career

The SPIE @ ICFO Chair for Diversity in Photonic Sciences seeks to promote diversity and support new talent in photonics to enhance innovation, creativity and excellence in research.

Maria Yzuel Fellowship Awards

ICFO aims to strongly support and encourage women's participation in science through the María Yzuel Fellowship Awards, which offer outstanding students the possibility to explore science by accomplishing a final degree project / masters' thesis, or research project.

The Fellowship program is the flagship of the SPIE@ICFO Chair for Diversity in the Photonic Sciences, and is named in honor of former SPIE president Prof Dr María Josefa Yzuel Giménez, a respected leader and role model in the international Optics community. She is also a longstanding advocate for the promotion of the role of women in science and an active member of the Asociación de Mujeres Investigadoras y Tecnólogas (AMIT-Association of Women Researchers and Technologists).

Carolina Fajardo
Student in the Medical Optics group led by ICREA Prof Turgut Durduran

Ana Pérez
Student in the Ultracold Quantum Gases group led by ICREA Prof Leticia Tarruell

Valeria Rosio País
Student in the Optoelectronics group led by ICREA Prof Valerio Pruneri

Núria Urgell Ollé
Student in the Quantum Nano-Electronics and NanoMechanics group led by Prof Adrian Bachtold

Maria Paula Ayala
Student in Thermal Photonics group led by Prof Georgia Papadakis

Sabhyata Gupta
Student in Quantum Optics Theory group led by ICREA Prof Maciej Lewenstein

Spie@ICFO Research Fellowships

Through the SPIE@ICFO Chair Research Fellowships, ICFO is able to attract outstanding students to conduct a research internship, bachelor or master thesis with an ICFO research group, with priority given to students from developing countries.

Selected students participate in ICFO's rich scientific life, benefit from the experience of ICFO researchers, cutting edge facilities, industrial projects, the institute's stimulating and interdisciplinary environment, and receive high-level training as well as extensive admin and tech support. They collaborate with scientists on research assignments tailored from available projects at ICFO, and acquire skills for communicating their research results.

Career Perspectives

Members of the Alumni Network offer current ICFOnians insights and skills

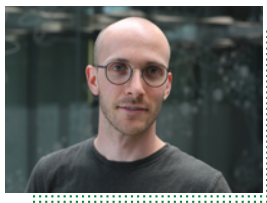
Members of the Alumni network who have moved on to careers in industry and academia have a lot to offer current students in terms of perspectives and skills that could help provide orientation on professional options after the PhD. ICFO is grateful for these productive collaborations and for the positive impact Alumni are able to continue to have on the institute event even after they have left.

Up-close with an entrepreneur

Jon Donner

Jon Donner earned his PhD in Nano Optics in 2014 in the group led by ICREA Professor at ICFO Dr Romain Quidant, following a double degree from TAU (Tel-Aviv University) in physics and electrical engineering. He then moved to ICFO's KTT unit, leading a spin-off of an elector optical device. Back in Israel, in 2016 Jon founded Nanofabrica and acted as its CEO. On April 27, 2021, Nano Dimension Ltd (Nasdaq: NNDM), an industry leading Additively Manufactured Electronics (AME)/PE (3D-Printed Electronics) provider, announced that it had signed and closed a definitive agreement to acquire Nanofabrica. Jon has made several trips back to ICFO to share his Nanofabrica experience and to offer candid insights into the highs and lows of the journey. In his March visit, he met with ICFOnians in the cafeteria for informal Q&A

FPGA programming lectures

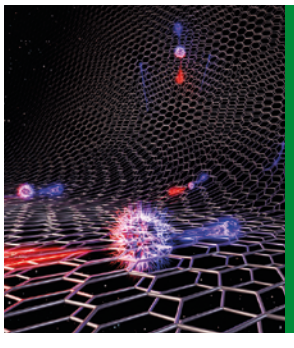


Pau Gomez

Pau Gomez earned his PhD in 2021 on ultra-cold gases in the group led by ICREA Prof at ICFO Dr Morgan Mitchell and is now working as a physicist and R&D developer at LuxQuanta, an ICFO spin-off company that develops quantum-safe cryptography for the digital world. He developed and presented a collection of hands-on Field-programmable gate array (FPGA) programming lectures for scientists without (or with very basic) experience in FPGA programming, providing simple, functional and opensource examples, which incrementally incorporate new FPGA programming concepts.

"I discovered my passion for FPGAs during my PhD in quantum physics.", he explained. "The first months were quite challenging, where learning VHDL/Verilog, understanding the chipset architecture and using the huge Xilinx/Intel toolchain involved a steep initial learning curve and a significant amount of frustration. But once these hurdles were overcome (1-2 months later), I became capable of designing my own signal generation/acquisition systems and I replaced multiple of the old OP-27 circuits with an FPGA running a few lines of code. I am happy I could offer ICFOnians the insights I wish that I had access to as I was learning FPGA programming during my PhD."

SAVE THE DATE



ICFO

ICFO international School on the Frontiers of Light: New Horizons in Quantum Materials

www.frontiers.icfo.eu

June 27-30, 2022

ICFO will offer **up to 5 SPIE@ICFO Chair Travel Fellowships** for selected students to attend the school.

Two SPIE@ICFO Chair Research Internships to conduct a project with an ICFO research group are also available on a competitive basis to outstanding students selected to attend the school.

Lectures and seminars will be broadcast online and are open to registration from interested students and researchers worldwide.

Register here

Collaboration

TRAINING

ICFO Enlighten Fellows

ENLIGHTEN (ENhanced PhD Fellowship Program in the Sciences of LIGHT) is a Marie Sklowdowska-Curie-COFUND action under the European Union's Horizon 2020 research and innovation program

Launched in 2019, the program has awarded 19 fellowships through four competitive calls to outstanding early stage researchers (ESRs) from all over the world to carry out ambitious PhD-projects at ICFO at the forefront of the photonic sciences.

The Enlighten program has set out very clear goals in order to prepare fellows for successful careers in both industry and academia. This includes course work that aims to enhance research and technical skills and develop key transferrable skills, build professional networks, ensure international & inter-sectoral exposure, and provide outstanding mentoring and career development. At the same time, the program is structured to embed a commitment to open science and responsible research, provide a life-long connection to the ICFO community, and ensure equal opportunities for all students.

We have talked to the Enlighten Fellows to know what do they value most about their experience pursuing a PhD in ICFO research groups.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 847517

Here is what some of our Enlighten Fellows tell us they value most about their experience pursuing a PhD in ICFO's research groups:

Jessica Angulo
Single Molecule Biophotonics group

"I joined the program because I wanted to learn more about bio-physics and microscopy techniques. Thanks to my supervisors, I feel that I am also learning how to become an independent researcher.

Riccardo Bertini
Quantum Nano-Optoelectronics

"This program is really helping to develop my professional career 360 degrees, offering activities and experiences to complement my researcher skills with soft skills like public specking or scientific writing.

Anubhav Jumar Srivastava
Quantum Optics Theory group

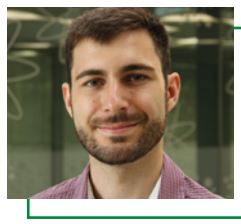
"Being a Marie Curie fellow has a lot of perks that enable you to work on your PhD more efficiently. There are multiple awards and recognitions under MSCA schemes that allow the fellows to share their experiences and work on problems that target humanity on a more direct level.

Maria Balanzó
Quantum Information Theory group

"This ENLIGHTEN Fellowship allows me to do a PhD in one of the best centers in Europe with the best possible conditions, and do the research that I have always wanted. I believe that this will be of great importance during my future career.

Costanza Agazzi
Neurophotonics and Mechanical Systems Biology group

Barbara Andrade
Quantum Optics Theory group



Eduardo Beattie
Quantum Photonics with Solids and Atoms group

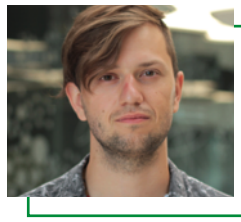
Marta Cagetti
Quantum NanoElectronics and NanoMechanics

Sumana Chetia
Medical Optics group

Katerina Gratsea
Quantum Optics Theory group

Sebastian Hägele
Optoelectronics group

Teresa Karanikolau
Theoretical Quantum-Nano Photonics group



Tomas Lamich
Atomic Quantum Optics group

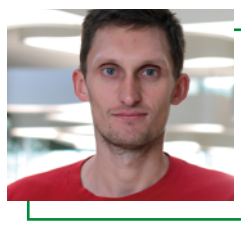
Lukas Lau
Single Molecule Biophotonics group

Aditya Malla
Functional Optoelectronic Nanomaterials group

Jie Meng
Attoscience and Ultrafast Optics group

Luis Felipe Morales
Neurophotonics and Mechanical Systems Biology group

Luke Mortimer
Quantum Information Theory group



Philip Stammer
Quantum Optics Theory group

Collaboration

OUTREACH

Successful first edition of Quantum Bits

An introduction to Quantum Communications for undergraduate, masters and PhD students

In the framework of the Quantum Technologies Education (QTEdu) initiative, QT5M, of the European Quantum Flagship, ICFO hosted a pilot event titled *Quantum Bits*, aiming to give undergraduate, masters and PhD students an introduction to Quantum Communication as well as to career development perspectives in this field. The event format, based on the highly successful "Quantum Technologies in 5 Minutes" events created by ICFO, combined short talks with Q&A, giving participants the opportunity to learn about different technologies in the quantum technologies space and to interact with the speakers.

Rotem Arnon-Friedman, from the Quantum Information Theory group in the Weizmann Institute of Science, Rupert Ursin, Founder of Quantum Technology Laboratories GmbH and Vanesa Diaz, Business Development Director at LuxQuanta, came together in this online event streamed over YouTube live, to give short talks presenting different organizations in the quantum communications arena. Over 100 participants followed this event from all over Europe.

ICFO partners in this pilot consortium with MCQST – Munich Center for Quantum Science and Technology, the Center of Quantum Science of Technology, Weizmann Institute of Science, the Institute for Atomic and Subatomic Physics. QT5M aims to hold more *Quantum Bits* editions dedicated to other pillars of the Quantum Flagship, such as sensing and metrology or computing and simulation.

#100tífiques

Women researchers promote scientific role models in a mega-event in celebration of the International Day of Women and Girls in Science

In its first edition, the #100tífiques program brought together 115 women researchers to give talks in schools across Catalonia in order to promote new scientific role models, breaking gender stereotypes and encouraging girls in particular to study science and engineering. This year, its fourth edition, the program has grown to almost 500 researchers, all giving talks simultaneously as a mega-celebration of the International Day of Women and Girls in Science.

The initiative, organized by the Fundació Catalana per a la Recerca i la Innovació (FCRI) and the Barcelona Institute of Science and Technology (BIST), with collaboration from the Generalitat de Catalunya's Department of Education, highlights the strategic role women play in science today, and creates a network among women scientists in academia and business.

A special thanks to ICFOnians **Joana Ibañez, Marta Sans, Auxiliadora Padrón, Lisa Saemisch, Marina Cunquero,** and **Clara Vilches** who took part in this inspirational event for 6th grade and 1st year ESO students.

The Young Photonics Congress reaches its seventh edition

On March 11, around 100 people took part in the seventh edition of the Young Photonics Congress, a scientific conference where the spotlight is on photonics-related projects developed by high school students

After two virtual editions, the congress finally came back to its original location in the ICFO premises. All the participants gathered in the ICFO Auditorium for a plenary session with an introduction to photonics and ICFO, followed by flash talks by the ICFOnians Dr Vito Giovanni Lucivero, María Paula Ayala, Marina Cunquero and Dr Roland Terborg, who talked about their work in photonics, touching different topics such as quantum sensors, nanomaterials for the improvement of solar cell technology, advanced microscopy and bringing technology from the lab to the market.

Following the talks in the Auditorium, the activities moved to the NEST Hall, where 32 high school students presented their research projects in a lively poster session. Many ICFOnians joined the event, interacting with the students and chatting about a variety of topics that reflected the diversity of the research in photonics. For example, there were posters about quantum physics, spectroscopy, and applications of light for communications and health.

One year more, the Young Photonics Congress brings together high school students and ICFO researchers to inspire the new generation of scientists

People

GO & FLY

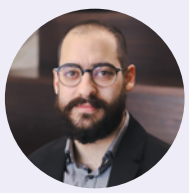
Congratulations to 6 New ICFO PhD Graduates

248 ICFOnians have successfully defended their theses at ICFO

Each of these ICFOnians has played an important role in ICFO's success and reputation as a leading international research institute.

Honoring ICFO's tradition, ICFOnians celebrate this important personal, professional and institutional milestone and encourage you to Go & Fly! Remember that wherever you go, you will always be a part of the ICFO community.

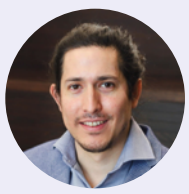
243



Daniel Pérez Salinas
Inhomogeneity and Disorder in Ultrafast Phase Transitions

January 31, 2022
Prof Dr Simon Wall

244



Sebastián Castilla
Photodetectors Based on Graphene pn-Junctions for Mid-Infrared and Terahertz Range

January 31, 2022
ICREA Prof Dr Frank Koppens

245

Onur Özdemir
Further into the Infrared with Quantum Dot Photodetector

February 4, 2022
ICREA Prof Dr Gerasimos Konstantatos

246

Lorena Bianchet
A versatile system for the study of light-matter interactions at the level of individual particles

February 25, 2022
ICREA Prof Dr Morgan Mitchell

247

Sarah Keary
Spatiotemporal organization of protein nanoclusters in adhesion complexes

February 28, 2022
ICREA Prof Dr María García-Parajo and Dr Felix Campelo

248

Sukeert
Versatile nonlinear frequency conversion sources in the near- and mid-infrared

March 9, 2022
ICREA Prof Dr Majid Ebrahim-Zadeh and Dr Chaitanya Kumar Suddapalli

COMMUNITY

ICFO Calçotada

March 25, 2022

ICFOnians came out in full force for the return of this uniquely Catalan community tradition.

Mystery ICFOnian

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

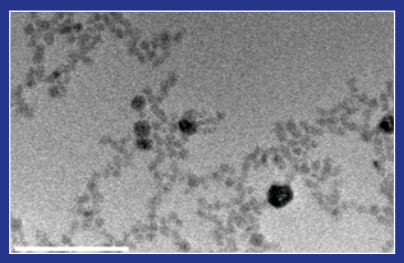
ICFOnians are a fascinating group, with hobbies, interests and talents that may surprise you. Have a look around and see if you can guess who this edition's Mystery ICFOnian is!

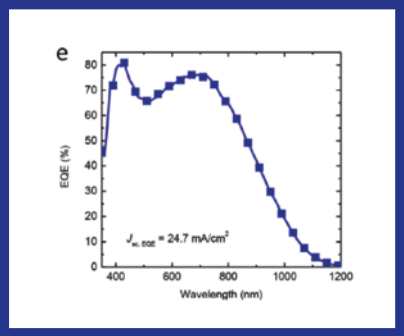
Look for the answer in the next edition of ICFOnians.

1. She comes to ICFO by bike everyday
2. Her favorite tv show is 'Gilmore Girls' or any doctor-related show
3. She loves playing ping-pong
4. She grew up next to a science museum, and she has become a big fan of Science museums (her favorite being La Ciutat de les Arts i les Ciències, in Valencia)

The Last Word

SCIENCE QUIZ





ICFOnians recently reported the production of nanocrystal solar cells using only environmentally-friendly materials, both in the cells and in the processes to produce them.

"Environmentally Friendly AgBiS2 Nanocrystal Inks for Efficient Solar Cells Employing Green Solvent Processing"
Yongjie Wang, Lucheng Peng, Zhuoran Wang, Gerasimos Konstantatos
Adv. Energy Mater. 2200700 (2022)

1. Non-toxic bismuth is a byproduct of the refinement of what toxic metal?

A) Lead

B) Arsenic

C) Antimony

2. What does EQE stand for?

A) Electron Quenching Efficiency

B) External Quantum Efficiency

C) Electron Quality Enhancement

3. Argyria is a medical condition caused by prolonged ingestion of silver. What are its symptoms?

A) Red skin and eyes

B) Yellow skin and eyes

C) Blue skin and eyes

4. Why does ingesting silver cause the skin and eyes to change color?

A) Immune reaction

B) Photoproduction of silver nanoparticles

C) Impeded liver function

HIGH PROFILE

Tanya Monro

Chief Defense Scientist, Australian Department of Defense

As a passionate and accomplished scientist, what enticed you to leave the lab and academia?

I would say 'once a physicist, always a physicist'. But taking on my current role as Australia's Chief Defense Scientist means that of course I can't spend as much time doing hands on research as I used to. I certainly try to keep in touch with what is happening in the labs here at Defense Science and Technology Group (DSTG), because research is at the heart of everything we do. Defense scientists work with partners across our national science-and-technology enterprise, including within academia, and with our international partners, to drive high-impact research that results in innovative solutions to Defense's big challenges.

I still consider myself a researcher, even though I spend most of my time being a leader. After all, it's all about asking the right questions, and using data to make the best decision possible. It's a great privilege to be in a position to chart the direction and shape the culture of an organization like DSTG, and to bring together teams that are best placed to tackle these challenges of national importance.

What in your career as a scientist in academia prepared you to engage with senior government officials on matters of national significance?

Effective communication is an essential skill for scientists, whether it's giving a presentation on your research to potential collaborators or writing a grant application that will be read by people outside your field of expertise. Being able to express your ideas in a way that enables you to connect with your audience is really important, no matter whether you're talking to a group of students or to the leaders of a country. That's not easy, so make sure you take every opportunity to practice. Policy should always be informed by the experts. Scientists need to play their part by working out how best to bridge the knowledge gap so that government decision-makers can make the hard choices based on evidence.

What new technology/technologies currently being developed in the area of Photonics do you find most exciting/interesting/inspirational, in or outside the area of defense?

I am really excited about recent developments in mid infrared laser technologies, which have a wide range of applications for medicine to defense. In the defense context, mid infrared laser technologies can be used to counter drones and drone swarms while remaining relatively eye-safe.

> *"Scientists need to play their part by working out how best to bridge the knowledge gap so that government decision-makers can make the hard choices based on evidence.*

What advice would you give to ICFOnians – at all career levels – to contribute to ensuring that the scientific community and its hierarchy resembles more every day the diverse society in which we live?

We definitely all have a responsibility. Leaders have a key role to play by shaping the culture of an organization, but we should all be role models and take a stand if we witness or hear about something that's not right. Defense in Australia is committed to addressing gender inequality in its science, technology, engineering and mathematics (STEM) workforce. We recognize that by identifying the best talent from all parts of our diverse community we are not only doing the right thing – we are also gaining a significant competitive advantage. We need to create an environment where anyone can thrive, regardless of their background and their individual approach to work. Of course, this is easier said than done. Although I'm encouraged by the progress we've made in recent times, there's still more to do.

As part of our ICFOnians for Women in Science Month celebration this year, we asked ICFOnians to nominate a woman in science they admire. Who would you nominate and why?

There are so many extraordinary women in science – it's great to tell the world about them! One woman in science I've always admired is Jocelyn Bell Burnell, the astrophysicist who discovered pulsars while still a student. It's a wonderful story of discovery, perseverance and the need to recognize the role of women play – her PhD supervisor got the Nobel Prize for the discovery and Jocelyn did not. Despite this, Jocelyn went on to become Dame Burnell, contributing over a long and distinguished career in astrophysics.

Follow us

@ICFOnians

This edition and back-issues of ICFOnians are available at www.icfo.eu/newsroom/newsletter

Please send questions, comments and suggestions to communications@icfo.eu