ICFO

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2024 Alumni Reunion

We are all a part of the ICFO Story

Community News

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Mystery ICFOnian

Solution Ed #56

Bianca Turini
PhD Student, Quantum Nano-Optoelectronics group

Science Quiz

Answers from p.12

1:D **2**:C **3**:C **4**:B
Bonus: A & B are both right!

ON THE COVER

2024 Alumni Reunion

The Alumni Reunion, which took place at the institute on April 26th, was an opportunity for all generations of ICFOnians to catch up, share memories and reconnect with colleagues and friends from around the world on all that we have in common.
Read all about it on pages 8-9.

EDITOR'S CORNER

The ICFO Story

... the stories behind the story

Brook Hardwick
Contributing Editor

ICFOnians is our community newsletter and our tool for keeping us all informed of shared interests and achievements, strengthening our connection to each other and the institute. This edition includes accounts of scientific results that have been published by our colleagues, project meetings that have advanced international initiatives, celebrations of awards, distinctions and tenures, new competitive funding, technology transfer initiatives, social activities shared and all the significant occurrences that are of importance to those who make ICFO an amazing scientific powerhouse. As editor of *ICFOnians*, I feel a bit like the institutional scribe, trying my best to gather documentation on the story as well as the "story behind the story", i.e. YOUR story. It is as my role as "scribe" that I pause to reflect on the Alumni Reunion that took place on April 26th. Most ICFO events involve a portion of our community however ALL members, past and present, were protagonists of the reunion- even some that were unable to attend in person, and this is indeed worth dwelling on for a moment.

This is not the first Alumni Reunion that we have hosted at ICFO. We launched the Alumni Network in 2016 very successfully by welcoming 84 members of the community back to Castelldefels to share their infectious enthusiasm for the institute and for the people with whom they lived their experience here. A lot has happened in the past 8 years. On top of a global pandemic which has marked us all and kept us from getting an Alumni Reunion on the books sooner, we have grown and matured. Today we have more than double the number of PhD graduates than we had in 2016, as well as number of ERC grants received by our colleagues.

We have new spaces to conduct research with the opening of the Mir-Puig building. New group leaders have joined us who have expanded the scope of research which we are able to explore.
And so much more!!

ICFOnians now number more than 2000 which translates into 2000+ unique and personal stories. Over 150 ICFOnians took part in the April reunion from as far away as California, Denmark, Columbia, and India. That is because ICFO is not just a place to build a career, it is a formative experience. Just as all 2000+ of us have been impacted by ICFO, each of us has also left an indelible mark on the institute. With each year and each ICFOnian that enters or goes and flies into another adventure, the institute grows and flies, expanding reach, amplifying what it can do for each and every ICFOnian, what it can do for science, and also for society.

It is easy to trace back to when ICFO came into being in 2002, with what for many years was talked about as the "big idea", but it is clear now that the sky is the limit on how far ICFO will fly because that depends on the stories that are yet to be lived that will take place in and around this place. Of course, there is a thread - or many, many threads, that run through each story and that is what we so enjoy sharing and celebrating when we get together at reunions.

A heartful thank you to all who participated in the Alumni Reunion, and for those who could not make it in person but followed the occasion with affection and interest. ICFO has a unique and solid history which has laid strong foundations for an amazing future, all thanks to your contributions to this story.

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Happenings

ICFO NEWCOMERS

Welcome to ICFO

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

Alejandra D. López
Student

Roberto Narvaez
Student

Matteo Gadani
Student

Ernest Granollers
Student

Laura Gómez
Student

Aya Mneimneh
Student

Mellius Mooiweer
Student

Ambika Shorny
Student

Kaviranjana Antony
Student

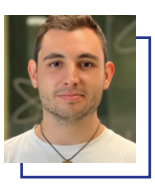
Smriti Kohli
Student

Wataru Senzaki
Student

Lucile Petronin
Student

Julie Blon
Student

Andrés Ramírez
Student

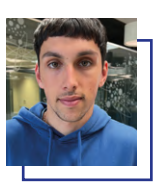


Llorenç Balada
Summer Fellow

Fernando D. Vera
Summer Fellow

Alice Lorrach
Summer Fellow

Raquel Minelli
Internship Student



Hugo Millán
Internship Student

Naiare Cortés
Internship Student

Sergio Hurtado
Internship Student

Daniel Molina
Internship Student

Paula Lersundi
Internship Student

Sergi Ramiro
Internship Student

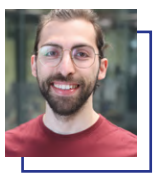
Samuel Cardoso
Internship Student

Martina Ibáñez
Internship Student

Lucia Pérez
Internship Student

Elena Olaiz
Internship Student

David Barroso
Internship Student



Raffaele D'Avino
PhD Student

Anika Pretorius
PhD Student

Francesco Flora
PhD Student

Roxana Wedowski
PhD Student

Davide Candoli
PhD Student

Arisa Tanaka
PhD Student

Andreas Meyer
PhD Student

Christopher Kiehl
Postdoctoral Researcher

Jonatan Hoeschele
Postdoctoral Researcher

Javier Rivera
Postdoctoral Researcher

Luis Trigo
Research Fellow

Felix Campelo
Research Fellow

Cristoffer Moller
Research Fellow

Laure Tiam
Visiting Scientist

Andreu Riera-Campeny
Visiting Scientist

Andrea Gorni
Project Engineer

Bernat Martín
Management

Carmen Céspedes
Management

Paola Frongia
Management

Maria Cano
Management

Oriol Romero-Isart
Group Leader

Not pictured **Gabin Fillié,** Student **Sara Molló, Maía J. Londoño, Carles Roqué, Ángel Vilar,** Summer Fellows **Malgorzata Strzalka, Maria Joao Lopes,** Visiting PhD Students

Happenings

ICFO NEWS

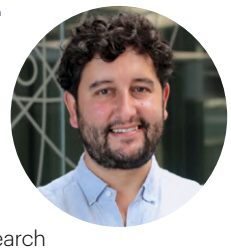
The United Nations Proclaims 2025 as the International Year of Quantum Science and Technology

The International Year of Quantum Science and Technology (IYQ) will be a year-long, worldwide initiative that will celebrate the contributions of quantum science to technological progress over the past century, raising global awareness of its importance to sustainable development in the 21st century, and ensuring that all nations have access to quantum education and opportunities. IYQ **coincides with the 100th anniversary of the birth of modern quantum mechanics.**

The U.N. proclamation is the culmination of a multiyear effort spearheaded by an international coalition of scientific organizations, including ICFO. After Mexico shepherded the coalition's initial proposal through UNESCO's 42nd General Conference in November 2023, Ghana formally submitted a draft resolution to the U.N. General Assembly in May 2024 that garnered co-sponsorship from six countries, including Spain, before its approval today.

Throughout 2025, the IYQ consortium will organize regional, national, and international outreach events, activities, and programming to celebrate and develop learning resources for quantum science, build scientific partnerships that will expand educational and research opportunities in developing countries, and inspire the next generation of diverse quantum pioneers. ICFO is leading the organization of several celebrations and events that will take place in Barcelona in January 2025, with more information about these activities to be announced in the coming months.

Young Academy of Spain



ICFO Prof. F. Pelayo García de Arquer, leader of the CO_2 Mitigation Accelerated by Photons research group, was chosen as a new academic member of the Young Academy this year by an independent international committee made up of highly prestigious research personnel who cover different areas of knowledge.

The committed evaluated 142 applications and chose seven new members in total, considering academic merits as well as other factors such as the diversity and multidisciplinarity of their work areas. The profiles of the academics cover different areas of knowledge including archaeology, sociology, biology, study of medical applications, electrocatalysis, theoretical chemistry or phylogenomics.

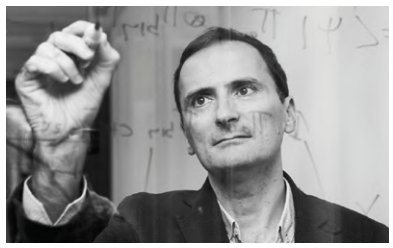
ERC Advanced Grant

ICREA Prof. at ICFO Dr. Javier García de Abajo, recipient of an ERC Advanced Grant in 2018 for the project eNANO: *Free Electrons as Ultrafast Nanoscale Probes*, has been awarded his second Advanced Grant for established research leaders, for the project **QUEFES: QUantum-Enhanced Free-Electron Spectromicroscopy**. In this new project, Prof. García de Abajo will introduce a conceptually disruptive approach to capitalize on the quantum nature of free electrons and their interactions with matter and radiation fields aiming to obtain previously inaccessible information on the atomic-scale dynamics of such materials, to reveal hidden properties of the quantum vacuum, and to control the many-body state of quantum matter.

The ERC Advanced Grant funding is amongst the most prestigious and competitive EU funding schemes, providing researchers with the opportunity to pursue ambitious, curiosity-driven projects that could lead to major scientific breakthroughs.

The Rei Jaume I 2024 Prize in Fundamental Science

ICREA Professor at ICFO, Antonio Acín, leader of the Quantum Information Theory group, was named the winner of the Rei Jaume I Prize for Basic Research "*for his revolutionary theoretical contributions in the field of quantum information, for example, the certification of random numbers of great relevance for the development of quantum communication*".



The Jaime I awards recognize people whose work is highly significant and has been developed mostly in Spain. The prizes are awarded annually, and each winner receives a gold medal, a diploma and 100,000 euros. On receiving this economic endowment, they undertake to reinvest part of the amount in research and entrepreneurship in Spain.

In addition to the award for Basic Research, winners in six other categories were also announced, including, Economics, Biomedical research, Environmental Protection, New Technologies Entrepreneurship, and Clinical Research and Public Health.

Nanophotonics Early Career Award

The journal ***Nanophotonics*** supports young scientists by organizing the annual Early Career Awards. This prestigious award acknowledges four early career scientists every year for their accomplishments, giving them recognition for their outstanding work in the field of Nanophotonics.

ICFO Prof. Georgia Papadakis, leader of the Thermal Photonics research group has been awarded this honor in the 2023 call "*For pioneering contributions to thermophotovoltaics and non-reciprocity in low dimensional materials*".

New Tenured Group Leader

Prof. Dr. Michael Krieg, leader of the **Neurophotonics and Mechanical Systems Biology** group at ICFO, was evaluated by an international committee and based on this successful evaluation has been **awarded tenure at ICFO by the Board of Trustees of the institute**.

Michael started his group at ICFO in 2017 as a NEST Fellow endowed by the Fundació Cellex that has given support to outstandingly talented and creative young group leaders at our institute. He brought with him an ERC Starting Grant that funded the project "*How to build a brain? Engineering molecular systems for mechanosensation and protection in neurons.*" His group studies the importance of cells' mechanical properties for health and disease on the molecular and systems levels, exploiting microfluidic and nanotechnological tools to apply precise forces to single cells or animals. Likewise, they have been working to establish an optogenetic neurotransmitter system with the aim to rewire neuronal circuits directly inside animals.

The program on Neurophotonics Mechanical Systems Biology he leads make a unique contribution to the institute. Likewise, highly valued by the committee was Michael's strong emphasis on the training opportunities and career paths after ICFO of the people affiliated with the team he supervises.

Happenings

LATEST ADVANCES

New catalyst unveils the hidden power of water for green hydrogen generation

Green hydrogen, a promising energy vector for decarbonizing society, requires sustainable production methods like water electrolysis, which splits water into hydrogen and oxygen.

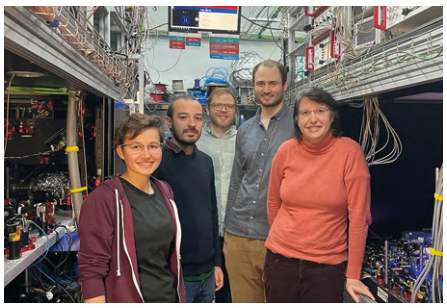
However, proton-exchange-membrane (PEM) electrolysis, the leading technology for its implementation, traditionally relies on scarce materials like platinum and iridium as its catalysts. Only a few compounds combine the required activity and stability at the harsh chemical environment imposed by this reaction, specially challenging in the case of anode catalysts, which have to operate at highly corrosive acidic environments. Iridium, one of the rarest elements on Earth, has been the only stable option for anodes in such conditions.

ICFO researchers **Ranit Ram, Dr. Lu Xia, Dr. Anku Guha, Dr. Viktoria Golovanova, Dr. Marinos Dimitropoulos, Aparna M. Das** and **Adrián Pinilla-Sánchez,** and led by **Professor at ICFO Dr. F. Pelayo García de Arquer,** together with other institutions, report in ***Science*** a new milestone for sustainable green hydrogen production through water electrolysis. They have developed a novel iridium-free catalyst by utilizing previously unexplored properties of water, offering an alternative to critical raw materials for water electrolysis at industrial-relevant conditions; a significant step towards making PEMs independent of iridium.

Their strategy involves a delamination process on cobalt-tungsten oxide (abundant and cheap), where tungsten oxides are replaced by water and hydroxyl groups. This method allowed the catalyst to achieve remarkable performance with higher activity and stability than previous non-iridium catalysts in acidic media.

However, cobalt, being more abundant than iridium, is still a very troubling material considering from where it is obtained. Therefore, they are thinking of alternatives based on other materials to explore and try with their catalyst design strategy.

QUIONE: Announcing the birth of a unique analog quantum processor in the world



Quantum-gas microscopes have proven to be powerful tools for understanding quantum systems at the atomic level by producing high-resolution images of quantum gases. Now, ICFO researchers **Sandra Buob, Jonatan Höschele, Dr. Vasiliy Makhalov** and **Dr. Antonio Rubio-Abadal,** led by **ICREA Professor Leticia Tarruell**, have built their own quantum-gas microscope, ***QUIONE***, **the only one in the world imaging individual atoms of strontium quantum gases, and the first of its kind in Spain.**

QUIONE's main goal is quantum simulation, the area which simplifies complex systems to understand open questions that current computers cannot answer.

The experiment's uniqueness lies in the fact that researchers managed to bring the **strontium gas** (whose more complex properties compared to alkaline atoms offer quantum simulators more ingredients to play with) to the **quantum regime** (cooling it to nearly absolute zero), place it in an **optical lattice** where the atoms could interact by collisions and then apply the single atom imaging techniques. This way they observed individual atoms, quantum tunneling and superfluidity effects.

Now that the team has added strontium to the list of available quantum-gas microscopes, it might be possible to simulate more complex and exotic materials soon. Then new phases of matter are expected to arise, and much more computational power to use these machines as **analog quantum computers** is expected.

A novel universal light-based technique to control valley polarization in bulk materials

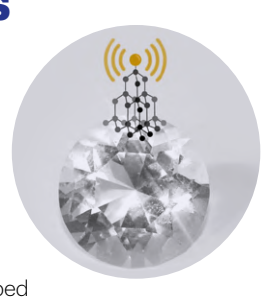
ICFO researchers **Igor Tyulnev, Julita Poborska, Dr. Lenard Vamos**, led by **Prof. ICREA Jens Biegert,** in collaboration with researchers from other international institutions have found a **new universal method to induce valley polarization in centrosymmetric bulk materials.** The discovery, published in ***Nature***, unlocks the possibility to control and manipulate valley population without being restricted by the specific chosen material. At the same time, the method can be used to obtain a more detailed characterization of crystals and 2D materials.

The experiment consisted in creating an intense light pulse with a polarization that fitted the hexagonal internal structure of the material. The result was the "trefoil field", whose symmetry matched the triangular sub-lattices typical of hetero-atomic hexagonal materials.

The resulting valley polarization depended on the orientation of the trefoil field with respect to the material. Therefore, by simply rotating the incident light field, the researchers were able to modulate the valley polarization, a major achievement in the field and a confirmation of a novel universal technique that can control and manipulate the electron valleys in bulk materials.

This technique could contribute to developing energy-efficient materials for information storage and fast switching, addressing the need for low-energy consumption devices and increased computational speed.

Atomic defects in diamond unveil a new class of efficient optical antennas



ICFO researchers **Dr. Francesco Andreoli** and **ICREA Prof. Darrick Chang** in collaboration with researchers from University of Chicago and ANL have developed novel optical antennas based on atomic defects in diamonds, showing up to one-million-fold intensity enhancement for electromagnetic fields. Published in ***Nature Photonics***, the study reveals that Germanium-Vacancy (GeV) centers in diamonds can efficiently concentrate optical energy, enabling advanced sensing and manipulation of their environment.

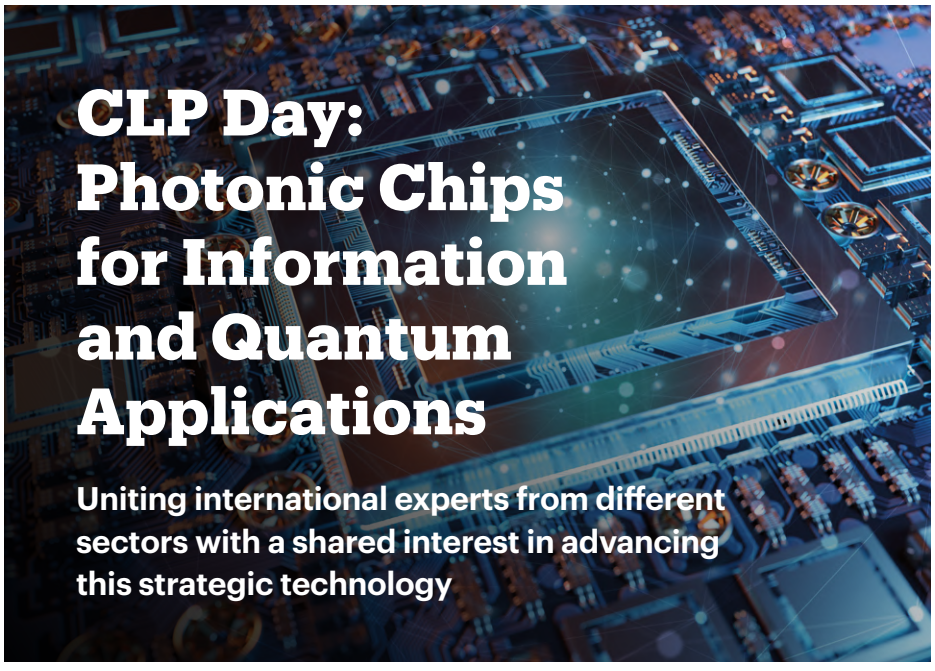
Unlike traditional nanoantennas, which suffer from significant losses at nanoscale sizes, GeV centers maintain efficiency due to their quantum coherence. This allows them to operate at extremely small dimensions without bulk absorption issues.

One of their landmarks was to detect, manipulate and induce for the first time charge variations in nearby carbon vacancies. This detrimental effect had been observed, but it wasn't clear up to now its cause and how to deal with it.

GeVs could improve molecular detection techniques and advance quantum computing by controlling decoherence in solid-state qubits, and might as well open new directions for optical nanoantennas towards yet unexplored regimes.

Happenings

BUSINESS NEWS



CLP Day: Photonic Chips for Information and Quantum Applications

Uniting international experts from different sectors with a shared interest in advancing this strategic technology

The **Corporate Liaison Program (CLP) Day** is a periodic meeting where ICFOnians, representatives of international platforms, multinational corporations, local business representatives and researchers of other institutions have the opportunity to interact with experts from around the world in a particular sector. A different theme of the event is chosen every year, bringing together ICFO researchers with consolidated research expertise related to this field with experts with shared interests hailing from different sectors.

This year's event was focused on **Photonic Chips for Information and Quantum Applications**. Semiconductor manufacturing and innovation moved to a position of strategic international concern when the precarity of the global supply chain was demonstrated by pandemic-induced disruptions in chips production, largely concentrated in Taiwan and South Korea.

With the central role of chips in the global economy in mind, both the European Union member states through acts like the 2023 European Chips Act and the United States through the 2022 Chips Act, aim to strengthen the chip industry and related technologies.

In Spain, efforts are being channeled by means of the PERTE Chip Program (Strategic Project for Microelectronics and Semiconductors) within the Spanish Recovery, Transformation and Resilience Plan.

ICFO, through its leadership in photonics, is exploring new application realms by means of **Photonic Integrated Chips (PICs)**, which integrate the generation, transport and detection of light to perform information processing functions equivalent to electronic chips but using photons for the same purpose. Due to their intrinsic characteristics, PICs are more efficient, more sustainable, faster, more compact and with higher processing capacity than their traditional electronic counterparts, which makes them ideal for emerging applications of enormous economic and industrial relevance, such as quantum technologies for ultra-secure communications, next-gen computing, aerospace, automotive chips, bio-sensing and medical devices, among others.

Accordingly, this year's CLP Day program was designed to reflect the strategic international importance of chips and how photonics and the quantum properties of light can contribute to the above objectives. **Lucilla Sioli**, Director for AI and Digital Industry from the European Commission, as well as **Jaime Martorell**, the special commissioner for Spain's PERTE Chip, began the program by outlining the efforts which are supporting R&D and industrial deployment of Chips at the EU and National levels. Leading researchers and representatives of European projects in PIC pilot lines and up-scaling facilities, as well as company representatives from a range of market verticals where PICs are already playing a key role, followed, giving unique and profound insights as to what is being done, and where future collaborative efforts are needed, to advance the development and commercialization of these technologies of strategic importance to the European Commission and the European industry.

More than 150 participants attended the event and contributed to the discussions. The event succeeded in bringing together experts from around the world for constructive, interdisciplinary discussions that are the necessary building blocks for advances in technology of strategic international importance.

Quside teams up with Equinix for cyber security

Quantum random number generation technology made available to thousands of businesses

ICFO Spin-off **Quside**, is working closely with Equinix, the world's digital infrastructure company®, to enable easy access to the latest quantum random number generation technologies to help customers build the strongest cryptographic foundation to defend against increasingly sophisticated attacks.

Through its globally interconnected Equinix Fabric network, Equinix enables businesses in Spain and worldwide to connect with this highly innovative and robust cyber security solution on high-speed, low-latency, and private network connections.

> *"As businesses seek ever more sophisticated solutions for modern problems, Equinix is proud to support the growth, scale and democratisation of the quantum industry. Working with businesses such as Quside provides our customers in Spain and around the world with unique access to some of the most innovative security solutions on the planet for the on-going transition to quantum-safe cybersecurity and efficient randomized accelerated computation.*
>
> **Eulalia Flo**
> Managing Director for Equinix, Spain

By allowing seamless communication between quantum entropy systems and operational data processing infrastructure, Equinix and Quside are lowering the barrier to world-class security for thousands of businesses across the globe.

Any business, based anywhere in the world on Equinix's network, that is looking to further increase the level of data protection they offer to their customers, can now up-level their encryption with Quside's quantum technology without changing or investing in any additional hardware – thanks to being part of Equinix's interconnected ecosystem.

Equinix already supports a number of quantum businesses as part of its network of over 10,000 customers worldwide. It is already well placed to support businesses such as Quside on their growth journey and lead the transition towards a range of quantum technologies for multiple sectors, including enhanced cybersecurity options and improved power efficiency.

Collaboration

RESEARCH

Photonics Tools for Pediatrics

April 17th, 2024

The Barcelona Medical Photonics Network Annual Meeting gathers experts focusing on photonic techniques to improve diagnostics and treatment personalization in pediatrics

The Barcelona Medical Photonics Network (BMPN) formally launched in March 2021 as a platform to promote the research and development activities in photonics being carried out in the Barcelona region through long-standing collaborations between ICFO and its biomedical and clinical partners. In April, BMPN celebrated the third edition of its annual meeting, co-organized with ICFO's two main medical partners in the field of Pediatrics: **Sant Joan de Déu Barcelona Children's Hospital (SJD)**, where the event was held, and **Vall Hebron University Hospital**, as well as their respective research institutes.

The speakers reviewed different photonic imaging and monitoring techniques and their recent and ongoing applications in several medical fields, with special attention to brain pathologies and neurodevelopment in pediatrics. The day counted with keynotes sessions by ICREA Professors at ICFO Dr. Turgut Durduran and Dr. Morgan Mitchell, Prof. at ICFO Michael Krieg and Dr. Pablo Loza, Head of the **SLN facility** at ICFO. The talks started by discussing **advanced imaging for pediatrics**, showcasing different photonic technologies for patient triage, treatment personalization and monitoring of brain function using advanced microscopy tools, optogenetics and photonics-enabled magnetoencephalography.

Then the topic shifted to non-invasive hemodynamic monitoring, delving into the importance of accessing microcirculation information at the patient's bedside and finding solutions particularly for neonates and young infants, such as the one that the **SafeICP project** is developing for patients in need of intracranial pressure monitoring. In this context, Dr. Joan Sánchez de Toledo, Chair of Pediatric Cardiology at SJD and researcher at IRSJD, and Dr. Marta Camprubí, neonatologist at SJD and researcher at IRSJD, presented the latest results of the **TinyBrains project**, an ongoing European project coordinated by ICFO.

> *It is our honor to see a full room each year for our annual meeting, with a mix of professional profiles that goes from technology developers to clinicians through to innovation managers, both from inside and outside the Network. Multidisciplinary endeavors thrive on collaborative ambiences like this, and while it is not an easy task, because it demands diverse perspectives, effective communication, and mutual trust, the results are very enriching.*
>
> **Dr. Ariadna Martínez**
> ICFO Light for Health program coordinator

Quantum Communication Pioneers of European Quantum Flagship Projects

June 5th, 2024

Researchers, industry leaders and innovators in the field of quantum communications gathered for the "Quantum Communications in Europe: Building the next generation of European quantum technology" event organized by the Quantum Flagship projects Quantum Secure Networks Partnership (QSNP) and Quantum Internet Alliance (QIA) and hosted by ICFO.

The dynamic event brought together policymakers, scientific experts, high-tech engineers, and technology start-ups to review and discuss the latest advancements and collaborations in this cutting-edge field, not only at the European level, but also gaining a clear context of the international panorama.

As a joint meeting of two Quantum Flagship projects, the project coordinators, **Valerio Pruneri** (ICREA Professor at ICFO and QSNP Coordinator) and **Stephanie Wehner** (Professor at QuTech and QIA Coordinator) set the stage for the day's activities. **Gustav Kalbe**, Acting Director of Digital Excellence and Science Infrastructure at the European Commission delivered the welcome words, and then was joined by **Tanner Crowder**, Senior Policy Advisor for the White House Office of Science and Technology Policy (USA), and **Mikio Fujiwara**, Director of the Quantum ICT Collaboration Center (Japan), all offering an overview of the international ecosystem as well as polices that each region is adapting to establish different programs to accelerate the research and development of quantum technologies and boost economic and national security.

> *The Government of Catalonia has demonstrated unwavering commitment to funding long-term effort quantum technology programs, by giving support to initiatives and projects within this field in particular. This underlies Catalonia's belief in the importance of staying at the forefront of technological evolution but also its commitment to fostering a thriving ecosystem that nurtures ground-breaking discoveries while seeking to enable collaboration among experts in the field.*
>
> **Gina Tost**
> Secretary of Digital Policies, Generalitat de Cataluña

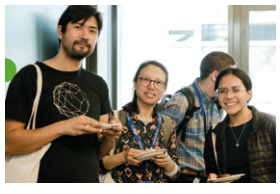
The full day agenda of impactful talks, workshops, presentations, and discussions that followed where participants in both projects shared perspectives, concerns and expertise, provided a platform for interdisciplinary and insightful interactions. The keynote talk, "**Trends in Quantum Technology and the state of business in Quantum Communications**" given by **Nikolas Mohr**, Expert Partner on Digital & Tech strategy and transformation at McKinsey, putting into perspective the enormity of the global public investments in quantum technologies emphasising the rising trend in uptake, investments and opportunities in the field of quantum communications. Other topics ranged from the current challenges and opportunities within the quantum communications market, strategies for commercialization and the importance of fostering new talent.

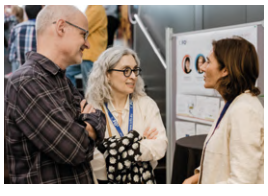
Collaboration

COMMUNITY

Alumni Reunion 2024

Over 150 ICFOnians gather to tell "the ICFO Story"





Back in 2016, ICFO formally launched its Alumni Network in order to provide a platform and institutionally backed structure allowing ICFOnians to maintain common ties, support personal and professional relationships as well as common interests and goals. We held our first Alumni Reunion in September of that year, bringing together over 80 ICFOnians from around the world who celebrated the kick-off event with talks about science and innovation, and reconnected through networking session where all could share experiences and perspectives.

In planning the **2nd Alumni Reunion, celebrated on April 26th,** it was agreed that the reunion program should simply focus on the individual stories told by ICFOnians about their ICFO-related adventures which, when strung together, recounted "the ICFO Story". This simple and effective strategy created an event that allowed all present to focus on some of the key moments and achievements that make ICFO a leading research center as well as a supportive community strengthened by the diverse contributions of each member.

It was clear before the formal program even began that the day would be a success in terms of reconnecting. It took longer than usual for participants to settle into the auditorium as most took their time to greet and embrace, quickly catching up before taking a seat. **Andrea Morales**, coordinator of the Alumni Network and **Rob Sewell**, Chair of the Alumni Committee, opened the reunion warmly, but swiftly passed the floor to **Lluis Torner** who, as the founding director of the institute, has more stories in his portfolio about all generations of ICFOnians than most. He set the inclusive tone for the day by welcoming each and every person in the room by name and remembering members of the community that were no longer with us.

Collaboration

To facilitate inter-generational networking between current ICFOnians and Alumni, a long coffee session followed the opening talk in a Career Fair format. Some alumni were eager to share career opportunities in their own research groups and companies, but all were interested in learning about current trends, advances, and why not, all the personal details of friends and colleagues who circulated around the Nest Hall.

Saturday turned out to be a great day for an Alumni BBQ. No on one had trouble finding the venue which was the very same place where ICFOnians have celebrated scores of Calçotadas and Food Festivals through the years. While "a blast from the past" for some, for some partners and family members this was a new venue and a chance to put faces to names and stories they had heard through the years. All stayed dry in spite of a 65% chance of rain, and the relaxed outdoor extended family party was the perfect way to round out the reunion.

A heartfelt thank you to the 150+ ICFOnians who took part in the reunion activities, and to the 2000+ ICFOnians whose unique stories, over the past 22 years, have impacted the institute. With each year and each new ICFOnian that enters or "goes and flies" into a new adventure, the institute grows and flies, expanding its reach, amplifying what it can do, empowering our extended community to make a positive mark on the world.

The reunion was designed to facilitate the telling of stories. Osamu, Alejandra, Carlos, Danny, Gabi, Armand, Silvia and Giovanni, as well as our session chairs, Naeimeh, Parisa, and Carsten, presented their own memories which in turn inspired more reminiscing and giggles from all in the room.
We also spent the afternoon exploring new corners of the ICFO facilities and labs, and ended helping ICONS to celebrate the birth of a student club, with many of its founding members in the room.

COMMUNITY

Happy 20th Birthday ICONS

PhD students at ICFO got together to create a student organization, originally known as the Optical Society of America (OSA) Student Chapter, in 2004

Thanks to the enthusiasm of these founders who had ambitious goals for promoting new career opportunities for ICFO students by offering access to the international photonics communicatee and additional training opportunities, as well as the contributions of scores of students who would follow, the organization grew into the **ICFO Organization and Network of Students (ICONS)** that we know today.

Panel discussion with ICONS icons

With many of these founders and a large number of its later leaders present at the 2024 Alumni Reunion, it was the perfect moment to celebrate ICONS' 20th anniversary, retelling the story of its history and discussing milestones.

20 years of ICONS Leadership

To celebrate the momentous occasion, the event ended with a blow-out, all ICFO **Social Friday** flanked by past and present drivers of the Student Network!

Collaboration

OUTREACH

Investiga'm

The program is based on the iScientist program from the Davidson Institute of Science Education at the Weizmann Institute of Science and was made possible thanks to the collaboration between the BIST and Davidson Institute.

With the aim of breaking stereotypes about research and facilitating insightful interactions between students and scientists, BIST and all the centers that make up its scientific community have created investiga'm, a program that provides students with tools to learn about a scientist and their research field, as well as a methodology to help formulate questions about their work, underlying science and careers.

Students during a Investiga'm virtual session

The pilot program of Investiga'm lead by BIST took place during May and June 2024, where each research center coordinated the virtual and in-person sessions with its scientists and took on the challenge of bringing science and scientists closer to both secondary school students and the general public.

With over 200 participants from 11 schools and 3 civic centers, the event initiated enriching conversations with 14 scientists from the BIST centers, three of whom from ICFO focused on health, energy, and quantum information topics. Each session included an introduction of a scientist and their research, followed by an interactive workshop, where participants prepared an interview and directed questions, doubts, curiosities and interests to the scientist.

During the preparation process all participants were highly engaged and showed interest in the activity, with over 95% of participants willing to repeat the experience

> *"It has been a very enriching experience both for the students' scientific knowledge and for meeting role models for their future professional if they consider dedicating themselves to scientific research.*
>
> **Quote from Investiga'm teacher**

> *I really liked how we prepared all the questions in groups.*
>
> *I found it very useful to do this interview as we started with a lot of doubts and ended up with a lot more answers than we thought. What I liked the most was going deeper into the topic and discovering everything we needed.*
>
> **Quotes from Investiga'm students**

The program now aims to continue growing by adding new activities within the BIST community, creating a platform for dissemination, and providing tailored training for teachers. Together, these efforts, will help to consolidate and build a mature project.

Thank you ICFO Outreach Volunteers

The following ICFOnians participated in outreach activities (April – June 2024) sharing their enthusiasm for science with new audiences: Dr. Adam Vallés Marí, Prof. Dr. Adrian Bachtold, Dr. Álvaro Cuevas, Ana Pérez Barrera, Prof. Dr. Antonio Acín, Dr. Antonio Rubio Abadal, Dr. Barbara Polesso, Dr. Clara Vilches Caubet, Constanza Agazzi, Diana Méndez, Diksha Mittal, Eric Calatayud Gómez, Georgina Tresanchez, Dr. Gustavo Castro, Jacqueline Martínez, Javier Arres, José Javier Ruiz González, Laura Zarraoa, Prof. Dr. Leticia Tarruell, Lorenzo Orsini, Dr. Luis Trigo, Marina Cunquero Navarro, Dr. Mariona Dalmases, Dr. Marta Zanoletti, Prof. Dr. Michael Krieg, Dr. Michal Gwizdala, Mirko Fornasier, Miguel Dosil, Dr. Nicoletta Liguori, Dr. Nishigandha Patil, Dr. Pablo Loza-Álvarez, Prof. Dr. F. Pelayo García de Arquer, Dr. Raja Yehia, Rajashree Haldankar, Santiago Ortiz, Dr. Stefan Forstner, Dr. Susanna Tagliabue, Prof. Dr. Turgut Durduran, Prof. Dr. Valerio Pruneri, Dr. Viktoriia Golovanova.Miguel Dosil, Dr. Nishigandha Patil, Dr. Raja Yehia, Rajashree Haldankar, Dr. Samuele Grandi, Tomas Lamich, Victor Roman Oliver.

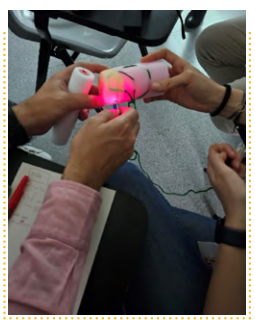
Become an Outreach Volunteer
outreach@icfo.eu

STEAMConf Barcelona 2024

In the framework of the 9th International Education Conference, ICFO organized a workshop for teachers focused on the use of light in medical photonics applications

The workshop demonstrated how light is a valuable tool for non-invasive and precise diagnostic techniques. Participating at the STEAMConf was a fantastic occasion to present the "*Medical Photonics for the Classroom*" platform and bring a hands-on activity to explore the fascinating interactions between light and matter, especially with the human body. At the workshop two modules of the proposed classroom activities of this platform were tested.

The ICFO Outreach team is closely working with the Medical Optics group led by **ICREA professor at ICFO Dr. Turgut Durduran** to develop this educational platform on medical photonics, "*Medical Photonics for the Classroom*", which is partially funded by Fundació Catalana per a la Recerca i la Innovació (Oró Grant 2023). The platform will be launched in July on the Outreach website under "Resources for Teachers." Programs and additional trainings for teachers are envisioned in the future.



People

GO & FLY

Congratulations to 8 New ICFO PhD Graduates

320 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.

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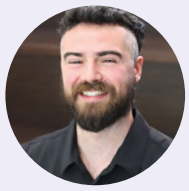
Joana Fraxanet Morales

Quantum many-body approaches to non-conventional topological phases of matter

April 12, 2024
ICREA Prof. Dr. Maciej Lewenstein



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Borja Requena Pozo

A machine learning ride in the physics theme park: from quantum to biophysics

April 24, 2024
ICREA Prof. Dr. Maciej Lewenstein and Dr. Gorka Muñoz

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Jonatan Höschele

A strontium quantum-gas microscope

April 29, 2024
ICREA Prof. Dr. Leticia Tarruell

316

Styliani Avtzi

Hybrid diffuse optics methods to assess the emergence of dementia in older adults

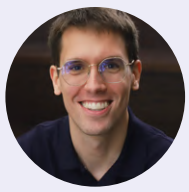
May 3, 2024
ICREA Prof. Dr. Turgut Durduran

317

Jaime Díez Mérida

Probing Magic-Angle Twisted Bilayer Graphene with Monolithic Gate-Defined Josephson Junctions

May 23, 2024
Prof. Dr. Dmitri K. Efetov and ICREA Prof. Dr. Maciej Lewenstein



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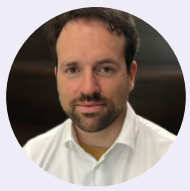
Javier Rivera Dean

Non-classical states of light: generation via strong-field processes and applications in quantum key distribution

May 24, 2024
ICREA Prof. Dr. Antonio Acín and Dr. Marcelo Ciappina



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Christian Knapp

Quantitative Fluorescence Imaging of Spatiotemporal Dynamics of DNA Damage and DNA Replication in Health and Disease

June 3, 2024
ICREA Prof. Dr. María García-Parajo and Dr. Felix Campelo

320

Sumana Chetia

New multi-modal neuroimaging approaches combining photonics and electrophysiology to study the basics of neurovascular coupling

June 10, 2024
ICREA Prof. Dr. Turgut Durduran

COMMUNITY

1. 3rd Annual Beach Volley Charity Tournament

2. Pride Month Book Club: "La Mala Costumbre" by Alana Portero opens a dialogue about many topics including social class, gender, and identity.

3.-5. Sant Jordi - a book and a rose

6.-8. Excursionistas in the Costa Brava

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. He's the first Barcelona metro driver with a PhD Degree in Photonics and a paper in *Science*.
2. Some days he comes to ICFO by bike from Barcelona.
3. He is a passionate about visual arts: photography, painting and renders.
4. He became the first community manager of his group.

The Last Word

HIGH PROFILE

Joan Comella Carnicé

Director of Research, Innovation and Learning at the SJD Barcelona Children's Hospital and Director of the Institute of Research Sant Joan de Déu (IRSJD)

IRSJD is an important partnering institute in the Barcelona Medical Photonics Network (BMPN) and with a special collaboration through the Joint Lab with ICFO. What do you see as the strength of these strategic partnerships and how specifically does IRSJD's research benefit?

The Sant Joan de Déu Hospital is a reference hospital dedicated primarily to childhood diseases. In addition to basic care, we see diseases known as rare, minority, or complex, for which there is very little known and that other hospitals cannot or do not want to take on. Our vocation is to try to cure, diagnose, and understand these diseases. Although we have very good doctors and surgeons, sometimes we need new technology to understand the cause of these diseases.

In Barcelona we are lucky to have excellent research centers, like ICFO, who, precisely because of the very cutting-edge type of research they do and the technology they are developing, make excellent partners. They allow us to analyze our patients' complex cases from a new perspective, helping to generate new knowledge to understand the origins of these diseases. We agree to collaborate on topics of common interest, creating open innovation with multidisciplinary teams working towards solutions. The BMPN is a long-term alliance and it is not just important for IRSJD. At ICFO you do fantastic science that sometimes seems like magic to us. We can help this science have an impact on children's lives.

> *We all need to raise awareness in society that science is important and that science changes lives, allowing us to imagine a much better future.*

I understand that, as director of IRSJD, your goal is to continue and strengthen your institute's "pursuits of global excellence with a tangible impact on enhancing the diagnosis and treatment of disease in its field". How are you doing this?

It always comes down to children who have very serious rare or minority diseases for which industry is not prepared to make a large and long-term investment. These are cases where we must try to contribute through patient care and research. We belong to 95% of the European networks of pediatric hospitals and coordinate two of them. We are also collaborating with hospitals in the United States. As an international collaborative network, if there is a discovery in one of these centers, this can quickly be incorporated into the rest of those centers. There are also increasingly some pharmaceutical companies that are betting on these therapies and we have to help them so that they can be developed through clinical research.

But I insist that when it comes down to understanding diseases to seek these diagnoses and treatments, we need alliances with the most basic research centers.

Having held leadership positions in hospitals, research facilities, research-related societies, foundation and associations in Catalonia, Spain, and Europe, you are uniquely poised to assess the relative strengths of our research ecosystem here in Spain- How are we doing?

The evolution of science in Spain in the last 40 years has been a fascinating success story. We have gone from not being on the map, to systematically appearing in positions among the top 15 countries in the world. In addition to publications, Spain is a true international power doing clinical research, second in the world after the US in doing clinical trials in some cases. Catalonia has rates of attracting competitively funded projects that are among the highest in Europe. This is the good news.

Spain has proven less successful at converting good science into an economic return. We must also be able to strengthen the private sector with the generation of spin-off companies and by demanding that large industrial companies base their growth on innovation and scientific knowledge.

The main problem is bureaucracy. It is increasingly difficult for us to be able to carry out our work due to documentation that often does not add any value. Our regulation in Spain should not be higher than that of the countries with which we must compete.

You have demonstrated throughout your career that there are many roles a scientist can play to have an impact. What advice would you give to ICFOnians who would like to see research improve the lives of people.

There is an argument that says that it is not rich countries that invest in science, but rather countries that have invested in science that become rich. To convert science to wealth and therefore sustain our welfare system and future generations, we must first be able to convert science into something tangible, which changes people's lives. This can be monetized, creating jobs and will happen if we are able to explain science's role in this process to society.

Vote for political options that are committed to carrying out research and innovation, the model of economic sustainability. We all need to raise awareness in society that science is important and that science changes lives, allowing us to imagine a much better future.

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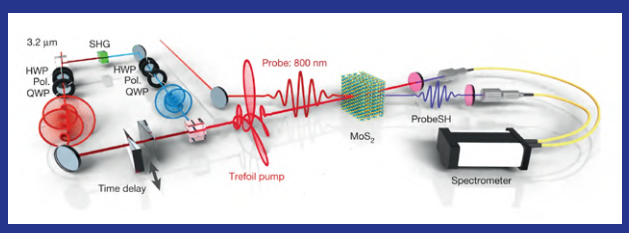
Please send questions, comments and suggestions to communications@icfo.eu

SCIENCE QUIZ



Researchers from the group of Jens Biegert, in collaboration with researchers in Madrid, Berlin, Erlangen, Haifa and London, recently used an optical pulse with trefoil polarization to induce valley polarization, as revealed by second harmonic generation.

"Valleytronics in bulk MoS2 with a topologic optical field" *Nature*, April 2024

1. Which of these is not a trefoil ?

A) 

B) 

C) 

D) 

2. What is a "valley" in this context?

A) An energy minimum in the conduction band

B) An energy maximum in the valence band

C) Either

3. What is "valley polarization"?

A) Spin imbalance in a valley

B) Charge imbalance in a valley

C) Population imbalance between valleys

D) Collapse of the political centre in the Loire

4. Which does not contribute to explain the results ?

A) Intra- and extra-cellular proteins

B) Intra- and extra-terrestrials

C) Invert and normal sugars

D) Lipids

Bonus question: Is "topologic" really a word?

A) Yes, it means "related to topology" or "topological"

B) No, it does not appear in any major English dictionary

Answers on pg. 2