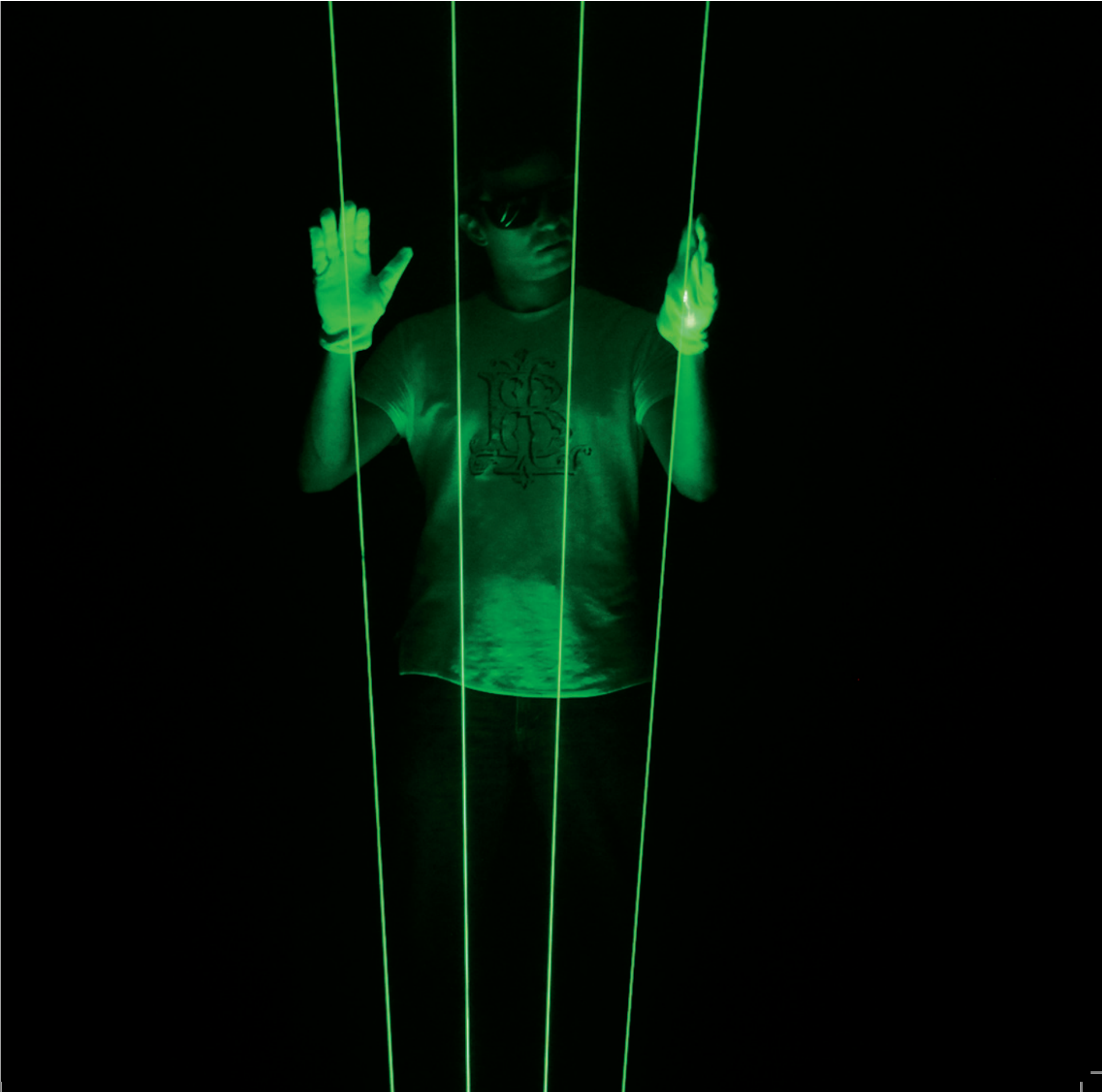


# ICFONians

Community News from the Institut de Ciències Fotòniques



## EDITOR'S CORNER

### Reaching out



**BROOK HARDWICK**  
Coordinating Editor



The other day, my son said to me, “My friend’s grandfather told me that you work at THE BEST institute for Physics in the world. Is that true?” His question was innocent, curious and frankly unexpected- he is after all, only in 4<sup>th</sup> grade. But it was one of many proud ICFOnian moments I have had recently related to the Max Planck study on *Mapping Scientific Excellence* which analyzes information from Scopus to project the potential impact of research from a given institute. The study placed ICFO in the highest position in the ranking in our area. Not only is it motivating to be associated with this level of excellence, it was wonderful to see this news trickle down through all levels of society (it is not often that this kind of information reaches elementary school students!)

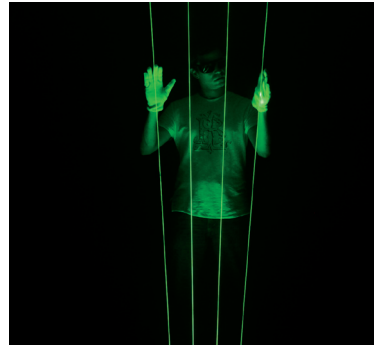
ICFO works very hard to spread the word on the importance of Photonics and to educate society at large on our work. This edition of ICFOnians focuses on ICFO’s efforts to make an impact on a very wide range of audiences, starting with a very unique program organized by our Outreach team, *La Llum a Les Ones* (Light on the Waves) which aims at motivating young minds and their teachers to write poetry and short stories inspired by light. Now in its second year, the program has successfully united musicians, teachers, students and ICFOnians, in a creative and exciting celebration of light.

Summer at ICFO is traditionally a time when the institute swarms with activity. It is the ideal season for Summer Fellows and students to visit the institute to learn about the research being conducted in our center, and to interact with ICFOnians. Between the Summer Fellows Program, in the framework of the Ignacio Cirac – Fundació Catalunya - La Pedrera Program Chair, the new CiM Cellex program, Outreach Summer Students, as well as the E2C3 program from Fundació Catalunya - La Pedrera, ICFO has made room for 21 students, some still in high school, others in University or Masters level programs, and a few about to join ICFO to begin the PhD program. All of these participants have had a chance to sample life as ICFOnians and to be infected by the spirit of innovation that motivates our work.

In line with all this young energy and creativity at ICFO this summer, we are very fortunate to count on the participation of Dr. Jorge Wagensberg - scientist, professor, editor, writer, speaker, and founder of the CosmoCaixa Museum in Barcelona and Madrid, our invited guest in the High Profile column. His enormously successful activities in the area of Scientific Outreach are an inspiration and support for ICFO’s own outreach efforts and we are grateful for his collaboration.

Without giving any more of our news away, I encourage you to explore this edition of ICFOnians to see what is happening at our “little” research institute with a big heart and big ambitions. The last few months have been packed with ‘Proud ICFOnian’ moments and lots of news to share. We really are doing amazing things to put light to work!

## COVER



This laser harp was built by Outreach Summer Student, Adrián López, coordinated by Dr. Marta García Matos from the Outreach team and supervised by Research Engineer Dr. Jordi Andilla, the inspiration behind the harp and the musician who played this unique instrument during the *Light on the Waves* concert at CCCB (27 Sept). The harp is a beautiful and impressive reminder that light is a ubiquitous tool that can be used in a huge range of unexpected and wonderful applications.

## INDEX

<b>EDITOR'S CORNER</b>	<b>2</b>
<i>Reaching Out</i>	
<b>HAPPENINGS</b>	<b>3</b>
<b>ICFO NEWS</b>	
<i>Mapping Scientific Excellence</i>	
<i>ERC Starting, Advanced and Proof-of Concept Grants</i>	
<i>Templeton Foundation</i>	
<i>Nature Publishing Index 2012's Top 200</i>	
<b>ICFO NEWCOMERS</b>	<b>3</b>
<b>LATEST ADVANCES</b>	<b>4</b>
<i>Uncovering Nature's Quantum Secret</i>	
<i>Artificial Graphene</i>	
<i>Noninvasive measurements of hemodynamics</i>	
<i>Deterministic teleportation between distant atomic objects</i>	
<b>BUSINESS NEWS</b>	<b>4</b>
<i>HemoPhotonics</i>	
<b>COLLABORATION</b>	<b>5</b>
<b>YOUNG TALENT</b>	
<i>Summer Fellows, Outreach Students, E2C3 and CiMs-Cellex</i>	
<b>COLLABORATION/PEOPLE</b>	<b>6</b>
<b>YOUNG MINDS</b>	
<i>Frontier of Quantum Physics Summer School</i>	
<b>GO &amp; FLY</b>	<b>6</b>
<i>Iván Amat</i>	
<i>Rafael Betancur</i>	
<i>Mónica Marro</i>	
<i>Alberto González Curto</i>	
<i>Lars Würflinger</i>	
<b>CREATIVE MINDS</b>	<b>7</b>
<i>Light on the Waves- 2nd Edition</i>	
<b>THE LAST WORD</b>	<b>8</b>
<b>HIGH PROFILE</b>	
<i>Dr. Jorge Wagensberg</i>	

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Brook Hardwick, Head of Communications Unit

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**ICFO NEWS**



**MAPPING SCIENTIFIC EXCELLENCE**

A study led by the Administrative Headquarters of the Max Planck Society places ICFO in the top position of research institutions world-wide in the area of Physics thus confirming the top quality and relevance of ICFO authored papers. The study analyzes data from Scopus on publications and citations, projecting an institute's probability of publishing papers which belong to the 10% most-cited papers within their subject categories. The remarkable ICFO position confirms the potential of the institution to cultivate and nurture top scientific talent- great news for an institution that is specially committed to offering outstanding opportunities to early career researchers and PhD students.

**ERC STARTING, ADVANCED AND PROOF OF CONCEPT GRANTS**

The European Research Council is the first pan-European funding organization for frontier research, which aims to stimulate scientific excellence in Europe by encouraging competition for funding between the very best, creative researchers of any nationality and age. ICFO proudly announces three grants for ICFO research. ICREA Professor at ICFO, Maciej Lewenstein was awarded the *ERC Advanced Grant* which provides generous funding to senior research leaders. PROJECT: "OSYRYS -Open Systems Revisited: From Brownian motion to quantum simulators". Nest Fellow, Prof. Melike Lakadayali was awarded the *ERC Starting Grant* which aims to support young researchers to establish themselves as independent research leaders. PROJECT: "On the move: Motor cargo and motor-microtubule interactions studied with quantitative, high spatio-temporal resolution microscopy in vivo". Nest Fellows Professors Frank Koppens (*ERC Starting Grant '11*) and Gerasimos Konstantatos have been awarded a *Proof-of-Concept Study Grant* which aims to help ERC grant-holders bridge the gap between their research and the earliest stage of a marketable innovation. PROJECT: GraQuaDot- developing novel ultrasensitive imaging sensors based on graphene-quantum dot hybrid technology.

**TEMPLETON FOUNDATION**

The John Templeton Foundation, a US based entity that serves as a philanthropic catalyst for discoveries relating to the "Big Questions" of human purpose and ultimate reality, has formalized a generous grant for a project entitled *Intrinsic Randomness in the Quantum World* which will be led by ICREA Professors at ICFO Antonio Acín (PI) and Maciej Lewenstein (Co-PI), as well as Prof. Marek Kus (Co-PI) from the Polish Academy of Sciences. The Foundation's motto, "How little we know, how eager to learn," exemplifies their support for open-minded inquiry and their hope for advancing human progress through breakthrough discoveries.

**NATURE PUBLISHING INDEX 2012's TOP 200**

The Nature Publishing Index, based on the tracking of the number and affiliations of primary research articles published in 18 Nature-branded journals, has included ICFO in its 2012 "Top 200". This ranking measures absolute numbers of publications, putting large entities with multiple institutes at a clear advantage. ICFO is the only institute of its size in Spain and one of few in the world to achieve a spot in the top 200, a truly remarkable achievement.

**ICFO NEWCOMERS**



**Nuray Aysan**  
Postgraduate Student



**Richard Lane**  
Postdoctoral Researcher



**Dalibor Javurek**  
Visiting PhD-student



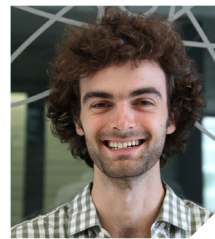
**Andrew Ferris**  
Postdoctoral Researcher



**Noslen Suárez Rojas**  
PhD Student



**Laura Pulido Mancera**  
Postgraduate Student



**Stijn Goossens**  
Research Engineer



**Miguel Mireles Núñez**  
PhD Student



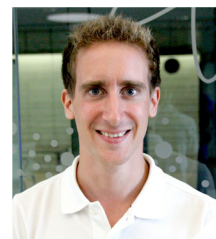
**Boris Bourdoncle**  
Postgraduate Student



**Sathya Sai**  
Postgraduate Student



**Juan Miguel Pérez Rosas**  
Postgraduate Student



**Peter Schmidt**  
Postgraduate Student



**Daniel Sánchez Peacham**  
PhD Student



**Denis Guilhot**  
Program Manager



**José Ramón Martínez Saavedra**  
Postgraduate Student



**Charles-Antoine Mignon**  
PhD Student



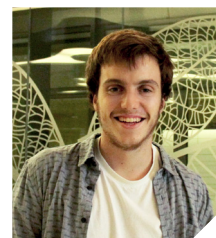
**James Hugall**  
Postdoctoral Researcher



**Oto Brzobohaty**  
Visiting Scientist



**Alina Hirschmann**  
Communications



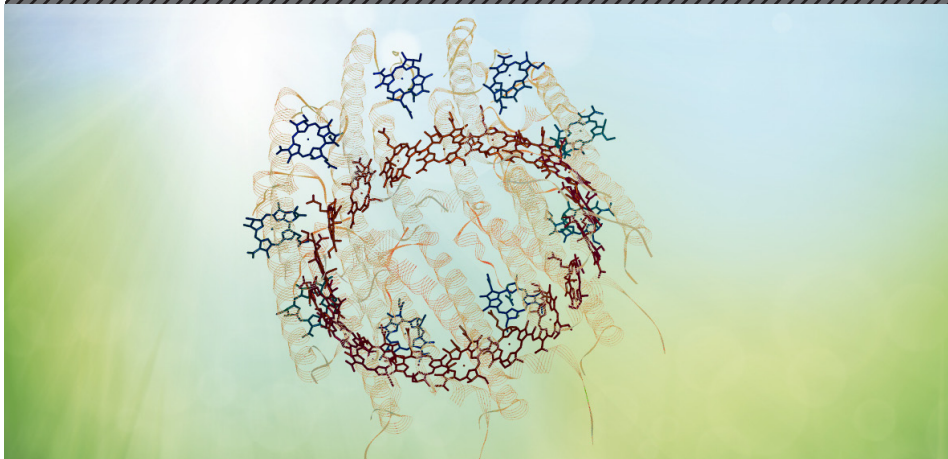
**Ignacio Sarasúa Cañedo-Argüelles**  
Undergraduate Student

Many of us joined ICFO or took a new position at the Institute between Mid June and September 2013.





## LATEST ADVANCES



## UNCOVERING NATURE'S QUANTUM SECRET

In an article published in *Science*, researchers from the group led by Prof. Niek van Hulst, in collaboration with biochemists from the Univ. of Glasgow, have shown for the first time at ambient conditions that coherence is responsible for maintaining high levels of transport efficiency in biological systems, even while they adapt their energy transport pathways due to environmental influences. Quantum coherence is manifested in photosynthetic antenna proteins that are responsible for absorption of sunlight and energy transport towards the photochemical reaction centers where the energy is stored. The process was observed by sending ultrafast femtosecond light flashes to capture a high-speed series of 'pictures' of the states of individual antenna proteins after light absorption. The energy transport pathways were traced at the level of individual antenna proteins and researchers showed that each protein uses a distinct pathway. Surprisingly, while the transport paths within single proteins vary over time due to changes in the environmental conditions, the protein uses the quantum character to adapt for optimal efficiency.

## ARTIFICIAL GRAPHENE

Recent advances in the design and fabrication of artificial honeycomb lattices pave the way for the realization, investigation, and manipulation of a wide class of systems displaying massless Dirac quasiparticles, topological phases, and strong correlations. One can consider these systems as examples of artificial graphene systems, which may provide a perfect playground for simulating and studying graphene physics. In a review in *Nature Nanotechnology*, Prof. Maciej Lewenstein with colleagues from Pisa, Madrid and Stanford, discusses recent progress in the creation of such artificial structures focusing on atom-by-atom assembling by scanning probe methods, nanopatterning of ultra-high-mobility two-dimensional electron gases in semiconductors, and optical trapping of ultracold atoms in crystals of light. They also discuss photonic crystals with Dirac cone dispersion displaying zero-refractive index and directional electromagnetic flow analogous to chiral edge states. The paper emphasizes how the interplay between single-particle band-structure-engineering and cooperative effects leads to spectacular manifestations in tunnelling and optical spectroscopy. (More on graphene at [graphene.icfo.eu](http://graphene.icfo.eu))

## NONINVASIVE MEASUREMENTS OF HEMODYNAMICS

Clinical results obtained by the group led by ICFO Prof. Turgut Durduran, in collaboration with researchers from University of Geneva, were selected as the featured article in *Physiological Measurement*. This paper discusses the cardiac cycle related pulsatile behavior of the hemoglobin concentration and oxygen saturation in the human patella (kneecap). Although the nature of the bone itself, which is hard and covered by other tissues, makes it difficult to investigate, noninvasive, quantitative and practical measurements of its hemodynamics could improve our fundamental understanding of bone function with potential applications in diagnosis and treatment of bone diseases. In this study by means of near infrared frequency domain spectroscopy, researchers were able to characterize optical and physiological properties of kneecap bone that opens a new window for future studies of vascular and skeletal diseases.

## DETERMINISTIC TELEPORTATION BETWEEN DISTANT ATOMIC OBJECTS

Quantum Teleportation is an essential element in Quantum Information Science and a key ingredient for distributed quantum networks. To date, the teleportation of a quantum state between two matter systems over a macroscopic distance could only be demonstrated in a probabilistic fashion. On the cover page of *Nature Physics*, a collaborative paper between Dr. Christine Muschik from the Quantum optics theory group at ICFO led by Prof. Maciej Lewenstein and the group led by Prof. Eugene Polzik at Niels Bohr Institute, presents a novel protocol for teleportation over a distance of 0.5m, allowing for the deterministic transfer of a quantum state, i.e. successful teleportation protocol in every single attempt. This feature is not only important for technological applications but opens up new possibilities for the teleportation of quantum dynamics.

## BUSINESS NEWS

*HemoPhotonics- ICFO spin-off in the medical device field*

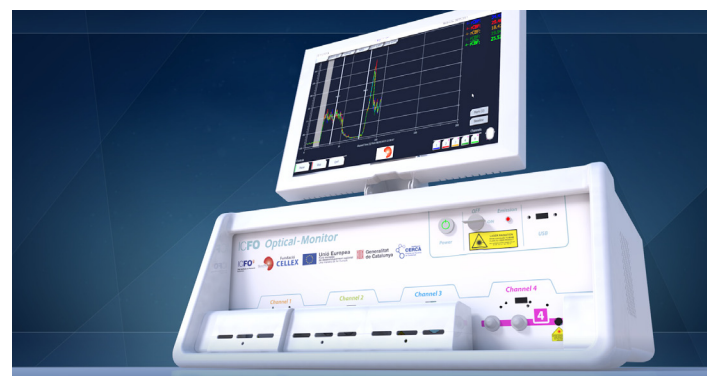
Noninvasive measurement of cerebral hemodynamics for clinical and scientific research applications

HemoPhotonics, ICFO's fifth spin-off company, was launched in April 2013 after two years of incubation in ICFO's KTT Launchpad under the supervision of ICFO Group Leader Prof. Turgut Durduran.

The new high-tech company is a result of Prof. Durduran's extensive know-how in medical optics and optical monitors. HemoPhotonics set up house in ICFO's incubator and is devoted to translating light-based technologies into compact and customized systems for non-invasive measurement of cerebral hemodynamics for clinical and scientific research applications.

The ICFOnian behind this new venture is Udo Weigel, who is CEO and co-founder of the new company. Udo obtained his PhD at Ruprecht-Karls University Heidelberg, Germany and has extensive experience in translational research. After working in both a university and industrial setting, in 2009 he joined the group led by Prof. Turgut Durduran at ICFO as a postdoctoral researcher. During the last two years of his postdoc, he led the pre-commercial prototype development project, partially financed under the Prova't funding scheme, which led to the formation of the company.

"For many scientists, the idea of translating innovative lab-based technology into applications that will help society is very exciting. ICFO's innovation-friendly and supportive environment is making it possible for HemoPhotonics to pinpoint the practical solutions which will maximize the utility of our non-invasive technology for researchers and doctors working with hemodynamic parameters" — Dr. Udo Weigel.





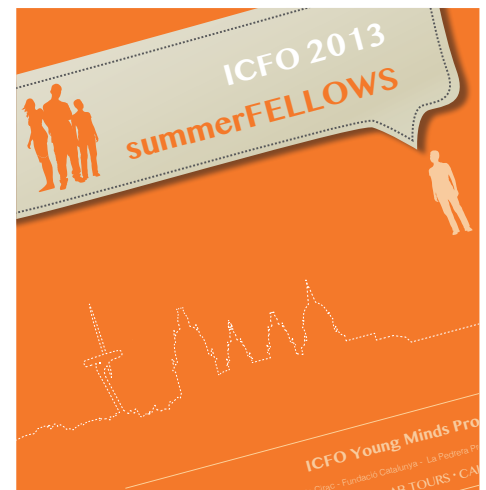
YOUNG TALENT

Young Minds programs welcome undergraduate and highschool students to ICFO

Students and budding researchers take advantage of summer opportunities to learn more about Photonic Sciences

Now in its 7th edition, the Summer Fellows Program in the framework of the Ignacio Cirac – Fundació Catalunya - La Pedrera Program Chair, welcomed nine undergraduate students to ICFO to carry out challenging research projects under the supervision of a Group Leader. This

program is part of ICFO's efforts to attract top talent at an early academic career stage. It represents a unique opportunity for the Fellows to collaborate in frontier research projects, to learn how these projects are conducted and to gain real research experience.



Fundació Catalunya - La Pedrera

The ICFO Summer Fellows tell us what made their experience at ICFO unique and valuable:



**Pau Bramon**  
 • Aged 23, Girona  
 • Telecommunications Engineering Student, Univ. Politècnica de Catalunya  
 • ICFO GROUP: Medical Optics

*"A big take-away has been learning how to work within a group. There is a big difference between doing things to resolve your own questions, and doing things that can help the group."*



**Jordi Morales**  
 • Aged 23, Girona  
 • Masters in Telecommunications Engineering Student, Univ. Autònoma de Barcelona  
 • ICFO GROUP: Plasmon nano-optics and Medical Optics groups

*"ICFO has a healthy environment that fosters camaraderie and professionalism which helps stimulate the imagination and discipline that scientists need to develop their work."*



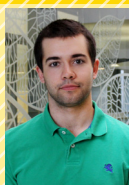
**Alvaro Piedrafita**  
 • Aged 22, Barcelona  
 • Telecommunications Engineering Student, Univ. Politècnica de Catalunya  
 • ICFO GROUP: Quantum Information with cold atoms and non-classical light

*"Learning how to build a setup from zero and all that needs to be done in an experiment before you can gather data are things that you can't learn in college but are very important for any scientist who wants to have a big picture and a solid base in his field."*



**Alejandro Pozas**  
 • Aged 21, Madrid  
 • Physics Student, Univ. Complutense de Madrid  
 • ICFO GROUP: Nano-optoelectronics

*"As I toured ICFO at the beginning of the program and saw the facilities and realized all the science that was taking place under this roof, I felt a mixture of amazement, excitement and motivation to do my very best work during this program."*



**Vicenç Rubies**  
 • Aged 22, Barcelona  
 • Electrical and Biomedical Engineering Student, Boston Univ.  
 • ICFO GROUP: Optoelectronics

*"The interactions with the rest of the Summer Fellows were a crucial part of my experience. Since we were each working with a different group, we could share our experiences and learn about more research areas."*



**Toni Rubio**  
 • Aged 22, Barcelona  
 • Physics Student, Univ. de Barcelona  
 • ICFO GROUP: Quantum information theory

*"After visiting ICFO during the PhD open day and getting to know about its research, I decided I wanted to be a part of this institution, and the Summer Fellows Program was clearly the best opportunity to do so."*



**Xavi Salvat**  
 • Aged 22, Barcelona  
 • Telecommunications Engineering Student, Univ. Politècnica de Catalunya  
 • ICFO GROUP: Optical Tweezers

*"I joined the Summer Fellows Program because I wanted to do research, something new for me. I wanted to try something different, but still somewhat related to my studies."*



**Maria Sanz**  
 • Aged 23, La Coruña  
 • Physics Student, Univ. de Santiago de Compostela  
 • ICFO GROUP: Ultrafast optical dynamics of solids

*"This summer has made me realize how important it is to be in contact with research around the world and to keep practicing and developing the practical skills I have learnt here."*



**Gil Trigriner**  
 • Aged 22, Barcelona  
 • Telecommunications Engineering Student, Univ. Politècnica de Catalunya  
 • ICFO GROUP: Quantum Information with cold Atoms and Non-classical light

*"My biggest take-away has been to learn from the inside the dynamics of a research center and, in particular, the functioning of a group. My vision of research has changed from what I experienced in University."*

ICFO-OUTREACH SUMMER FELLOWS 2013

In 2012, the first year for the Outreach Summer Students program, undergraduates worked with ICFOnians to build a Photonic Robot. In this 2nd edition, in the framework of the Life Long Learning program, students carry out two new projects with the support and coordination of ICFO's Outreach team.



• **The Development of a Laser Harp** which made its debut at the "Light on the Waves" concert. (Student: Adrián López; Coordinator: Dr. Marta García Matos, ICFO KTT Outreach Project Manager in charge of the "Light on the Waves" program; Supervisor: ICFO Research Engineer Dr. Jordi Andilla.)

• **An Educational Research Project** to develop a low-cost, open source system that uses light to remotely monitor babies' arterial oxygenation and heart-beat. This system has applications in prevention of problems such as Sudden Infant Death Syndrome. (Students: Montserrat Anglès, Júlia Carbonell, Marc Salvadó, and Ignacio Sarasúa. Teachers: Antonio Caveró, José Luis Tourón, both members of ICFO's Educators Advisory Team. ICFO Researchers: Prof. Turgut Durduran, Claus Lindner, Claudia Valdés).

E2C3 @ ICFO



PROGRAMA JOVES I CIÈNCIA

ICFO hosted six high school students for a 2 to 5 week stay as part of the E2C3-Centre Recerca program, supported by Fundació Catalunya-La Pedrera. Students worked on the following projects: "Image Compression" within the Theoretical quantum-nano photonics group, "Laser Light" within the Quantum optics theory group, and "Quantum non-locality" within the Quantum information theory group.

**Participating students:** Christian Velasco Gallego, Pol Mesalles Ripoll, Ulisses Martí Palma, Álvaro Moreno Abajo, Anicet Tibau Vidal, and Eulàlia Nicolau Jimenez.

CiMs-CELLEX @ ICFO

In what was the pilot for the CiMs-Cellex program at ICFO, Victor Manuel González Dueso, International Baccalaureate student at IES Jaume Vicens Vives (Girona), spent the month of July collaborating with the research group led by Prof. María García-Parajó.





## IN FOCUS

## ICFO Frontiers in Quantum Physics and Quantum Information

Experts in the field reach out to bright young minds in Quantum Physics with a comprehensive overview of new and exciting research lines

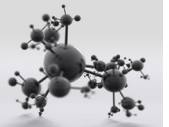
Within the framework of the Ignacio Cirac Program Chair, made possible by Fundació Catalunya- La Pedrera, ICFO hosted 'Frontiers of Quantum Physics and Quantum Information', a summer school program aimed at the brightest young minds in the field, which took place from the 25-27 July 2013.

In keeping with the Chair's goal which is to promote world-class research, outreach and dissemination in the targeted area of quantum information science and technology, as well as to promote frontier research at large, the Summer School gathered known experts in the field

to provide a comprehensive overview of new and exciting research lines at the frontiers of quantum physics.

Participation in the program was competitive, open to talented PhD students and young post-docs, selected by an internal committee. Participants came from research institutes all around the world such as Max Planck Institut für Quantenoptik (Germany), MIT (USA), Technical University of Denmark (Denmark), CQI - Tsinghua University (China), University of Toronto (Canada), Macquarie University (Australia), the Universities of Cambridge and Oxford (UK), among

ICFO FRONTIERS  
in Quantum Physics  
and Quantum  
Information 2013



others as well as from institutes closer to home, such as IFF-CSIC, UB, UAB (Spain) and ICFO.

Approximately 80 students in total took part in the program which included lectures from Professors Antonio Acín (ICFO), Immanuel Bloch (Max Planck Institut für Quantenoptik), Ignacio Cirac (Max Planck Institut für Quantenoptik), Mikhail Lukin (Harvard University) and Frank Verstraete (University of Vienna). The course content covered a broad spectrum of concepts and questions, from abstract problems in quantum information theory to quantum optics experiments using ultra-cold gases.



ICREA Professor at ICFO Antonio Acín: Lecturer and head of local organizing committee.



Professor Ignacio Cirac, Director of the Theory Division of the Max Planck Institute of Quantum Optics at Garching, Germany.

*“The school offered an excellent research environment for knowledge exchange: from lecturers to students, but often also in the opposite direction!”*  
-Professor Antonio Acín

## GO &amp; FLY



**62** women and men have successfully defended their thesis at ICFO since its founding in 2002 and have helped us to measure what we have learned, how far we have come, and how much we have yet to learn.

These ICFOnians have recently succeeded in defending their PhD Thesis. Honouring ICFO's tradition, ICFOnians gather together to celebrate your accomplishments and encourage you to Go & Fly! Remember that wherever you go, you will always be a part of the ICFO community.



**58 | IVÁN AMAT**  
*'Ultrashort laser pulse measurement for multiphoton microscopy'*  
TD: Dr. Pablo Loza-Alvarez  
June 21, 2013



**59 | RAFAEL BETANCUR**  
*'Photon Control in Nano-Structured Organic Photovoltaic Materials'*  
TD: UPC Professor at ICFO Jordi Martorell  
July 10, 2013



**60 | MÓNICA MARRO**  
*'Statistical Analysis and Plasmonic Effects to Extend the Use of Raman Spectroscopy in Biochemistry'*  
TD: ICREA Professor at ICFO Dmitri Petrov  
July 12, 2013



**61 | ALBERTO GONZÁLEZ CURTO**  
*'Optical antennas control light emission'*  
TD: ICREA Professor at ICFO Niek van Hulst  
July 16, 2013



**62 | LARS WÜRFLINGER**  
*'Nonlocality in multipartite correlation networks'*  
TD: ICREA Professor at ICFO Antonio Acín  
September 18, 2013



CREATIVE MINDS



**LIGHT ON THE WAVES:**  
*A Great Night of Light*

"A tragic end that no one could fix  
on the first of May one thousand and six"

This verse corresponds to one of the songs featured at the "Light on the Waves" concert celebrated on September 27th. The song is about a supernova explosion that took place more than a thousand years ago, but whose light has only just begun to reach us. It was composed by Pierre Gugen, lead singer of The Flying Moussaka Eaters, a French-Canadian music group living in Barcelona, with lyrics from a poem written by Lasrian Cronin, a 15 years old student at Josep Lluís Sert High School in Castelldefels.

Both the poem and the song are fruits of ICFO's outreach program "Light on the Waves", a contest which encourages young students and teachers to write science fiction inspired by light. The ten winning texts were awarded a collaboration with a Barcelona based music group whose job it was to put the text to music.

And for a second year, "Light on the Waves" concluded with an exciting concert, this time at the Theater of the Center for Contemporary Culture in Barcelona (CCCB). The event was made possible thanks to the collaboration of CCCB Education, who provided support for the project as well as the use of their facilities for the concert. The CCCB works to provide Barcelona citizens with a comprehensive analysis of the latest advances in arts, humanities and science. CCCB Education is devoted to serving as a resource for teachers and students, providing an interdisciplinary environment to complement their work in the classrooms. Dr. Marta García Matos, KTT Outreach Project Manager responsible for the *Llum a les Ones* Program, believes that the participation of CCCB Education was critical to the success of this year's program and announced that "ICFO is extremely grateful that CCCB Education was able to incorporate "Light on the Waves" into their program of activities".

The musicians in charge of turning the winning texts into songs were Blaumut,

The Free Fall Band, Esperit!, Flying Moussaka Eaters, Gerard Civat i els Civets, Los Gerónimo, El tercer semestre, Oscar Martorell, II Xef Malatesta + Els Laietans. All of these groups added music to the winning lyrics, creating beautiful pieces focused on different aspects of light. The featured songs dealt with supernovas, colors, new methods for hunting shooting stars, Little Red Riding Hood's pursuit of fireflies to gain the strength to fight the wolf, the way in which history mirrors myth, and, of course, the light in 'her' eyes. All those who attended the concert can vouch for the generosity and brilliance that the musicians brought to the event.

Also performing in this unique concert was our very own "ICFO Entangled Band", made up by Jordi Andilla (laser harp and bass, research engineer at Super Resolution Light Nanoscopy facility), Ignacio de Miguel (solo guitar and research engineer at the Plasmon nano-optics group), Tàtiana Statsenko (melodic guitar and student in the Optoelectronics group), Hiroki Mamine (rhythmic guitar and design engineer from Elisava School, collaborating with the Medical Optics group), Nuria Segú (vocals and occupational safety and security at ICFO), Darrick Chang (flute and leader of the Theoretical quantum-nanophotonics group), Joachim Cohen (sax and student in the Quantum photonics with solids and atoms group), and Vito Giovanni Lucivero (drums and PhD student in the Quantum information with cold atoms and non-classical light group). As part of the final act, the band presented an unexpected revelation: a laser harp made by Outreach Summer Student, Adrián López, coordinated by Marta García Matos, and supervised by Jordi Andilla, who also played this unique instrument in a captivating finale.

Thanks and congratulations to all involved for adding fun and emotion to this unforgettable event.



**From top to bottom:**

1. The stars of the show: students, teachers and musician.
2. The show's MCs, Daniel Arbós, Màrius Belles and Eixarc Escaramis from "Pa Ciència, la Nostra" entertained and informed between acts
3. Blaumut opened the concert with a song that will appear on their upcoming album
4. Poster of "La Llum a les Ones 2013"
5. ICFO's own musicians: The Entangled ICFO Band



## HIGH PROFILE



### Jorge Wagensberg:

*“I have been lucky to be involved in science in three different ways: through research, teaching and what I never imaged, creating museums.”*



Jorge Wagensberg is a physicist, professor, researcher, publisher and writer. He is the driving force behind Barcelona's CosmoCaixa, a pioneering institution in scientific museology. He created and manages the “Metatemas” series, an authoritative collection for scientific thought.

**How did you evolve from scientist to writer and publisher?**

In reality I have never stopped being a scientist. I have been lucky to be involved in science in three different ways: through research, teaching and what I never imaged, creating museums. Museums required that I distance myself from the tone of scientific papers. When you do science, you must be objective, but when you transmit science, emotions are crucial. And with emotions came the literary aspect.

**Yes, you once wrote that there are three steps in learning: stimulus (emotion), conversation and comprehension.**

Sure- imagine a teacher without emotion and without conversation- he would be indistinguishable from a robot. Researchers, professors and scientific communicators can also use these values.

**Your work in publishing and museology has been fundamental in the scientific education of an entire generation. Are you conscious of that?**

In a way, that was my goal. Both my foray into publishing and museology were born of indignation and discomfort. Many of the exhibits I saw were texts from encyclopedias copied onto walls. And books on scien-

tific outreach, with a few exceptions, were in the self-help genre. The “Metatemas” series is not a collection of popular science, but rather of scientific thinking. The concept is that a scientist has an idea which could be interesting and applicable to other fields. It is the “cross-fertilization” of ideas.

**You are about to embark on a new project, a branch of the Hermitage in Barcelona that uses artwork to analyze the human condition. Is there room for science in this analysis?**

Science and art represent two different forms of knowledge which greatly influence each other. If you want to talk about the human condition, better use art, because that's art's objective. Scientists on the other hand must be totally objective in their analysis, but if you look at the history of science you will find that it has been influenced by the human condition. That is why I have in mind an interdisciplinary project- a museum dedicated to knowledge. The interdisciplinary focus is attractive but in practice, it scares people because it requires venturing out from your field of expertise. When you leave your field of expertise you must convince the accepted experts, and conquer the naysayers.

**Of course, if different fields cannot understand**

**each other, it is difficult to achieve interdisciplinary collaboration. In the XVI century, artists with an interest in the science of the day were able to understand it. Now it is more complicated.**

The most creative moments in history occurred when there was an exchange between science and the humanities. In this regard, they were more modern in the Renaissance age than we are today.

**Could we live to see another moment like that?**

Of course, we need more museums (laughs) and more conversation. If you look at Vienna in the 1930's, it was tremendous: Boltzman, Schrödinger, Freud, Kokoschka, Schönberg, Gödel, Wittgenstein... physicist, psychiatrists, painters, musicians, mathematicians, philosophers... the best of the XX century all together! Why? Because of the cafés where they would go to talk and eat Sacher. If it happened in Florence and Vienna, it could happen again!

**Do you have a message for ICFOnians?**

Yes- you have a field of research with a great future, and highly interdisciplinary. For example- super-resolution imaging is a great tool for biomimetics which seeks solutions in nature to some of today's problems. Or nanotechnology- that seems to me to be the future: a new economy, new science, and new interdisciplinary collaboration.

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