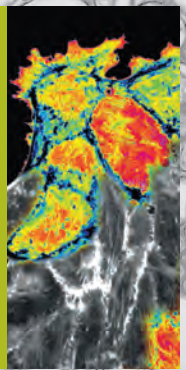
Winter 2011 / Issue 3

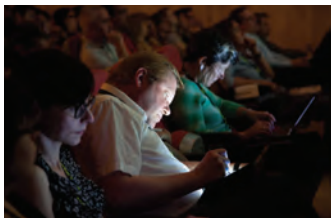
INSIDEIBEC

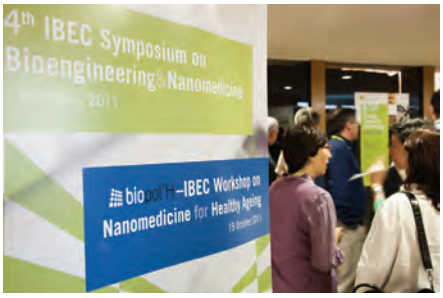
The newsletter of the Institute for Bioengineering of Catalonia

INSIDE this issue...



Fourth symposium in pictures





Photos: Maria Pujol

The fourth annual IBEC symposium on Bioengineering and Nanomedicine at the Hospital de Bellvitge attracted a record number of attendees, with more than a third coming from outside the institute. Experts in the various fields of IBEC's research areas gathered to network and listen to the top-class speakers from Europe and beyond at the event on 18-19 October.

Seventy-one posters were on display during the coffee and lunch breaks, with courageous researchers distilling their work into just three minutes for the 27 quick-fire flash presentations. The winners of the poster sessions were Andrea Malandrino of the Biomechanics and Mechanobiology group, who won the prize for best flash presentation of his work on 'A mechano-transport computational model for the study of intervertebral disc degeneration', and Xavier Serra of Integrative Cell and Tissue Dynamics, who won best poster for 'Emergence Of Mechanical Patterns During Tissue Growth'.

One speaker, Professor Herman Gaub from Ludwig-Maximilians-Universität in Munich, Germany, congratulated IBEC on the symposium. "I've been endlessly impressed by the quality and breadth of the science being done at this institute," he said after the first session of flash presentations. Another speaker, Laura Ballerini of the University of Trieste, who addressed the audience about her work on carbon nanotubes, also praised the event. "I really enjoyed the meeting and the overall pleasant ambience," she said. //

Building bridges

IBEC has been building on its partnerships with other centres and hospitals lately with a trio of workshops and meetings.

Following the signing of a Memorandum of Understanding between the two institutes last year, IBEC played host to visitors from the University of Warwick on 22-23 September. Nigel Stocks, Christopher James, Jianfeng Feng, Pat Unwin and Pam Thomas from the UK-based institution took part in some high-level meetings with IBEC's directors and toured the labs, as well as presenting their science to a gathering of IBEC researchers.

From the IBEC side, Gabriel Gomila, Pau Gorostiza, Agustin Gutiérrez, Josep Samitier and Raimon Jané presented their work, and the event proved a ideal opportunity to identify future collaborations and discuss the exchange of knowledge and personnel.

In October, IBEC had an in-depth meeting with Bellvitge Biomedical Research Institute (IDIBELL) researchers to lay some concrete foundations for an agreement that started in June this year, and three days later a delegation of the Innovation department of the Vall d' Hebron Research Institute (VHIR) visited IBEC to establish the basis of a similar cooperation agreement. //

The Warwick visitors with their IBEC hosts

Bringing robotics to the people

Alícia Casals and her Robotics group have been in the public eye quite a bit recently. On 23 October, the lab was featured in an episode of 'Emprendedores e innovadores' on TVE2, when visiting masters student Paloma Fuentes gave viewers a tour of the robot kitchen with the help of IBEC PhD student Manuel Vinagre (below left).

A few days later, on 3 November, Alícia could be heard on the Catalunya Ràdio programme "El Café de la República" being interviewed on the subject of 'Put a robot in your life'. A few weeks earlier, she had delivered the Robotics and Automation Society distinguished lecture at the IEEE LARC & CCAC 2011 meeting in Bogotá, Colombia on 1-4 October. On 11 October she gave the opening speech, 'Neurorobotics, the challenges of assistive robotics', at the inaugural session of the 2011-2012 courses at Barcelona's Institut d'Estudis Catalans, in the presence of the president of the Generalitat, Artur Mas, and other VIPs (centre).

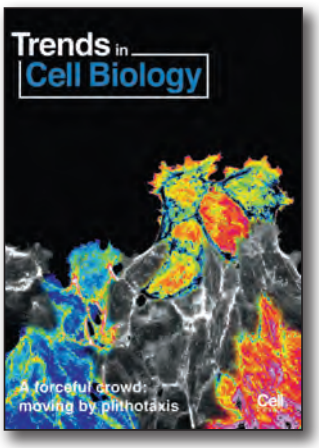
To round things off, also in October the Spanish film Eva (right) was released, with Alícia on the credits as consultant for the robotics in the film. Starring Catalan/German actor Daniel Brühl and directed by Barcelona director Kike Maíllo, the film is set in 2041 and follows a programmer who returns to his home town to work on a project to create a new line of robot child. During production, Alícia lent the filmmakers some robots and other kit to recreate a lab environment for the movie.

"Sometimes films about robots can give a misleading or sensationalist impression so I don't usually like watching them," comments Alícia. "But I do go to see them, just to know how robotics is being presented and to form an opinion about them." //

SCIENTIFIC NEWS

The dance of the cells: a minuet or a mosh?

This fabulous November cover of the high-impact journal *Trends in Cell Biology* illustrates work by IBEC researchers in the Integrative Cell and Tissue Dynamics group, who collaborated with Harvard investigators earlier this year to come up with a brand new concept in biology, plithotaxis.



Trends in Cell Biology's cover feature was a review of the work by the IBEC group and Harvard researcher and IBEC ISC member Jeffrey J. Fredberg, which sheds light on how cells move within a monolayer cell sheet to enable the whole to migrate. "We'd long suspected that each cell exerts force not only upon its extracellular matrix but also upon neighbouring cells," explains group leader Xavier Trepat. "Plithotaxis, which comes from the Greek *plithos*, meaning swarm, describes what we discovered when we devised a way to measure these forces: that each cell pushes and pulls on its neighbours in a chaotic 'dance', yet moving the whole cooperatively in its intended direction."

The image shows the actin cytoskeleton of a group of migrating epithelial cells. The colour-coding depicts how differences in forces can exist within the one sheet. //

Funding success for tissue projects

Two IBEC-led projects have been awarded funding by the EU under the ERA-Net EuroNanoMed initiative, among just 8 chosen from 41 proposals.

Coordinated by Josep Planell's Bio/non-bio Interactions for Regenerative Medicine group, 'Angiogenic nanostructured materials for non-consolidating bone fractures' (nAngioFrac) brings together academic, clinical and industrial partners in France and Poland. It proposes the development of tailored biodegradable and bioactive nanostructured scaffolds that ensure the correct release of calcium, a major player in angiogenesis.

STRUCTGEL ('Nanostructured Gel for Cellular Therapy of Degenerative Skeletal Disorders'), coordinated by Molecular Dynamics at Cell-Biomaterial Interface group leader George Altankov, will involve Turkish, French and German partners. It will focus on degenerative skeletal tissue disorders such as osteoporosis by designing a unique implant which can influence site-specific tissue regeneration.

A fond farewell

Mobility is intrinsic to research, so all institutes have to say goodbye to good scientists sometimes. In the summer IBEC's loss was María García-Parajo and her group, who moved to ICFO after five years.

"IBEC gave me the chance to turn my research in the direction of biology, about which I knew nothing, and apply my physics background to the development of imaging techniques for biological processes," says María, whose group focuses on Single Molecule Biophotonics. "Without that experience, and the excellent support and facilities that were available, I wouldn't be able to do what I'm doing today."

// "IBEC's admin staff are not just doing a job: they're really taking care to do their best"
- María García-Parajo

Now, however, the Institut de Ciències Fotòniques offers a more appropriate environment for the lab's changing strategies. "We'll be increasing the resolution of our near-field optical microscopy (*a technique to study individual quantum structures that María developed while a postdoc in France*) using photonic antennas, and we'll also be looking at methods of exerting force on cells, emulating shear-stress and studying the resulting biophysical changes to answer some fundamental biological questions," she explains.

Since her move from IBEC at the end of July, María has been busy setting up her new equipment and settling into the lab space, but not too busy to have already made some useful connections in her new environment. "People here not only value collaboration highly, they also have many chances to talk to each other," she says. "We're all in one building, everyone's door is open, there are many seminars, and much of the networking is done on the ICFO bus that brings Barcelona people to Castelldefels!"

As a result, her group has already established a close collaboration with the Advance Fluorescence Imaging and Biophysics lab, sharing techniques and resources, but María hasn't left behind her connections to IBEC; postdoc Carlo Manzo continues to collaborate with Laura Casares from IBEC's Integrative Cell and Tissue Dynamics group. To him and the other group members who moved from IBEC with her, Thomas, Merche and Juan, Maria has added another PhD student, and the group will also gain two more postdocs and two master's students in the new year.

As well as getting used to new members and a different location, María and her researchers are adapting to some new ways of working. "The group leaders here are expected to contribute in various ways to committees, institutional projects and outreach activities," she says. "It's more work, but it really engenders a sense of belonging. We're all playing a part in making ICFO more successful, and we're happy and proud to do so, because we feel we're contributing to its coherence as an institute with a strong identity and a sense of community."

There are things that María misses about IBEC, however. "The support services staff were superb," she says. "I really got the impression that many people in IBEC's administration are not just doing a job; they're really taking care to do the best they can. Also, having project managers is an excellent idea and it's really helpful for all the group leaders." //


Maria and some of her IBEC group

A man ahead of his time

December saw the 200th anniversary of the death of a man without whom IBEC might not exist.

Catalan surgeon and applied physicist Antonio Cibat Arnautó – who died in 1811 – introduced modern physics to Catalonia, published a groundbreaking book, *Elements of Experimental Physics* (1804), and had a major impact both nationally and internationally, particularly with his work on the origins and causes of epidemics.

"He was an early example of a interdisciplinarian," says IBEC associate director Josep Samitier, who presented a paper about Cibat at the XXIX Congreso Anual de la Sociedad Española de Ingeniería Biomédica (CASEIB 2011) in November. "Two hundred years ago he had the idea to combine basic science with medicine and surgery, seeing the importance of using basic science to better understand the human body in health and sickness."

Cibat recognised that, in a world where the natural sciences had previously been completely excluded from the study of medicine, 'their knowledge is so essential that without physics, chemistry and botany, no practitioner can boast of being accomplished in surgery or medicine'. He lamented the 'utter lack' of good methods of physiological experimentation in the various branches of surgery and medicine, which led him to write his seminal work.

IBEC's multidisciplinary approach owes it origins to these early ideas, and although he lived 200 years ago, Cibat's working life was not so much different from that of a scientist today. A product of the enlightenment, he lived abroad to pursue his research and spoke several languages, and his recognition of the importance of experimentation led to the emergence of electrophysiology as a new field of research in Catalonia. "Cibat was a true pioneer of biomedical engineering in our country," says Josep. //

Latest news from the Connect-EU project

Photo: ACC1Ó

The IBEC-coordinated Connect-EU Nanobio+Nanomed working group, which was set up at the end of 2010, has published a 'roadmap' for nanobiotechnology capabilities in Catalonia.

The document, 'Connect-EU Nanobio+Nanomed Strategic Research Agenda' was presented on 20 October at the annual forum of the European Platform on Nanomedicine (ETPN), which followed the 4th IBEC Symposium at the Hospital de Bellvitge on 18-19 October.

In addition to the European community of nanomedicine concentrated in Barcelona, more than a hundred participants from all over Europe, including representatives of the European Commission, the Spanish Ministry of Science and Innovation, Catalan institutions such as ACC1Ó and AGAUR and the EU's Connect network, attended the presentation of the agenda. The document marks the first major step of the working group's first ten months of work, and is the beginning of a series of actions to promote and reinforce Catalan participation in the EU's instruments for research funding such as FP7 and its successor, HORIZON 2020.

As well as providing a plan for this strategic area of knowledge in the region, the publication aims to help define priorities in innovative applications for the pharmaceutical, medtech and environmental industries that can be transformed into European projects. The document is available as a digital version from the group's website at www.connecteu-nanobionanomed.cat or as a printed copy from project manager Roger Rafel (rrafel@ibecbarcelona.eu).

Earlier in the summer, on 13 July, the Nanobio+Nanomed working group was officially presented at the Acte de Presentació dels Grups Connect-EU in Brussels (www.youtube.com/watch?v=tBi_0-XTC14). Later, WG representatives from IBEC attended 21 September's Jornada Connect-EU here in Barcelona, which enabled the coordinators and partners to hear about open calls in FP7 and meet representatives of the EC and national funding programmes.

All in all, 15 working groups were set up at the end of last year as part of the Connect-EU initiative, covering such diverse areas as aerospace, agribusiness, water, energy, information technology and communication, photonic and electronic systems, materials, and health. They'll work individually and together to achieve the initiative's goals, which include matching partners in research and industry for collaborative technology projects. //

More news on the web...

You can keep up-to-date with news and events at IBEC by visiting www.ibecbarcelona.eu

IBECinPICTURES

Right: Antonio Villaverde (Institute for Biotechnology and Biomedicine, UAB) talking about his work on protein-only nanoparticles with tuneable properties at the IBEC seminar on 15 July. Last season ended with some top-class presentations from Jaume Veciana (CSIC, 3 June), Sanjay Kumar (University of California, 30 June) and Lluís Orozco (Institut de Teràpia Regenerativa Tissular, 1 July), and PhD students Ana Oliva and Arlyng González presented their research in the PhD Discussion session on 17 June. After the holidays, the new seminar season began with Nadia Mercader of CNIC talking about heart regeneration in the zebrafish on 7 October and the Universitat Rovira i Virgili's Roger Guimerà presenting statistical models of complex biological networks on 4 November. The PhD Discussions sessions started on 28 October with a Complementary Skills session on funding.

Sweet smell of success

The European project NEUROCHEM had its final review back in the summer, when the EC and a panel of experts evaluated the results of its 3½ years of research and development.

'Biologically inspired computation for chemical sensing', which was coordinated for the UB from IBEC's Artificial Olfaction group, involved 9 research organisations from 5 different countries in its aim to develop novel computing paradigms that are inspired by the biological olfactory pathway.

"NEUROchem achieved all its milestones, including creating the biggest and most diverse conductive polymer array ever produced: 65,536 elements, with the corresponding read-out electronics that interpret the sensor signals," says Project Manager Jordi Fonollosa, who has now left IBEC to work as a Research engineer at the Centre de Recerca i Innovació de Catalunya (CRIC). "In addition, ours is the first robotic platform able to localize one odour source in the presence of two plumes."

Adding an extra flourish to its final act, NEUROCHEM was also one of the winners of best stand at the FET'11 conference in May this year.

Off to a flying start

High school students Joaquim Viñes (left), Laia Gil (right) and Laia Gili (second from right) joined IBEC researchers Melba Navarro (second from left) and Cécile Perrault (centre) for some hands-on lab experience during July. The visitors, who stayed at IBEC for two weeks, were participants in CatalunyaCaixa's E^2C^3 Youth and Science Programme, which exposes talented and motivated young students to 'real' scientific work to encourage more of them to embark on a scientific career.

Learning to communicate

Throughout the year, IBEC's researchers have had the chance to improve their complementary skills at a selection of workshops aimed at supplementing their professional expertise. This year, training was focused on efficiency in communication in three main areas: scientific writing, oral presentations, and communicating with colleagues.

"While most researchers are fluent in spoken English, when writing their PhD theses, publishing articles or participating in competitive EU projects, we've noticed that they need help to communicate their scientific results clearly, succinctly and – when necessary – persuasively," says Head of HR Carol Marí, who organised the training. To this end, the Writing Style Workshop: What Makes a Competitive Proposal? aimed at senior researchers, postdocs and project managers was held every Thursday in November, and in the same month a one-day Scientific Writing workshop attracted 28 PhD students.

In June, 11 PhD students were given the opportunity to improve their confidence in presenting in English at scientific conferences. Later in the semester, while the Leadership and Management of Challenging Situations was the last of a cycle of workshops addressed to group leaders and heads of units, 16 support staff took part in the workshop Efficient Communication, aimed at improving customer service and communication between the different support units. "I learnt that I often have a very inflexible stance, so I'll try to use a more collaborative approach," remarked one participant afterwards. "It's been a great team experience, as we've helped each other to find solutions," said another.

"All the courses scored between 8 and the maximum 10 points in the questionnaires afterwards," says Carol. "We're glad that they fit peoples' requirements and that we're on the right track to help the IBEC community with their career progression."

Strength in numbers

IBEC's Communications and Events units have merged to combine their expertise and provide the best support and services to researchers.

The new unit, Communications and Outreach, is the overall responsibility of Vienna Leigh. Pilar Jiménez will continue to manage events, and Àngels López and Marta Redón will provide support to both. Marta, formerly of HR, will also continue her previous responsibilities of booking travel and accommodation.

"Communications and outreach in a research institute like IBEC are vitally important to encourage continued financial support based on our reputation for top results and transparency, and to attract the best researchers," says Vienna. "With funding coming from outside, we also have a moral obligation to help advance the public understanding of science and to encourage the next generation of researchers.

L-r: Vienna (standing), Pilar, Angels and Marta

"We've got so many ideas about adding to and improving our activities both externally and internally, and I hope that combining our resources and skills will allow us to achieve more of these faster. It's the same for events; we'll work to develop a reputation for providing top-class conferences, symposia and meetings to provide the best knowledge exchange for our researchers, students and visitors."

The team has moved to floor 10 of Tower I at the PCB, and they'll be operating an 'open door' policy for all queries, suggestions or gripes, and inviting researchers to visit regularly for a coffee, glass of cava or just a chat. "One of the most important and immediate areas to work on is internal communication, both to build a sense of 'belonging' for everyone within IBEC and to facilitate further scientific collaboration," says Vienna. //

FEATURE

Why this green...

...and not some other green, like this one? IBEC director Josep Planell tells *InsideIBEC* all about the thinking behind the IBEC branding

Have you ever wondered what the colours in the IBEC brand signify, why the logo looks the way it does, or why the IBEC meeting rooms are named after trees? Well, wonder no longer.

"When we created the IBEC look we wanted to encapsulate life, technology and vibrancy," says IBEC director Josep Planell, who, when the Catalan Reference Centre for Bioengineering transformed into IBEC in 2005, was faced with determining the brand that would forever be associated with the new institute. "The green of IBEC signifies the olive tree, which takes fifteen years to mature and bear fruit; that's the same amount of time it takes to educate a human to adulthood. After it matures, the olive continues to yield fruit for decades and sometimes even centuries – just as the discoveries of our scientists will make a difference for centuries into the future.

"The logo has a basic square shape to indicate stability, and the acronym IBEC being at the bottom in a simple typeface forms a solid 'base' and keeps us grounded," he continues. "The energetic orange circle is the dot over the 'i', and its round shape indicates life, which is flexible and spontaneous, with no straight lines.

"The blue square indicates science and technology. The interaction between the two is like the interaction of organic and inorganic matter. We didn't want to come across as completely symmetrical and straight-laced, so the blue square is at a jaunty angle to reflect our unconventional and daring side," he reveals.

// "The blue square is at a jaunty angle to reflect our unconventional side"

Researchers at IBEC, especially newcomers, may not be aware when they're sitting in a seminar or attending a meeting that the very room is part of this concept too. The meeting room on the 11th floor of Tower I where the ISC meetings take place, because of it's importance to IBEC's foundations, is named Olivera after the olive tree again. "The seminar room, Baobab, is named after the tall, thick tree that lives on the savannah and could have been the only source of water, nutrition and shelter for early humans," says Josep.

"Finally, the 8th floor seminar room is called Lotus, because the leaf of the lotus flower has nanostructured properties that enable it to be clean all the time, as water just rolls off it and takes dirt with it; it's perhaps the first example of a nanostructured plant, so it seemed ideal to reflect the nature of one of IBEC's major areas of interest."

IBEC's branded materials, including notepads, pens, postcards and folders, are freely available from the Communications and Outreach office. You can also download the logo and some useful templates from the 'Documents and Downloads' section of the IBEC website. //

News in brief • News in brief • News in brief • News in brief • News in brief • News in brief • N

// IBEC students Oiane Urra (Biomedical Signal Processing and Interpretation), Cristina Vergara (Molecular and Cellular Neurobiotechnology), Riccardo Levato (Bio/non-bio Interactions for Regenerative Medicine), Isil Tekeli (Control of Stem Cell Potency), and newcomer Sergi Oller (Artificial Olfaction) are recent recipients of **Formación de Profesorado Universitario (FPU)** grants from the Spanish Ministry.

// **IBEC's football team**, with a new line-up, got off to a flying start at the beginning of the season in October. They're now sporting IBEC jerseys with the slogan 'More than Research', which was coined by Project Manager Juan Fran Sangüesa in the recent competition.

// The PCB's **Joint Health and Safety Service**, including IBEC representative Jordi Martínez, is having meetings with all IBEC groups over the next few weeks to present themselves and their services, which include consultancy on occupational health and safety. If your group hasn't been contacted yet, you'll be hearing from them soon.

// IBEC now has a brochure, **'Doing your doctorate at IBEC'**, which introduces the institute and outlines the entry requirements for potential PhD student applicants. Copies for your contacts or to take to meetings, as well as a matching poster, are available from the Communications and Outreach office (vleigh@ibecbarcelona.eu). Please also direct any interested parties to the jobs page of the IBEC website, where they can see the latest open positions, find funding information and download the brochure.

IBEC PEOPLE

Juli Bafaluy, IBEC's new IT manager, joined the institute in June. Juli studied computer engineering at the University of Girona and gained a master in direction and management of information technologies and communication in 2010. Before coming to IBEC he worked for more than fifteen years managing IT projects at various companies including Crèdit Andorrà, Nissan, Danone and Telefonica Soluciones.

More new starters (since 1 Sept): Adriana Rodriguez, postdoc, Control of Stem Cell Potency; Vijaykumar Rajasekaran, PhD student, Robotics; Antonio José Sánchez, assistant researcher, Biomechanics and Mechanobiology; Juan Luís Vázquez, PhD student, Control of Stem Cell Potency; Luís Botaya, PhD student, Nanobioengineering; Eduard Bergés, PhD student, Robotics; Sergio Oller, PhD student, Artificial Olfaction.

Leavers (since 1 September): Elisabet Baró, masters student; Felipe Caballero, Ling Wang, Ivón Rodríguez Villareal, George Toromanov, PhD students; Aurelio Salerno, Olga Esteban, Jordi Fonollosa, postdocs; Idoya Agudo, Sergi Udina, David Montilla, technicians; Aida Castellanos, Support Services.

AWARDS AND HONOURS

On 7 October **Jérôme Noailly**, a senior postdoc in IBEC's Biomechanics and Mechanobiology group, was awarded the prize for best PhD thesis in engineering by the UPC (left). His thesis on lumbar spine finite element modelling, for which he received his PhD in 2009, has since formed the basis of one of the group's three main areas of research.

On 18 October, former IBEC student technician **Bernat Sunyer** was awarded the Argó-UAB higher vocational (CFGS) award for his work on how laminin and myelin affect the migration of ensheathing olfactory cells. The prize recognises excellence in vocational or practical training, which Bernat completed in IBEC's Molecular and Cellular Neurobiotechnology group.

Want to get involved?

If you have an idea for an article for *InsideIBEC* or would like to write one yourself, please contact us. Is your group starting or finishing a project? Is there an important change in procedure that people should know about, or a deadline coming up? Perhaps something interesting has happened in your area of research, or perhaps you've had an interesting visitor. Maybe you'd just like to find out what the IBEC community thinks about something, or you have a request for help.

Send your ideas to vleigh@ibecbarcelona.eu.

IBEC EVENTS

11 January 2012
Institutional project meeting: Plataforma Española de NanoMedicina (NanoMed Spain)

18 January
School visit: Visit to IBEC of final year students from the Institut El Til·ler in Les Franqueses del Vallès

20 January
IBEC Seminar: to be confirmed

9 February
Project meeting: HYPER (Hybrid Neuroprosthetic and Neurorobotic Devices for Functional Compensation and Rehabilitation of Motor Disorders) (Alicia Casals)

10 February
IBEC Seminar: Dr. Anna Laromaine, Institut de Ciència de Materials de Barcelona (ICMAB)

15 February
School visit: ESCOLAB visit to IBEC

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IBEC in pictures

Some of IBEC's **support services staff** getting into the spirit of the event at this summer's **'IBEC makes a splash'** day on 28 July. 80 IBEC staff and researchers joined in the fun at Esports UB to **play football, table tennis, basketball, take a self defence class or swim** for the afternoon, which also provided the ideal opportunity to celebrate IBEC's great achievement of getting to the first round of the **MICINN's Severo Ochoa selection**.

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