

## » DEFENDED THESES

*Jets as Probes of Strongly Coupled Quark-Gluon Plasma*, D. Pablos, supervised by J. Casalderrey, 22/6/2016

*New insights into holography from supersymmetric localization*, G. Torrents, supervised by B. Fiol, 27/6/2016

*The cross-correlation among tracers of the underlying large-scale mass distribution in the universe*, I. Pérez-Ràfols, supervised by J. Miralda-Escudé, 3/10/2016

*Studies of Black Hole Horizons*, M. Martínez, supervised by R. Emparan, 14/10/2016

*Observational and theoretical study of the interaction of relativistic winds from young pulsars with inhomogeneous stellar winds*, X. Paredes, supervised by V. Bosch-Ramon and M. Ribó, 17/10/2016

*Study of b-hadron decays into two hadrons and a photon at LHCb and first observation of b-baryon radiative decays*, V. Rives, supervised by A. Puig (U. Zurich) and M. Calvo (La Salle), 17/10/2016

*Electronics control and signal processing for the LHCb fast calorimeter detectors*, E. Picatoste, supervised by D. Gascón and A. Herms (UB), 22/12/2016

*Best values of parameters of cosmological Dark Energy in various models and gravity*, E. Karimkhani, supervised by J. Solà and A. Khodam-Mohammadi (Bu-Ali Sina U.), 28/09/2016

*Seções de choque de bremsstrahlung de elétrons, estudo experimental no Acelerador Microtron de Sao Paulo*, J.A. García, supervised by J.M. Fernández-Varea José M. and N.L. Maidana (U. Sao Paulo), 4/11/2016

*Coupling Fluid-dynamics and Non-thermal Processes to Study Sources of High-Energy Emission*, V. Moreno, supervised by V. Bosch-Ramon and D. Khangulyan (Rikkyo U.), 28/4/2017

*Chemical and dynamical analysis of Open Clusters in the context of the Milky Way disc*, L. Casamiquela, supervised by C. Jordi and R. Carrera (IAC & INAF-OAPd), 23/6/2017

*Collapse scenarios in magnetized star-forming regions*, Juárez Rodríguez Carmen, supervised by J.M. Girart (ICE) and A. Palau (UNAM Morelia), 26/6/2017



## HIGHLIGHTS

- » The ICCUB creates a Technology Unit to develop highly specialized instrumentation and massive data analysis [+]
- » Work begins on the construction of the four LST telescopes [+]
- » LHCb finds new hints of possible Standard Model deviations [+]
- » The latest asteroid discovered at Fabra Observatory is named after the UB professor Jorge Núñez [+]
- » Will Earth-like planets be found to have Earth-like oceans? [+]

## RECENT APPOINTMENTS



- » Domènec Espriu, research vice rector of the UB since last December [+]
- » Francesca Figueras, first female president of the SEA [+]

## ERC GRANTS



- » David Mateos, *Holography for the LHC era* [+]
- » Roberto Emparan, *A New Strategy for Gravity and Black Holes* [+]
- » Licia Verde, *Beyond Precision Cosmology: Dealing with Systematic Errors* [+]

## INTERNATIONAL MEETINGS AND SCHOOLS



- » The Gaia DPAC Consortium Meeting gathers over 250 researchers and engineers [+]
- » Second Barcelona TechnoWeek, “Course on Nanosatellites” [+]
- » Second edition of the ICCUB School, Course “Hot Topics in Cosmology” [+]

## OUTREACH ACTIVITIES



- » The ICCUB participates in the 3rd UB Science Festival [+]
- » Nobel Prize John Mather visits the ICCUB [+]

### The ICCUB creates a Technology Unit to develop highly specialized instrumentation and massive data analysis

The unit, hosted at the new ICCUB premises at Parc Científic de Barcelona, has been created to centralize and increase the technological activity of the ICCUB, allowing its members to participate in high-tech projects and looking for new technology transfer projects where the expertise acquired by ICCUB members in past scientific projects can be applied.

At present the unit consists of 25 electronic and telecommunication engineers, computer specialists and physicists and also includes, among other facilities an electronics lab and a precision measurement lab. A clean-room for instrumentation assembly is currently under construction. [<http://iccub.edu/news/341>]

### Work begins on the construction of the four LST telescopes

The construction of four Large Size Telescopes (LST) for the Northern Cherenkov Telescope Array (CTA) at Roque de los Muchachos has started, after the approval of a 19.5 M€ budget by the Spanish Government to co-finance this international project.

CTA will be an array of more than 100 telescopes of three different sizes, located on the northern and southern hemispheres, devoted to gamma-ray astronomy at very-high energies. The ICCUB is participating in design, prototyping and construction of the cameras for the Large and the Middle Size Telescopes.



**ICCUB-TECH INAUGURATION CEREMONY**  
The ceremony was attended by the secretary of State for Research, Development and Innovation, C.Vela, the Secretary for Universities and Research of the Generalitat de Catalunya, A. Navarro, and the rector of the UB, J. Elias. Pictured on the left, ICCUB researcher E. Graugés shows the new premises to C. Vela and J. Elias.

### LHCb finds new hints of possible Standard Model deviations

The LHCb experiment has found intriguing anomalies in the way some particles decay. If confirmed, these would be a sign of new physics phenomena not predicted by the Standard Model of particle physics. The observed signal is still of limited statistical significance, but strengthens similar indications from earlier studies. Forthcoming data and follow-up analyses will establish whether these hints are indeed cracks in the Standard Model or statistical fluctuations. [<http://iccub.edu/news/338>]

### The latest asteroid discovered at Fabra Observatory is named after the ICCUB researcher Jorge Núñez

The asteroid 1941 WA, one of the minor planets in the main asteroid belt of the Solar System, has been named (4298) Jorgenunez after Jorge Núñez de Murga, director of the Fabra Observatory of the Royal Academy of Arts and Sciences of Barcelona (RACAB) and researcher at the ICCUB.

The asteroid, which has a 16.5 km diameter and an orbital period around the Sun of 5.3 years, was the latest asteroid to be discovered in Fabra Observatory. It was discovered on November 17, 1941, in Fabra Observatory by Isidre Pòlit i Buxareu, who was professor of Astronomy at the UB and director of the Astronomical Area of the Fabra Observatory between 1937 and 1957. [<http://iccub.edu/news/351>]



J. Núñez, at Fabra Observatory

### Will Earth-like planets be found to have Earth-like oceans?

For a planetary surface to boast extensive areas of both land and water, a delicate balance must be struck between the volume of water it retains and the capacity of its oceanic basins. In a paper published in MNRAS, ICCUB researcher Fergus Simpson has constructed a statistical model – based on Bayesian probability – to predict the division between land and water on habitable exoplanets. In his paper, F. Simpson proposes that the Earth's finely balanced oceans may be a consequence of the anthropic principle – more often used in a cosmological context – which accounts for how our observations of the Universe are influenced by the requirement for the formation of conscious life. [<http://iccub.edu/news/337>]

### LST PROTOTYPE FOUNDATION



**Domènec Espriu, research vice rector of the UB since last December**

ICCUB member and former director Domènec Espriu took office as the new vice rector of research at the University of Barcelona (UB) last December, as part of the new UB governing team, lead by J. Elias.

During his term of office, D. Espriu will be responsible for the UB research institutes, the UB research support office as well as the institutional relations in the field of science policy and the research staff policy. [<http://icc.ub.edu/news/353>]



Top: D. Espriu opens Founding Symposium of the Institute of Complex Systems of the UB (UBICS); Bottom: F. Figueras, on the left, during SEA's XII Scientific Meeting.

**Francesca Figueras, first female president of the SEA**

Francesca Figueras, ICCUB Deputy director, became the first female president of the Spanish Society of Astronomy (SEA) last January. She will hold office from 2017-2020.

Founded in 1992 with a significant contribution of the UB members, the SEA gathers over 750 members among Spanish professional astronomers. This year, the SEA will celebrate 25 years promoting the development of Astronomy. [<http://icc.ub.edu/news/281>]

ERC GRANTS



**David Mateos**

ERC Starting Grant  
*Holography for the LHC era*  
(2012-2017)

D. Mateos has been an ICREA Research Professor at the ICCUB since 2008. He works on gravity, quantum field theory (QFT) and string theory, with the goal of understanding the physics of the Universe at the most fundamental level.

In his ERC project, which will come to an end next September, D. Mateos has applied holography to particle physics. Holography is an equivalence between a QFT in flat space, such as Quantum Chromodynamics (QCD), and a string theory in curved space. Main achievements include the understanding of the far-from-equilibrium dynamics of the Quark-Gluon Plasma created in heavy ion collisions, and the description of quark-matter phases that could exist in neutron stars.

Future plans include a full-scale holographic analysis of the in- and out-of-equilibrium physics across the entire QCD phase diagram, with particular emphasis on the dynamics near a critical point and the properties of color superconducting phases.



**Roberto Emparan**

ERC Advanced Grant  
*A New Strategy for Gravity and Black Holes*  
(2016-2021)

R. Emparan has been an ICREA Research Professor at the University of Barcelona since 2003, and a member of ICCUB since its creation in 2006. He carries out research in gravitation and cosmology, trying to understand the nature of spacetime at its most fundamental level.

General Relativity encompasses a huge variety of physical phenomena and provides the basis to our understanding of the Universe. Black holes play a central role in this theory. However, their equations are exceedingly hard to solve.

The awarded project uses novel approaches, pioneered by his group, in order to unravel the complexities of the classical and quantum properties of horizons, and to throw light on the cosmic censorship conjecture and the formation of singularities. One of these main new approaches (but not the only one) is based on using the number of dimensions  $D$  as a perturbation parameter.

[<http://icc.ub.edu/news/252>]



**Licia Verde**

ERC Consolidator Grant  
*Beyond Precision Cosmology: Dealing with Systematic Errors*  
(2017-2021)

L. Verde joined the ICCUB as an ICREA Research Professor in 2010. She is an astrophysicist with an interest in cosmology. Among other recognitions, she has been awarded the Gruber Prize of Cosmology 2012 and an ERC Starting Grant in 2009.

Over the past 20 years cosmology has made the transition to a precision science. Forthcoming massive surveys will further reduce the (statistical) error and tighten constraints on key quantities such as the composition of the Universe and the nature of dark energy. Their aim is to answer a number of big questions, with deep links to fundamental physics.

However, precision without accuracy is dangerous, as highly significant (but incorrect) results may be inferred. While there is a well-defined and developed framework for treating statistical errors, there is no established approach for systematic errors. The aim of this recently awarded ERC project is to develop a framework to deal with systematic errors in forthcoming cosmological surveys.

[<http://icc.ub.edu/news/330>]

### The Gaia DPAC Consortium Meeting gathers over 250 researchers and engineers

The second Gaia DPAC Consortium Meeting of the European Space Agency (ESA) event, organized by the Gaia team at ICCUB, was held in Sitges between the 23rd and 27th of January and over 250 members of the consortium attended. During the event, the first Gaia results were reviewed, and the next steps to take for the Gaia mission were decided upon. [<http://icc.ub.edu/news/316>]



GAIA DPAC CONSORTIUM MEETING

### Second Barcelona TechnoWeek, “Course on Nanosatellites”

After the great success of the *First Barcelona TechnoWeek*, “Course on semiconductor detectors”, held on July 2016 at the Physics Faculty of the University of Barcelona, a second edition of the event, the *Second Barcelona TechnoWeek*, “Course on Nano-

satellites”, took place between the 10th and the 14th of July, 2017 at the same facilities. The event comprised lectures from world leading experts in the field and an intensive 5-day “bootcamp” providing a comprehensive introduction to the basic concepts of nanosatellite design and construction.

The *Barcelona TechnoWeeks*, organized by the ICCUB as part of its *Maria de Maeztu* scientific program, intend to become a reference meeting point for experts and trainees from the academy and industry sectors to tackle technological topics of interest to both. [<http://icc.ub.edu/activity/948>]

### Second edition of the ICCUB School, Course “Hot Topics in Cosmology”

Also as part of its *Maria de Maeztu* scientific program, in 2015 the ICCUB created the *ICCUB School*, a series of courses about hot scientific topics in the research areas of the institute, addressed principally to PhD students and postdocs.

The second edition of the School, the “Course on Hot Topics in Cosmology”, which will take place from the 23rd to the 26th of October at the Physics Faculty of the University of Barcelona, will highlight a few selected topics on cosmology which are currently receiving a lot of interest from the scientific community. [<http://icc.ub.edu/activity/1009>]

## OUTREACH ACTIVITIES

### The ICCUB participates in the 3rd UB Science Festival

The 3rd UB Science Festival took place last May 12th at the Historical Building of the University of Barcelona. The ICCUB, in collaboration with the FQA Department of the UB, organized two workshops, “3D constellations” and “Ultracold-UB”, and displayed the ICCUB-IEEC exhibition “Telescopi Assumpció Català”.

### Nobel Prize John Mather visits the ICCUB

J. Mather, Nobel Prize in 2006 for the discovery of the blackbody form and anisotropy of the cosmic microwave background radiation, visited the ICCUB facilities last September. In front of a packed auditorium, Mather gave a seminar about how we will learn more about the Universe and the Big Bang with the James Webb Space Telescope, the most powerful ever built.

From left to right: “3D constellations”, “Ultracold-UB” and J. Mather Seminar



## » CONFERENCES AND COLLOQUIA

- 10-14 JUL: *Second Barcelona Techno Week: Course on nanosatellites*, Physics Fac., UB
- 21 SEP, 12:00: *ICCUB Col. Equilibrium and Dimensionality in Chemical Evolution*, by D.H. Weinberg, Aula Magna, Physics Fac., UB
- 23-27 OCT: *ICCUB School: Hot Topics in Cosmology*, Physics Fac., UB
- 23-27 OCT: *MAGIC Collaboration Meeting*, Physics Fac., UB
- 18-20 OCT: *The vacuum of the Universe: from cosmology to particle physics*, Physics Fac., UB
- 27 NOV - 1 DES: *Week of Weave #2 Meeting 2017*, Physics Fac., UB

## » OUTREACH ACTIVITIES

- 24 JUN-3 SEP: Exhibition *Amb A d'Astrònoma*, Museu Palau Mercader (Cornellà de Llobregat)
- 21 AGO: Solar Eclipse. More information in <http://serviastro.ub.edu>
- 29 SEP - 30 OCT: Exhibition *Amb A d'Astrònoma*, Biblioteca Josep Janés (Hospitalet de Llobregat)
- 29 SEP - 30 OCT: Exhibition *Les Distàncies Còsmiques*, Biblioteca Tecla Sala (Hospitalet de Llobregat)
- 19 OCT: Talk *Com viuen, neixen i moren les estrelles*, by C. Jordi, Biblioteca Jaume Fuster
- 9 Nov - 10 DES: Exhibition *Les Distàncies Còsmiques*, Centre Cívic Guinardó



<http://icc.ub.edu>  
[www.serviastro.am.ub.edu](http://www.serviastro.am.ub.edu)  
[www.lhc.cat](http://www.lhc.cat)



<https://www.youtube.com/channel/UC8HJ3IYkytEHoAOf9gYYww>



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Institute of Cosmos Sciences  
 C. Martí i Franquès 1  
 08028 Barcelona  
[secretariacientifica@icc.ub.edu](mailto:secretariacientifica@icc.ub.edu)  
<http://icc.ub.edu>