AWARDS


L. Verde and R. Jiménez, Radcliffe fellows at Harvard University, 27 April 2015

DEFENDED THESES

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ICCB ANNUAL REPORTS

Please visit: http://icc.ub.edu/about/reports

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Institut de Ciències del Cosmos — Universitat de Barcelona

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The ICCUB, awarded María de Maeztu Unit of Excellence

The ICCUB has been awarded the distinction Unidad de Excelencia María de Maeztu in the first edition of the call organized by the Ministry of Economy and Competitiveness (MINECO).

The María de Maeztu distinction consists on a new modality within the programme of Centres of Excellence started in 2011 with the Severo Ochoa call. This new modality recognizes the excellence of research entities which are included into more complex institutions as universities. The requisites, exigence levels, demands and procedures of evaluation have been the same as for Severo Ochoa, as stated in the press release published by the Ministry.

This distinction means a recognition for all the work done so far and an important financial support for the ICCUB scientific programme. For the next four years, the eight high-priority research lines will be: determination of the dark energy component of the universe at the 1% level; precise determination of the neutrino mass from cosmology; holography and QCD in extreme conditions; search of new physics in radiative flavour decays; galaxy formation and chemo-dynamical evolution unravelled by Gaia; the nature of dark matter; the Gaia archive; and LHCb detector upgrade.

La Palma, chosen for final negotiations to host Northern CTA installations

In July 2015, the Cherenkov Telescope Array (CTA) Resource Board decided to enter into detailed contract negotiations for hosting the CTA major scientific infrastructure of the Northern Hemisphere at the Roque de los Muchachos Observatory in La Palma, Spain.

The ICCUB, which is part of the CTA consortium, has participated in the project since its inception, contributing to both physics and electronics and welcoming the Third General CTA Meeting (January 2008) as well as several working meetings of the network. Concerning physics, ICCUB researchers have made simulations of gamma ray binaries as observed by CTA and are planning the observation of transient Galactic objects. Concerning electronics, ICCUB engineers have been developing several ASICs for the telescopes cameras.

Counting stars with Gaia

Work is ongoing at the ICCUB to daily run the Gaia Initial Data Treatment (IDT) system to cope with real Gaia telemetry. More than 316 days of science data processed up to now collects more than 27 billions of detections. Gaia housekeeping data (part of the telemetry being received) include the total number of stars that is detected every second in each of Gaia’s fields of view. This information has been used to present this first map of the Milky Way as seen by Gaia. Furthermore, the ICCUB team has recently confirmed that IDT astrometric positions are accurate up to 100 milliarcsec at magnitude G=19.

Gaia Science alerts at Montsec

The Montsec Observatory (OAdM), an infrastructure managed by IEEC and located at Àger (Lleida, Spain), has started contributing to the Gaia Science Alerts ground-based follow-up programme with its robotic telescope Joan Oró (TJO). Since February 2015 members of the ICCUB have obtained around 1400 CCD images in multicolor Johnson-Cousins passbands which have allowed to monitor the evolution of several Gaia science alerts to follow up transient objects such as Supernovae, RR Lyrae and stars of unknown variable type.

J. Solà, Honorable Mention 2015 by the Gravity Research Foundation

The ICCUB member J. Solà and the ICCUB collaborator P. Towsend have been selected for Honorable Mention by the Gravity Research Foundation, an organization established in 1948 with the aim of generating interest in the study of Gravity. The awards are given for essays on the subject of gravitation, its theory, application, or effects.

J. Solà has been recognized for his essay The cosmological constant and entropy problems: mysteries of the present with profound roots in the past. It is the third consecutive year that he is awarded this mention.

Verde and Jiménez named Radcliffe fellows at Harvard University

L. Verde and R. Jimenez, ICREA professors at the ICCUB, have been named Radcliffe fellows at Harvard University. It is the first time this very prestigious distinction has been given to a scholar based in Spain.
First real-time observation of the onset of stellar jets during the formation of a massive protostar

Researchers from ICCUB, ICE and IAA have observed for first time the moment in which a massive protostar begins to develop jets of matter and energy, crucial for star formation.

The study, published in *Science* in April 2015, proves that the massive protostar W75N(B)-VLA2 has dramatically changed the way in which it expels matter. It has allowed observing the transition from the first regime in which the star ejects matter in all directions, to a second regime in which the ejection is along a preferred single direction, forming the jet. Although star formation processes trigger hundreds of thousands of years, researchers have been able to observe how the wind from the protostar has evolved from a compact to an elongated source in only 18 years, from 1996 to 2014. [Science, 348, 114-117 (2015)]

A pentaquark observed at LHCb experiment at CERN

The LHCb experiment at CERN’s Large Hadron Collider (LHC) reported on 14 July the discovery of a new class of particle, the “pentaquark”, a particle formed by five quarks. Until now only mesons (particles formed by two quarks) and baryons (three quarks) had been observed. Although the quark model did allow the existence of pentaquarks, they had never been observed before.

LHCb researchers looked for pentaquark states by examining the decay of the baryon known as \( \Lambda_b \) into three other particles, a \( J/\psi \) meson, a proton and a charged kaon. The study of the spectrum of masses of the two first particles revealed that intermediate states were sometimes involved in their production. These have been named \( P_c(4380)' \) and \( P_c(4450)' \), the former being clearly visible as a peak in the data, and the latter being required to describe the data fully.

The detection of the pentaquark was reported in the journal Physical Review Letters [http://arxiv.org/abs/1507.03414] on behalf of the international collaboration, in which ICCUB researchers participate.

A NEW WAY TO AGGREGATE QUARKS

The structure of the pentaquark is still to be determined. The quarks could be tightly bound or they could be loosely bound in a sort of meson-baryon molecule.

CMS and LHCb experiments reveal new rare particle decay

In a paper published in *Nature* on June 2015 [Nature 522, 68-72 (2014)], the CMS and LHCb collaborations described the first observation of the very rare decay of the \( B^0 \) particle into two muon particles, which are similar to electrons but heavier.

This result has a profound impact: it delimits many possible theories beyond the Standard Model because it hinders validation as the energy regime required is far from the one which has been studied today by means of particle accelerators.

The LHC starts its second run

After an almost two year shutdown and several months re-commissioning, on 3 June 2015 the Large Hadron Collider started delivering physics data at the unprecedented energy of 13 TeV, almost double the collision energy of its first run.

Over the two-year shutdown, the four large experiments, as the LHCb, in which ICCUB researchers collaborate, went through an important programme of maintenance and improvements in preparation for the new energy frontier.

This marks the start of season 2 at the LHC, opening the way for new discoveries.
Great attendance success to ICCUB Colloquia 2015 edition

Up to date five colloquia have been given by I. Cirac (MPG), G. Baym (U. Illinois), R. Emparan (ICCUB), B.J.T. Jones (U. Groningen) and R. Sunyaev (MPG). The colloquia have been recorded and the videos are available on the ICCUB Youtube channel.

UB Master students visit Calar Alto

Students of the Master degree in Astrophysics, Particle Physics and Cosmology offered by ICCUB had the opportunity to perform professional observational work at Calar Alto Observatory last April. Two days of intensive work included an introduction to astronomical instrumentation, a real observing experience at the 2.2m telescope and a general training to data analysis and reduction. This experience provides students with the basic methodological skills needed to conduct PhD research work that requires observational techniques in astrophysics.

ICCUB offers new Master and PhD grants

The ICCUB will broaden its training program during the next academic year by using the María de Maeztu award budget. Six student grants will be offered to pursue the Master program in Astrophysics, Particle Physics and Cosmology. The application process will start in September 2015. Also several calls for PhD and postdoc postions will open during the next academic year.

Gaiaverse, the new Gaia portal of outreach

A dissemination portal on the ESA Gaia’s mission has been developed within the GENIUS project, a European FP7 project led by the ICCUB to boost the impact of the next European breakthrough in astrophysics, the Gaia astrometric mission. The web collects all kind of divulgation material such as presentations, videos, posters, brochures, tools and news. http://gaiaverse.eu/

Observing the Sun at the first UB Science Festival

The ICCUB organised a public observation of the Sun during the first UB Science Festival that took place on 25 May. Around 150 people, including students from four schools and general public, passed by the telescopes installed at the central building of the Univesity, at Barcelona city center.

The ICCUB now on Youtube and Twitter

The new Youtube channel includes several reproduction lists containing the ICCUB Colloquia 2015 Edition and several outreach videos created by ICCUB groups. The twitter account will contribute to promote ICCUB activities such as colloquia, seminars, conferences and outreach activities.

CONFERENCES AND COLLOQUIA

15 Oct, 12:00: ICCUB Col. Understanding the Atomic Nucleus: Recent Dramatic Advances and Remaining Challenges, by R. Machleidt, Aula Magna, Physics Sch., UB
26 Nov, 12:00: ICCUB Col. about Direct Dark Matter Searches, by L. Baudis, Aula Magna, Physics Sch., UB
31 AGO-4 SEP: Gaia Challenge Meeting Aula Magna, Physics Sch., UB
04 SEP, 9:00: Symmetries in Particles and Strings, A Conference to celebrate the 70th birthday of Quim Gomis, Aula Eduard Fontseré, Physics Sch., UB
21-23 SEP: Gaia Catalogue Access CU9 plenary Meeting, Aula Magna, Physics Sch., UB
19-20 OCT: HESPERIA Progress Meeting, DAM Seminar, Physics Sch., UB
21-23 OCT: Workshop The vacuum of the Universe: from cosmology to particle physics Progress Meeting, Sala de Juntes, Physics Sch., UB

OUTREACH ACTIVITIES

29 NOV-21 DEC: Exhibition Amb A d’Astromònoma, Centre Civic Espai Gatassa, Mataró
20 NOV-11 JAN: Exhibition De la Terra a l’Univers, Museu Darder de Banyoles

NEW TERMINOLOGY COLLECTIONS

ICCUB members contribute with new entries in:


http://icc.ub.edu
www.serviastro.am.ub.edu
www.lhc.cat
https://www.youtube.com/channel/UC8HJ3IYkytEHoAOAPgYyyww
https://twitter.com/ICC_UB

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