AYUDAS RAMÓN Y CAJAL
CONVOCATORIA 2015

Turno de acceso general

Nombre: **MARIS , IOANA CODRINA**
Referencia: RYC-2015-18517
Área Científica: Física y Ciencias del Espacio
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Título:

Origin of Ultra High Energy Cosmic Rays

Resumen de la Memoria:

The origin, the mass and the acceleration of cosmic ray particles to energies above 100 EeV still constitutes a crucial puzzle of modern astroparticle physics. My research up to now has been focused on helping to solve this puzzle and my most important achievement is the measurement of the energy spectrum of the ultra-high energy cosmic rays and its spectral features. The results have shown unambiguously the presence of a flux suppression at the highest energies and the presence of the ankle feature.
During the last years I was involved in the design and installation of enhancements of the Pierre Auger Observatory to measure the MHz and GHz emissions of air-showers. I am also one of the main proponents of an upgrade of the Surface Detector of the Observatory, the layered surface detector. The proof of concept, based on simulations and data from prototype detectors, has been recently published.
I have participated as well to the data taking and analysis of beam-experiments: NA61/SHINE and AMY.
Recently I have joined the Xenon 1T collaboration in the quest for the direct searches for dark matter.

Resumen del Currículum Vitae:

The research that I have conducted up to now combines two fields of science: the Ultra High Energy Cosmic Rays (UHECRs) and Particle Physics at fixed target experiments. The two domains are highly correlated, since understanding the origin of the highest energy particles in the Universe requires a fair knowledge of the air shower development and thus of the hadronic interactions that take place in the atmosphere. Recently I decided to enlarge my scientific horizon and have joined the XENON collaboration, in the quest for the direct searches for dark matter. In my research career as an experimentalist I have gained expertise in particle detectors and in the analysis of the data they deliver. I have a good knowledge of Water Cherenkov and Fluorescence detectors (Auger), time-projection chambers and time of flight detectors at fixed target experiments (NA61/Shine),dipole (MHz) antennas, horn (GHz) antennas and Faraday chambers (EASIER, AMY) and since October 2015, double-phase liquid Xe TPCs.
My PhD thesis results were published in two papers of the Auger collaboration: Observation of the suppression of the
flux of cosmic rays above 40 EeV. Phys.Rev.Lett.101, pp. 061101, 2008 (504 citations) and Measurement of the energy spectrum of cosmic rays above 1 EeV using the Pierre Auger Observatory. Phys.Lett.B685, pp. 239-246 2010 (338 citations). In the last years I have been active in the design of new detectors and I participated in the R&D for the upgrade of the Pierre Auger Observatory.
Summary of papers and conferences:
- Published papers in journals: 63 (2 with more than 500 citations , 4 with more than 300 citations)
- h (HEP) index: 30
- Talks given at international conferences: 15
- Auger internal notes: 33
- Xenon internal notes: 1

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Nombre: **TARRUELL , LETICIA**
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Título:

Experimental quantum simulation with ultracold Fermi gases

Resumen de la Memoria:

I am an experimental researcher in the field of ultracold quantum gases. My research lies at the interface between atomic physics, quantum optics and condensed-matter physics, and is centered on the simulation of condensed-matter phenomena using ultracold quantum gases, focused on fermionic systems. I have worked on three major lines: the study of the BEC-BCS crossover, the simulation of the Fermi-Hubbard model, and the study of topological systems. My research has been developed in leading groups of prestigious European research centers: Ecole Normale Supérieure in Paris (Master and PhD), ETH Zurich (post-doc) and Centre National de la Recherche Scientifique (Chargée de Recherche 2). Since June 2013 I am a Junior Group Leader (tenure-track position) at ICFO.

Major scientific achievements of my previous research (h-index=13 with 1531 citations WoS, including 13 peer-reviewed publications, 1 invited feature article, 4 conference proceedings and 1 invited book chapter):
i) Optical lattices:
Artificial graphene (Nature, cited 260, Nature cover)
Spin correlations (Science, cited 103)
Out-of-equilibrium dynamics (PRL, cited 103)
Validation of lattice fermions as quantum simulators (PRL, cited 92)
ii) Bulk systems:
Early studies of BEC-BCS crossover (PRL, cited 522)
P-wave Feshbach resonances (PRA, cited 113)
Collective excitations in imbalanced Fermi gases (PRL, cited 116)
Early theoretical studies of Tan&#65533;s contact (EPJB, cited 68)

I have given 20 invited talks at international conferences and workshops in world-wide recognised physics centers (Aspen Center for Physics, KITP-Santa Barbara, Institut Henri Poincaré-Paris, ICTP-Trieste and Aarhus Institute for Advanced Studies, among others), 2 invited talks in broad spectrum conferences (CLEO-San José and Physics@FOM-Veldhoven), 3 invited talks and 3 series of lectures in prestigious physics summer schools (Varenna, Benasque, Les Houches and Strathclyde). I have been invited to present my work in 25 departmental seminars.

In 2013 I established the Ultracold Quantum Gases group at ICFO. I currently supervise 2 post-docs (1 Marie Curie fellow) and 2 PhD theses. I have directed at ICFO 2 Master theses, 2 exchange Master projects and 1 Bachelor thesis. My group produced in June the first Bose-Einstein condensate in Spain, in January the first dual BEC of potassium isotopes (never observed before), and is now extending the setup to prepare degenerate Fermi gases.
My research is supported by several projects in which I am PI or co-PI: European (Marie Curie CIG and IF fellowships, FET-proactive) and National (Plan Nacional, Fundación BBVA and L&#65533;Oréal-UNESCO prize For Women in Science).

Resumen del Currículum Vitae:

I did my undergraduate studies in physics at Universidad Complutense de Madrid (1999-2002) and Université Paris 7 (2002-2003). During that year my interest in experimental cold atom physics led me to perform a 3-month internship in Jean Dalibard&#65533;s group at École Normale Supérieure (ENS) in Paris, after which I decided to pursue a research career in the field. Supported by a scholarship of the French government, I obtained a Master degree in Quantum Physics at ENS Paris in 2004. My master thesis work was carried on at ENS in the group of Christophe Salomon and concerned the study of p-wave Feshbach resonances in degenerate Fermi gases.
During my PhD studies at ENS (with a competitive French government scholarship) I worked on the study of superfluidity in strongly interacting Fermi gases and on the construction of a 2nd generation experimental setup under the supervision of Christophe Salomon. I graduated in June 2008 with the highest qualifications. My research work at ENS led to 4 experimental publications in refereed journals (2 Phys. Rev. Lett. and 2 Phys. Rev. A), 1 theoretical paper (Eur. Phys. J. B) and 2 conference proceedings. The experimental setup which I constructed has been operated without major changes since my departure and has allowed the ENS team to perform key quantum simulation studies in the last years.
I pursued my research career as a postdoctoral fellow in Tilman Esslinger&#65533;s group at ETH Zurich (2008-2013) where I carried on experiments with ultracold fermionic gases in optical lattices. I worked on the first simulation of artificial graphene with ultracold atoms

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and on the study of the equilibrium and non- equilibrium properties of the repulsive Fermi-Hubbard model. My work at ETH has led to 7 publications in refereed journals (1 Nature first author publication, 1 Science, 4 Phys. Rev. Lett., 1 Phys. Rev. B, 1 Eur. Phys. J. ST) and 2 conference proceedings. I was awarded the ICAP Poster prize 2012 for the graphene experiments, which were selected as cover of Nature.
In 2011 I obtained a competitive junior researcher position (Chargé de Recherche 2, permanent position) at the French Centre National de la Recherche Scientifique (CNRS) and was appointed to Institut d Optique in Bordeaux.

Since June 2013 I hold a Junior Group Leader (tenure-track) position at ICFO, where I have established an experimental group that has produced during 2015 the first Bose-Einstein condensate in Spain.
In parallel to my research activities I have a diversified teaching experience in 3 different countries and 7 higher education institutions. My current and past teaching activities include lectures, exercise classes, laboratory courses, summer schools and the development of outreach activities for the general public and demonstration experiments for the undergraduate laboratories (teaching prize of the ETH physics Department 2012).
I currently supervise at ICFO 2 postdocs and 2 PhD theses, and have supervised 2 Master theses, 2 exchange Master students and 1 Bachelor thesis. In my previous positions I supervised 1 Master thesis, 4 undergraduate research projects, and tutored 6 PhD students. I have also been member of 4 thesis committees.
I am presently referee for 7 international physics journals (including Science, Nature, Nature Physics, Phys. Rev. Lett. and Phys. Rev. A) and for a French scientific funding agency.

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Nombre: **MATHUR , SAVITA**
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Título:

Stellar Dynamics and Structure

Resumen de la Memoria:

I did my PhD in helioseismology to better constrain the solar dynamics. My thesis was in instrumentation, modeling, and data analysis. During my postdoc at the IIA, I broadened my research to asteroseismology by developing the pipeline A2Z to determine the global acoustic parameters of stars with solar-like oscillations.

Stellar magnetic activity results from the interaction between rotation, convection, and magnetic field. My research focuses on the understanding of the detailed mechanisms involved in the generation of magnetic activity cycles. I have been working on constraining stellar magnetic activity through these three processes.

With the A2Z pipeline I analyzed many solar-like stars and red giants observed by CoRoT and Kepler missions to look for the properties of their acoustic modes, providing a first estimate of the mass and radius model independently. A2Z also measures the timescale of granulation, which is a manifestation of the stellar convection. I showed for the first time how granulation timescale scales with surface gravity (Mathur et al. 2011).

At the HAO, I led the first homogeneous asteroseismic analysis of 22 stars with the Asteroseismic Modeling Portal (AMP). This is a Genetic Algorithm that fits the spectroscopic and seismic observables. I participated to the improvement of the algorithm by implementing the ratios that get rid of the surface effects (one of the unknown parameter in stellar modeling). This is important to infer stellar structure, particulary the depth of the convection zone, which is a key ingredient in stellar dynamo models developed to simulate magnetic activity cycles.

I worked on the determination of surface rotation periods of solar-like stars using time-frequency analysis and looked for magnetic activity cycles (Mathur et al. 2014). I was in the core team of the first discovery of a magnetic activity cycle using seismology in a star other than the Sun (Garcia, Mathur et al. 2010, Science).

Finally, I used all the seismic constraints to compute a 1D stellar model of a Kepler target, which was used as the input for a 3D MHD dynamo simulation. It allowed us to study a polarity reversal, and hence the properties of the magnetic cycle.

Resumen del Currículum Vitae:

I obtained my engineering degree in Telecommunications in France in 2004. In 2007, I obtained my PhD in helioseismology. My thesis was divided in three aspects: instrumentation (I was responsible for the calibration of a detection chain for the GOLF-NG prototype), data analysis, and modeling. I have been doing my research abroad for almost 8 years. In particular, in 2008 I was awarded the prestigious Chandrashekhar Postdoctoral Fellowship at the Indian Institute of Astrophysics in India. That is when I broadened my research to asteroseismology and started to work with CoRoT data and with the preparation of the Kepler mission. In 2009 I obtained the HAO postdoctoral fellowship in Boulder (CO, USA). Since 2012, I am the PI of a NASA grant for a proposal within the Astrophysical Data Analysis Program (success rate < 15%) and the institutional PI for two additional NASA and NSF grants.
I am currently a research scientist at the Space Science Institute (SSI) in Boulder (USA) and recently became head of the Center for Extrasolar Planetary Systems within SSI.

My research interests include understanding stellar evolution through asteroseismic observations, in particular to study the dynamics of stars (convection, rotation, and magnetic activity). My multidisciplinary skills (instrumentation, data analysis, modelling) put me in a good position for this project involving data analysis and modelling. I have not only managed small groups of people when developing the A2Z pipeline (collaboration of three main institutes HAO, IAC and CEA) but I have also led several projects with a large number of scientists (around 30 people) within the Kepler Asteroseismic Science Consortium (KASC), leading to 3 publications (Mathur et al. 2011a, 2011b, 2012). I was in the core team of the first discovery of a magnetic activity cycle using seismology in a star other than the Sun (Garcia, Mathur et al. Science, 329, 1032). I recently led the work to produce the Kepler star properties catalog for the close-out of the Kepler mission, which will be used for the final planet search in the Kepler data. I am well recognized among the international community as a member of the AsteroFLAG group, an invited member of the science core team of APOKASC (a collaboration between Sloan SDSS3 survey and KASC). I

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gave several invited talks and reviews in particular in stellar modelling (KASC4 and KASC7 meetings) and stellar activity cycles (Stellar pulsation conference 2011, IAU SpS13).

I was also the co-chair of the SOC of a European Geophysical Union meeting entitled Space Weather in Planetary Systems (ST5.3). I have mentored three undergraduate students and one graduate student. I have also been teaching in engineering school called the Institute for Electronic of Paris (ISEP) and gave a few guest lectures at the University of Colorado (Boulder, USA).

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Nombre: **BLENNOW , MATTIAS**
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Título:

Present evidence for new physics: neutrino and dark matter sectors

Resumen de la Memoria:

I obtained my PhD from KTH Royal Institute of Technology, Stockholm, in June 2007. After obtaining funding through external grants, I spent 3.5 years as a postdoc at the Max-Planck-Institut für Physik, Munich, and later moved on to spend another postdoc year at the Max-Planck-Institut für Kernphysik, Heidelberg. Since the fall of 2012, I hold a four-year junior faculty position at KTH. In this capacity, I have been leading a small research group, including a postdoc, a PhD student, and several Master students as well as acted as the co-supervisor of another two PhD students.

I currently have active research in the fields of neutrino oscillations, neutrinos in astrophysics, physics beyond the Standard Model, and dark matter phenomenology.

Neutrino oscillations: I have several papers on how the remaining oscillation parameters may be determined experimentally, including the first study of the capabilities of the proposed MOMENT experiment. In 2012 I wrote a review on matter effects together with Alexei Smirnov.

Neutrinos in astrophysics: I am currently studying the possible effects of new physics on the fluxes of ultra-high energy neutrinos at neutrino telescopes. I have written papers on the effects of non-standard interactions on these fluxes as well as their impact in the collective behaviour of neutrinos in supernova explosions, and the possibility of measuring the cosmic neutrino background in beta decay experiments.

Physics beyond the Standard model: I have studied several types of new physics scenarios and their phenomenological implications, mainly in the form of non-standard neutrino interactions, but also in specific models, in particular extra-dimensional models and neutrino mass models

Dark matter: I have and continue to study dark matter phenomenology, in particular with regards to the neutrino signal from dark matter annihilations in the Sun and halo independent constraints. I also have an interest in alternative dark matter models, such as asymmetric dark matter.

As of December 27, 2015, I have written a total of 47 papers published or submitted to international peer reviewed journals with 1602 citations in the INSPIRE-HEP database.

Resumen del Currículum Vitae:

Carreer:After obtaining a Master degree in Engineering Physics from KTH Royal Institute of Technology, I started my doctoral studies with prof Tommy Ohlsson in early 2004 within the subject of neutrino oscillations, funded by a central KTH grant awarded for excellence in undergraduate studies. My research at the PhD student level was aimed mainly at phenomenological three-flavour and non-standard effects in neutrino propagation. I completed my PhD in 3.5 years (nominal time 5 years, including teaching and course work) and obtained grants from the Swedish research council and the Marie Curie actions for a postdoctoral position at the Max-Planck-Institut für Physik in Munich. Upon completion of my postdocs in Munich, I spent one year as a postdoc at the MPI für Kernphysik, Heidelberg, before moving on to a time-limited junior faculty position at KTH. In this position, I have obtained external grants to fund a PhD student and a postdoc and I have supervised several Master theses.

Research interests:
I currently have active research in the fields of neutrino oscillations, neutrinos in astrophysics, physics beyond the Standard Model, and dark matter phenomenology.

Neutrino oscillations: I have several papers on how the remaining oscillation parameters may be determined experimentally, including the first study of the capabilities of the proposed MOMENT experiment. In 2012 I wrote a review on matter effects together with Alexei Smirnov. I have also written a series of papers regarding the statistical interpretation of sensitivity limits for future oscillation experiments.

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Neutrinos in astrophysics: I am currently studying the possible effects of new physics on the fluxes of ultra-high energy neutrinos at neutrino telescopes. In the past, I have written papers on the effects of non-standard interactions on these fluxes as well as their impact in the collective behaviour of neutrinos in supernova explosions, and the possibility of measuring the cosmic neutrino background in beta decay experiments.

Physics beyond the Standard model: I have studied several types of new physics scenarios and their phenomenological implications, mainly in the form of non-standard neutrino interactions, but also in specific models, in particular extra-dimensional models and neutrino mass models. I am currently investigating the possibility of constraining the parameter space of several neutrino mass models through global fit procedures using data from oscillations as well as colliders and astrophysical considerations.

Dark matter: I have and continue to study dark matter phenomenology, in particular with regards to the neutrino signal from dark matter annihilations in the Sun and halo independent constraints. I also have an interest in alternative dark matter models, such as asymmetric dark matter.

I have been the co-organiser of several international conferences and workshops, including a one month scientific program at the Nordic Institute for Theoretical Physics (NORDITA) and convening the neutrino session at EPS-HEP 2015.

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Nombre: **MARTINEZ RUIZ, JOSE IGNACIO**
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Título:

Theory and Simulation of Low-dimensional Functional Materials

Resumen de la Memoria:

My main research line is placed within the context of the Theory and First-principles Simulation of Low-dimensional Functional Materials. I have focused, on one side, on the conceptual development of theoretical tools and models to understand the behavior of nanostructured materials and surfaces in nature. On the other side, I have covered the characterization of structural/mechanical, chemical reactivity/catalytic activity and spectroscopic properties of nanostructures with enhanced and emerging properties regarding targeted functionalities.

Within this context, during the last decade I have played a very active role in fields such as surface physics, computational physics, characterization of nanomaterials (from small clusters/nanoparticles, nanowires/tubes and layered materials, to their extended surfaces), catalysis, physico-chemical modeling and on-surface chemistry. Specifically, the main new materials and processes I have studied involve: i) on-surface-assisted formation of organic 2D-layers, and organic/metal (O-M) and metal-oxide (O-MO) interfaces, ii) novel chemical routes and nanomaterials (thermally-assisted H-induced etching of carbonaceous species) to explain the formation of Polycyclic Aromatic Hydrocarbons (PAHs) in space, and iii) advanced functional nanostructured catalyzers (pre-filtering of catalysts for their potential use in fuel/solar cells). I have developed a number of novel simple and predictive descriptors successfully linking the geometric arrangement of a large variety of nanostructured materials and surfaces of high technological interest to their intrinsic stability, chemical reactivity and catalytic properties. I have pioneered full first-principles studies of a wide variety of organic molecules forming different O-M and O-MO interfaces towards the design of nanoelectronic devices, and participated in the development of new routes towards the formation of pristine/N-doped graphene on metal surfaces from novel aromatic precursors by on-surface (cyclo)dehydrogenation reactions, as well as understanding other on-surface processes. Besides, I have studied novel nanostructured materials of high potential to be implemented in nanoelectronic devices (SiO_2, RuO_2 and SiO_2@RuO_2 composite nanotubes/wires), characterized new 2D-coordination polymers for gas-sensing purposes, and novel materials for their utilization in hydrogen storage, such as layered WS_2 nanostructures.

The aforementioned scientific achievements have been adequately combined with the conceptual development of first-principles based methodologies towards the efficient and fast characterization of materials in all their nanostructured versions, such as home-made simulation codes implementing a theoretical state-of-the-art STM-imaging tool, energy level alignment in O-M and O-MO interfaces, and a thermally-assisted theoretical quenching tool to more efficiently trigger the phase-space for structural optimization. During my research career I have covered the study of the nanostructured functional materials from a highly interdisciplinary approach, involving chemistry, physics, and computational science, towards the guidance of multidisciplinary Material Science experimentalists on the basis of an efficient, fast and trustable theoretical pre-filtering of materials across their nanostructured versions on demand of the specific targeted functionalities.

Resumen del Currículum Vitae:

TRAJECTORY. Bachelor in Physics at University of Valladolid (UVA) in 2002. PhD "summa cum laude" in Physics at UVA, 2007. 4 post-doctorate stages in prestigious research groups of Catalysis and Surface Science: FP7 post-doc at CAMD (Denmark), 2007-2009; FP7 and JdC post-docs at the Autonomous University of Madrid (UAM), 2009-2013; and CSIC-JaeDoc scientist (2013-2015) at the ICMM-CSIC (Madrid), where currently I hold a contracted scientist FC3 position associated to the ERC-Synergy NANOCOSMOS Project.

SCIENTIFIC CONTRIBUTIONS. I have coauthored >65 JCR articles in peer review journals, among them: 1 NatComm, 1 AdvMater, 3 AngewChemIntEd, 1 ACSNano, 2 ChemSci, 3 PRL, 2 Nanoscale, 2 ChemComm, 1 Carbon and 1 SciRep. Awarded with 7 artistic journal covers. Coauthor of 4 book chapters (one in a CRC Handbook of Nanophysics). 1st/corresponding author in almost half of the articles, and 2nd author in other 15. 85% of papers published in journals within the first quartile (Q1), 6 of these papers in journals with an impact factor >10 (20 articles >5) according to JCR 2014. The overall publications have attracted 1400+ citations, one of them accumulating >300, and several others >40, yielding an h-index of 19 and average IF per publication >5.5. Average number of citations per year (accounting last five years) of around 250, and an i10 factor of 33. Results have been personally communicated in >50 national and international symposiums (18 oral+12 invited and keynote contributions). >15 invited seminars for highly specialized research groups at CNRS (France), CAMD (Denmark), and DIPC, UAM and CSIC (Spain), among others.

R&D PROJECTS. Participation in 11 R&D Projects (8 national, 2 international EU-FP7, and 1 international ERC-Synergy).

SUPERVISION. During 2008-2011 I co-supervised a PhD Thesis at the DTU (Denmark) entitled "DFT Perspectives on the Activity and Stability of Electrocatalysts" (mark: passed with "summa cum laude").

SCIENTIFIC COMMITMENT. External proposal evaluator for scientific national agencies: ANEP (Spain), FWF (Austria) and ANPCyT (Argentina). Frequent referee for the most prestigious scientific editorial groups (APS, ACS, RSC, Wiley&Sons, Nature PG, among others).

INTERNATIONALIZATION. I have opened and maintained a large number of relevant and fruitful international collaborations with the most

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prestigious groups in experimental and theoretical Material Science all over the world. I have participated in technological and knowledge transfer activities with several international fuel-cell enterprises (GERMANOS, NEDSTACK) and providing atomistic simulation tools to SAMSUNG KOREA. Large amount of international collaborative visits, scientific seminars and master classes given in international centers, as well as the designation as external international proposal evaluator, the co-supervision of a PhD Thesis in Denmark, and the mentioned collaborative efforts with international technological enterprises, endorse up to a high level the internationalization of my scientific trajectory.

TEACHING EXPERTISE. >60 ECTS (~500 teaching hours validated by Spanish ANECA) in courses of Physics and Chem. Eng. Degrees. Invited to teach a number of master classes within a Nanotechnology Master Program at CNRS (France). Ad-honorem Professor at UAM since 2013; and accredited Professor (Assistant, Contracted and Private University Professor) by ANECA.

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Turno de acceso general

Nombre: **KITAURA JOYANES, FRANCISCO SHU**
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Título:

Modelling and reconstructing the cosmic large-scale structure

Resumen de la Memoria:

My interest is to understand how the Universe evolves, how it forms structures, why it expands, and what is the nature of dark matter and dark energy. These belong to the major questions in modern cosmology. Next decade large and expensive observational projects will bring information on the structure and the distribution of many millions of galaxies at different redshifts enabling us to make great progress in answering these questions. However, these data require a very special and complex set of analysis tools to extract the maximum valuable information. I focus my research to develop these techniques, bridging the gaps between theory, simulations, and observations.

To this end, I have worked on cosmological perturbation theory to develop: linearisation techniques of cosmological density fields, augmented Lagrangian perturbation theory to simulate structure formation, and nonlinear relations between the density and the peculiar velocity field. These techniques in combination with effective galaxy bias expressions have led to the PATCHY code used to produce the largest set of synthetic galaxy catalogues to date modelling baryon acoustic oscillations (BAO) and redshift space distortions (RSD). They have been used to analyse the BOSS (SDSS-III) data and contributed to understand the galaxy bias of luminous red galaxies, and to detect for the first time the BAO from voids.

Moreover, I have intensively worked on Bayesian inference algorithms (Big Data) to reconstruct cosmic density and peculiar velocity fields, power spectra, and the primordial fluctuations of the Universe. In particular, I developed the ARGO and KIGEN machine learning codes, which pioneered non-Gaussian, and non-Poisson, multivariate inference methods.

These novel techniques permit one to deal with the nonlinear complex nature of cosmic fields, while taking care of observational systematics, such as survey geometry, and selection functions, inherent to galaxy redshift surveys. They have been applied to different catalogues, such as the SDSS-II main sample (detecting super-voids and making a cosmic web classification), the 2MRS sample (studying the galaxy morphology and environmental relation, bulk flows, the Local group motion and CMB-dipole, and the cosmic web in the Local Volume), or the BOSS (SDSS-III) luminous red galaxy (LRG) sample (providing velocity field reconstructions). Templates resulting from these reconstructions have been cross correlated with the cosmic microwave background (CMB) maps from WMAP and PLANCK to study the warm hot intergalactic medium (providing the first kinematic Sunyaev Zeldovich detection with PLANCK data).

In addition, I contributed in my early career to explain the explosion mechanism of the low mass end of stars producing core-collapse supernova. Here I used hydrodynamical simulations with neutrino Boltzmann transport, including a detailed nuclear burning and electron capture description.

Resumen del Currículum Vitae:

F.-S. Kitaura started Physics at the UCM after passing the University selection exams with the highest possible qualification in Physics and Mathematics. He obtained degrees in Physics with specialisations in Theoretical Physics and Astrophysics, UCM (2002) and TUM (2003), respectively. He started working on "hydrodynamical simulations with Boltzmann neutrino transport of the low mass end progenitor stars producing core-collapse (neutron stars) Supernovae explosions" during his master thesis (2003). His first author paper on this subject lead to a press release of the MPA in 2006. In mid 2004 he received an IMPRS fellowship which permitted him to work on any subject at the MPA. After being inspired by an intensive school on astro-statistics at Penn University in 2005, he focused his research to study the cosmological large-scale structure (LSS) from galaxy surveys with statistical Data Analysis/Data Mining/Big Data tools.

His PhD thesis "Cosmic Cartography: Bayesian Reconstruction of the Cosmological Large-Scale Structure" with advisors Prof. S. White and G. Boerner (December 20 2007) including some Supernova work received a perfect score in the written part and was altogether rated Magna Cum Laude by the LMU commission.

In 2008 he was granted a Marie-Curie fellowship from the EU to further develop his techniques to study the LSS from the Lyman-alpha forest with Prof. A. Ferrara at SISSA (Trieste) and at SNS (Pisa). The work he developed during this period joined for the first time peculiar velocity, power- spectrum and density reconstructions. He then got several grants in the period end of 2010 till mid 2011 from The Cluster of Excellence and the Max-Planck Society in Munich. In mid 2011 he was awarded with the Karl-Schwarzschild fellowship to work at the AIP in Potsdam.

There he combined his statistical data analysis tools with higher order perturbation theory to make the first self-consistent phase-space analysis of the initial conditions and cosmic web of the Local Universe. This led to a press release at the Royal Astronomical Society in 2012 and applications of this work have appeared in National Geographic January 2015.

These years of efforts have led him to a large number of publications presenting original break through methods, becoming a renown expert in the field of LSS modelling and analysis, being invited in numerous international conferences (more than 25 times since 2007), and being awarded with the Leibniz Society young promising researchers prize (2013). He has more than 40 publications, about 1/3 of them as 1st author, about 1/2 of them including 2nd author contributions, and gathering more than 1500 citations (h-index: 21). Since 2008 he has

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worked as a referee for A&A, ApJ, and MNRAS. He has given courses on Cosmology and Data Analysis at SNS (2009) (Pisa), at the Kapteyn Institute (2011) (Groningen), at the LMU (2011), at the Potsdam University (2013-2014), and at the Summer School in Corfu on Dark Energy (2014). He has also a wide experience supervising undergraduate and PhD students.
In addition, he is an active member of several international collaborations. He is co-lead of the BAO reconstruction working group in EUCLID, co-PI of the cosmology science case in 4MOST, co-lead of the data analysis tools in J-PAS, and leading the massive production of light-cone galaxy mocks project for the BOSS DR11/DR12.

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Nombre: **MARTÍNEZ RUIZ DEL ÁRBOL, PABLO**
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Área Científica: Física y Ciencias del Espacio
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Título:

FISICA EXPERIMENTAL DE ALTAS ENERGIAS

Resumen de la Memoria:

I started my research career as an undergraduate student in the year 2004 when I obtained several grants for young researches. I joined the High Energy Physics (HEP) group of the Institute of Physics of Cantabria (IFCA) and started working in the context of the Compact Muon Solenoid (CMS) experiment. At the end of the year 2005 and after being awarded with the "Outstanding Bachelor Award" by the University of Cantabria I received both the FPU and I3P grants for the realization of a PhD thesis, being the I3P my preferred option.

Between 2004 and 2010 I was fully involved in the installation and commissioning of the CMS detector at CERN, playing a leading role in the development of muon reconstruction algorithms, and in the alignment of the muon system including both hardware and track-based techniques and taking several positions of responsibility. As a result of this pioneering work, the muon alignment goals of CMS were achieved. In recognition, I was awarded in 2010 with the "CMS Achievement Award for outstanding contribution to the muon alignment program" and later with the "Outstanding Award to the best PhD thesis in Science" by the University of Cantabria.

In 2010 I was selected by the prestigious ETH Zurich for a postdoc position, being based at CERN. My research activities evolved naturally with the startup of the LHC to detector operation, data analysis and physics analysis. In particular, I have participated and contributed to several Supersymmetry (SUSY) analysis, being remarkable my leading role in the search with the most promising indication of new physics at CMS, which became also the most precise and scrutinized search in the history of the collaboration, and being of maximum interest for the next years. I also got involved in the Jets and Missing ET group (JET/MET) of CMS, successfully pioneering a new calibration of the b-jet energy scale, never done at the LHC before and with a large impact on the top-quark physics program of CMS. In this period I also had different positions of responsibility on the trigger of CMS that ended up in 2014 with my election as convener of the SUSY Trigger, MonteCarlo and interpretations group, being the responsible and coordinator of the full trigger and Monte Carlo simulation strategy of the SUSY group for the startup in the year 2015. During this year these strategies were implemented under my leadership being two of the fundamental pillars of the CMS SUSY program.

In addition to the active participation at all levels of a HEP experiment (from installation and commissioning, to data analysis or coordination activities) my career is complemented by years of teaching, including the supervision of PhD and Master thesis students and also the participation in outreach activities.

Resumen del Currículum Vitae:

* Education

- Bachelor in Physics, University of Cantabria UC 2005

- PhD thesis in Physics, UC 2010

* Positions and grants after graduation

- I3P PhD fellowship (CSIC) 2006-2010 IFCA

- Postdoctoral researcher 2010-nowadays ETH Zurich

* Research projects

- "Measurements of Higgs boson properties and Searches for Supersymmetry with CMS " ETH, Swiss National Science Foundation, 2014-2016

- "Search for New Physics and Measurements of Higgs boson properties with CMS " ETH, SNSF, 2013-2014

- "High pT Physics with CMS and Upgrades of the CMS Barrel Pixel Detector " ETH, SNSF, 2011-2013

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- ¿Fisica en colisionadores hadronicos (Experimentos CMS y CDF) ¿ IFCA, MEC, 2008-2010

- ¿Participacion en los experimentos CMS y CDF ¿ IFCA, MEC, 2006-2008

* Stays at research centers

- CERN, 10/2010-nowadays, 03/2008-10/2009, and 06/2007-08/2007

* Selected responsibility positions within the CMS collaboration

- Drift Tube Alignment coordinator 2008-2010

- Muon System geometry coordinator 2008-2010

- Convener of SUSY Trigger, Monte Carlo and Interpretations group, 2014-2015

* Selected publications

- ¿Search for Physics Beyond the Standard Model in Events with Two Leptons, Jets, and Missing Transverse Momentum in pp Collisions at sqrt(s) = 8 TeV¿, JHEP 1504 (2015) 124

- ¿Search for physics beyond the standard model in events with a Z boson, jets, and missing transverse energy in pp collisions at sqrt{s}=7 TeV¿, Phys.Lett.B716

- ¿Aligning the CMS Muon Chambers with the Muon Alignment System during an Extended Cosmic Ray Run¿ , JINST 5

- ¿The CMS experiment at the CERN LHC¿, JINST, 3

* Most relevant works presented in conferences and seminars

- Seminar at University of Zurich: ¿Searches for SUSY with two opposite-sign same flavor leptons¿, Zurich, 2015

- ¿Search for Beyond the Standard Model Physics in multi-leptonic and photonic final states with the CMS detector¿ ICHEP 37th 2014

- ¿Searches for SUSY in events with two or more leptons at CMS¿ ICHEP 36th 2012

- ¿Commissioning and performance of the CMS detector¿ 22nd Rencontres de Blois on Particle Physics and Cosmology, 2010

* Selected experience in review of R&D&I articles

- Reviewer of the European Physics Journal C (EPJC)

- Thesis committees: "Search for new heavy bosons decaying into muon-neutrino pairs at the CMS experiment" and ¿Measurement of electroweak processes in muon decay channels, in pp collisions at sqrt(s) = 7 TeV, in the CMS experiment at LHC¿, Universidad Complutense, 2012

* Teaching/supervision (selected)

- Teacher at ETH Zurich, 2010-now

- PhD thesis: ¿Search for Physics Beyond the Standard Model in the Opposite-Sign Same-Flavor Dilepton Final State with the CMS Detector¿ ETH, 2014

- Master: ¿Studies of the Mass Dependence of the JZB in SUSY searches in CMS ¿ ETH, 2013

* Organization of R&D&I activities

- CMS SUSY Workshops Autumm and Spring 2014

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- CMS Data Analysis School 2012

- CMS Muon Barrel Workshop 2009

* Selection of awards

- ﷺOutstanding award to the best doctoral thesis in Scienceﷺ, UC,2013

- ﷺCMS achievement award for outstanding contribution to the muon alignment programﷺ, CMS Collaboration, 2010

- ﷺOutstanding Bachelor Awardﷺ, UC, 2005

* Outreach

- ﷺHands on Particle Physics: European Masterclassesﷺ IFCA, 2005, 2006 and 2010

- Participation in "La Hora Cero" awarded with CPAN ﷺbest blog of 2010ﷺ

- CMS official guide since 2008

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Turno de acceso general

Nombre: **CORNELLES SORIANO, MIGUEL**
Referencia: RYC-2015-18140
Área Científica: Física y Ciencias del Espacio
Correo Electrónico: miguel@ifisc.uib-csic.es

Título:

Nonlinear dynamics and applications of complex systems

Resumen de la Memoria:

My research career has been devoted to the study of complex systems. In my work, I have combined theoretical aspects, numerical simulations and laboratory experiments. By combining these aspects, I have embraced an interdisciplinary approach to science. In recent years, I have produced several relevant contributions to the fields of complex systems and nonlinear dynamics, covering aspects of information processing using complex systems and chaos synchronization of coupled nonlinear oscillators.

In total, I co-authored 47 papers in high-impact Physics and Optics journals, including 1 publication in Reviews in Modern Physics, 3 in Nature Communications and 2 Physical Review Letters. My publications have been cited 906 times according to the Web of Science (H-index 15) and 1299 times according to Google scholar (H-index 18). A significant part of my publications are a result of national and international collaborations. I appear in my papers mostly as first, second or last author. The citations to my publications show a steady increase in the last years and illustrate the current relevance of my research line (275+ citations in 2015).

I am especially proud of two particular aspects of my research line, namely my contributions to nonlinear photonics and information processing:
1) In the field of nonlinear photonics, I am first author of a review paper entitled "Complex photonics: dynamics and applications of delay-coupled semiconductor lasers" in the prestigious journal Reviews of Modern Physics, which has the largest impact factor in multidisciplinary science (IF:42.86). This manuscript is quickly becoming a key reference in the field, with over 100 citations since 2013. I also co-authored a book chapter on this topic edited by Wiley. My work on nonlinear photonics has a strong international projection and I was invited to the 2013 international school on nonlinear optics and photonics in Sao Paulo (Brazil), addressing the dynamics and applications of delay-coupled semiconductor lasers. I also co-organized, together with Japanese colleagues, a mini-symposium on Laser and Complex Dynamics at Dynamics Days Europe 2015.
2) In the field of information processing, I implemented experimentally the first delay-based reservoir computer, an electronic system inspired in how the brain seems to process information. This novel approach uses a single analog nonlinear oscillator subject to delayed feedback to solve computationally hard tasks, such as speech recognition and time-series forecasting. In addition, I contributed to the first optoelectronic and all-optical implementations of the concept. These experimental achievements were published in the journal Nature Communications in 2011 and 2013 (highlighted in Nature Physics News and Views) and were milestones of the FET-Open European project PHOCUS, in which I participated and contributed to. My work on this topic is not only restricted to collaborations within Europe but I also collaborate with e.g. Prof. Dan Gauthier (United States) and Dr. Masanobu Inubushi (Japan).

I am currently co-PI of a Collaboration Research Agreement with a private company on the analysis of biomedical data and local coordinator of a Thematic Network on complex networks funded by the MINECO.

Resumen del Currículum Vitae:

I finished my university studies at the Universitat Politecnica Catalunya in 2002. Immediately afterwards, I enrolled in the doctoral training program of the Department of Applied Physics and Photonics at the Vrije Universiteit Brussel (Belgium), where I received a PhD title with the greatest distinction in 2006.
During this doctoral training period, I specialized in aspects of noise and optical feedback of semiconductor lasers, with long research stays in renowned institutions such as the European Laboratory for Non-Linear Spectroscopy (Florence, 5 months in 2013) and the Laser Center (Amsterdam, 3 months in 2015).
In 2007, I had a 1-year postdoctoral contract with the Universitat de les Illes Balears (UIB) and in 2008 I was awarded a 3-year "Juan de la Cierva" scientific contract with the IFISC research institute, a joint center of the UIB and CSIC.
From 2011 to 2014, I held a "Profesor Ayudante Doctor" position at the Physics Department of the UIB.
My current position is funded by the Government of the Balearic Islands via the program "contractes postdoctorals", in which I was ranked first in a competitive region-wide process.

In my research career, I have built a strong scientific network of collaborations with national and international research groups that I have visited several times, including the Instituto de Física de Cantabria (Spain), the Universitat Politècnica de Catalunya (Spain), the FEMTO-ST Institute (France), the Centro de Investigaciones Ópticas (Argentina) and the Vrije Universiteit Brussel (Belgium). I have co-authored 47 publications in indexed journals, 1 book chapter and 4 conference proceedings. I am proficient in English, Spanish and Catalan, and fluent

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in French and Italian.

I have personally presented 29 conference contributions, including 3 invited talks and 12 oral presentations. I have also been invited to give seminars in selected institutions (e.g. Aston University in 2014, Universidad de Cantabria in 2011). In addition, I was a member of the organizing and scientific committee of the International Conference on Delayed Complex Systems (DCS2012) and co-organized a dedicated Symposium at Dynamics Days Europe 2015 (Exeter, UK).

During my scientific career, I have participated in 11 research projects, 5 of them funded by the European Union, and I have been local PI of a complementary action funded by the MICINN. I am currently co-PI of a Collaboration Research Agreement with a private company and local coordinator of a Thematic Network funded by the MINECO. I have been Referee for 2 European National Science Funding Agencies (Belgium and France) and 20 scientific journals in the fields of Physics and Optics.

I co-supervised two PhD students (M. Escalona and X. Porte defended their thesis in 2015) and four master thesis students. I have been teaching at the bachelor and master levels at the UIB since 2010 with over 600 teaching hours and I am accredited as "Profesor Titular de Universidad" by the ANECA since 2015.
I have participated in several outreach activities promoting nonlinear science and photonics and I have been member of three PhD juries.

Currently, I am responsible of the Nonlinear Physics laboratory at IFISC, studying fundamental properties of coupled non-linear oscillators and targeting at applications in information processing, secure communications and brain-computer interfaces.

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Turno de acceso general

Nombre: **DALLA VECCHIA , CLAUDIO**
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Área Científica: Física y Ciencias del Espacio
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Título:

Numerical simulations of galaxy formation and evolution

Resumen de la Memoria:

I have over one decade of extensive experience in developing hydrodynamic, cosmological simulations for study-ing galaxy formation and evolution within the current paradigm of structure formation. I have been working with and developing massively parallel applications, using several European supercomputers. My primary interest is the role of baryonic physics processes in galaxy evolution, with particular focus on stellar feedback. I have been developing state-of-the-art algorithms for star formation and feedback, and have been working on the numerical implementation of several other baryonic processes (e.g. cooling, stellar evolution, enrichment of the inter-galactic medium, hydrodynamics). My work in the field of numerical cosmology found application in several projects: e.g. OWLS, FiBY, AURORA and EAGLE. The project OWLS gave me an extensive training and experience in supercomputing and massively parallel applications. The project itself had a huge impact on the scientific community, with more than 60 published articles making use of the simulations I performed. OWLS put the bases for the development of a very accurate model of galaxy formation and evolution, the EAGLE model. The EAGLE project greatly benefitted of my work on hydrodynamics algorithms and sub-grid physics modelling such as the new implementation of SN feedback and the new hydrodynamic solver. The EAGLE model of galaxy formation and evolution is the state-of-the-art to date. It reproduces the properties of the observed galaxy population at unprecedented level of accuracy. The FiBY project consisted in producing the highest resolution simulation of the evolution of the early universe. The collaboration investigated the contribution of galaxies to re-ionization, the role of Lyman-Werner radiation in the evolution of the cosmic star formation history, and the direct black hole formation scenario. My current interests are on the internal structure of galaxies, clusters of galaxies and the large-scale structure of the universe. The project on clusters of galaxies has been designed to study the evolution of the luminosity function of cluster galaxies, and the formation and evolution of dwarfs in clusters. It will be fundamental for the interpretation and planning of observations with the WEAVE instrument, and of great importance for other surveys like MANGA and EUCLID.

Resumen del Currículum Vitae:

I obtained the PhD at the Institute for Computational Cosmology of Durham under the supervision of prof. Carlos Frenk and prof. Richard Bower. After, I was postdoctoral fellow at Leiden Observatory in the group of prof. Joop Schaye, working on the OWLS project, and, subsequently, senior postdoc at the Max Planck Institute for Extraterrestrial Physics of Garching in the group of dr. Sadegh Khochfar, working on the FiBY and EAGLE projects. I am currently Advanced Severo Ochoa Fellow at the Instituto de Astrofísica de Canarias (IAC). I am leader of the Galaxy Evolution Theory group and member of the IAC Research Committee. I am also member of the EUCLID collaboration. I co-authored more than 60 peer-reviewed scientific articles, 15 of them published in 2015. I am top ten in the list of IAC researchers for number of publications in 2015. My scientific articles are reference in numerical astrophysics, and the numerical models I developed are used in state-of-the-art cosmological simulations. Indeed, my three first-author publications have 412 citations. Together with publications where I am second or third author, the number of citations sum up to 1409. My h-index is 34 according to NASA/ADS (28 on WoS). During my career I have been awarded several grants. During my second postdoc, I was awarded a Marie Curie Reintegration grant of 45,000 euros for three years. Most notably, I am PI of the project NEXIS funded by MINECO (plan nacional), started in 2014, soon after I joined the IAC, and extended for the period 2015-2017. As far as I am aware, I am the only postdoc of the IAC (non RyC) who has achieved this goal. I have been PI of several numerical proposal and awarded compute time at national (RES) and European level (DECI/PRACE), and I participated in two proposals for massive parallel applications awarded almost 80 million core hours. I have (co-)supervised several Master and PhD projects, and have been involved in outreach activities. I am regularly asked to referee articles for high-impact scientific journals.

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Turno de acceso general

Nombre: **VARELA RIZO, OSCAR**
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Área Científica: Física y Ciencias del Espacio
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Título:

Supergravity and Holography

Resumen de la Memoria:

String theory has shown an amazing power to provide deep insights into long standing problems in modern theoretical physics. String constructions have taught us a great deal about the mathematical structure of gauge theories and have unravelled unexpected interrelations between quantum field theory and gravity. Progress has been made by exploiting symmetries and dualities, often resorting to the powerful formalism provided by the supergravity limit. In past work, I have made significant contributions to the development of string theory's mathematical framework, uncovering previously unknown connections among its different supergravity descriptions and discovering new solutions to its equations.

Three of my results have had a profound impact in the area, pushing the state-of-the-art in the field well beyond its limits at the time: 1) the development of new methods to generate Lie algebras from given ones, 2) the establishment of consistent truncations on wide classes of internal spaces down to matter-coupled supergravities in four and five dimensions, and 3) the construction of one of the first and few known instances of string theory Lifshitz backgrounds.

At a crucial time, when feedback from accelerator experiments may soon provide new hints on the way to obtain observational physics from string theory, it is vital to further develop the formal apparatus of the latter in order to gain a deeper understanding of our best candidate for a unifying theory of all interactions. With a strong background in the field and a proven track-record, I have the necessary skills and determination to develop new supergravity and quantum field theory descriptions of string theory along the lines that I outline in this proposal. I will build on my previous results to extend them into new directions, including comprehensive classifications of consistent truncations, mappings of full classes of scale-invariant backgrounds and the exploration of new dyonic supergravity gaugings and their holographic duals.

Resumen del Currículum Vitae:

My area of expertise is string theory, supergravity and the AdS/CFT correspondence. My research output has systematically met the highest international standards, it has always been at the forefront of developments in high-energy theory, and it has triggered itself further activity by many other groups. Three of my results have had a profound impact in string theory and mathematical physics, pushing the state-of-the-art in the field well beyond its limits at the time: 1) the development of new methods to generate Lie algebras from given ones, 2) the establishment of consistent truncations on wide classes of internal spaces down to matter-coupled supergravities in four and five dimensions, and 3) the construction of one of the first and few known instances of Lifshitz backgrounds in string theory. The latter result has also had an impact away from High Energy Theory, having received a significant number of citations from the Condensed Matter literature. More recently, I have produced the first AdS4 solutions of a class of string theories and have given, for the first time, precision tests of the AdS/CFT correspondence in that class.

I am currently a Marie Curie research fellow with the Center for the Fundamental Laws of Nature of Harvard University, USA, as the outgoing institution, and the Max-Planck-Institut für Gravitationsphysik–Albert Einstein Institute (AEI), Potsdam, Germany as the return institution. I have carried out my previous research at like-wise top-tier institutions across Europe including Imperial College London, UK; AEI; and the Institute for Theoretical Physics, Utrecht, The Netherlands. I have carried out my postdoctoral research with funding from prestigious European or national schemes, thus showing a great capability to attract funding. I am currently supported by my own Marie Curie International Outgoing Fellowship, and have previously enjoyed an Alexander von Humboldt fellowship and a postdoctoral fellowship from the Spanish Government.

My scientific output includes 31 research papers published in the peer-reviewed, international journals with the highest impact factors in high energy physics. In addition, I have one invited review article and 7 peer-reviewed conference papers. My publications gather 916 citations in Inspire, the online database of high energy physics papers. This gives an average of 25.4 citations per paper and a h factor of 17. Further, one of my papers exceeds 100 citations in Inspire and has been accordingly classified as very well-known, while 6 of them have received between 50 and 100 citations and have been catalogued as well-known.

I have also presented my work in numerous international venues. I have given 11 invited talks at international conferences, 3 invited colloquia at universities, 43 invited specialised research seminars, and have contributed 9 talks to international conferences.

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Finally, I have collaborated in a number of international R+D+i activities, I have organised conferences and seminar series, I regularly referee for the major international journals in the field and for a national funding agency and I am currently co-supervising graduate students at Harvard University.

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Turno de acceso general

Nombre: **AMARO SEOANE, PAU**
Referencia: RYC-2015-17563
Área Científica: Física y Ciencias del Espacio
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Título:

Stellar dynamics around supermassive black holes: Gravitational waves and high-energy astrophysics

Resumen de la Memoria:

My list of publications, postdoctoral and PhD mentoring, and invitations to talks in international meetings are a proof of my expertise in stellar dynamics, protoplanetary systems and high-performance astrophysics in general, including the development of GPU algorithms, the Galactic Center, tidal disruption events, circumbinary accretion disks, globular clusters, dark matter, cosmography, and gravitational wave (GW) astronomy.

In GW astronomy I have made a significant contribution for the whole spectrum of black-hole masses, from supermassive to intermediate-mass down to stellar-mass ones. In my most recent paper I have predicted that the first source that the advanced detector LIGO will see is a stellar-mass binary with a large mass, fairly circular and with small spin values. I was the first one to include relativistic corrections to a direct-summation code to address the formation of sources of GWs.

The link to the innermost stellar dynamics in galactic nuclei became obvious, by addressing the question of how to produce sources of extreme- and intermediate mass ratio inspirals that we expect to detect with the proposed mission eLISA. My research played a crucial role in preparing the science case for this mission that has now a firm launch slot as L3 by ESA. I am chair of the working group Extreme-Mass Ratio Inspirals of the eLISA Consortium. These efforts led recently to my official acceptance as as member of the European Pulsar Timing Array, something which is not granted a priori.

In view of recent observations of the Galactic Center, the apparent lack of cusp and the dearth of giant stars in the sub-parsec region of the Milky Way, I recently presented an idea that explains the absence of red giants in the innermost region of the Galactic Center, as well as the origin of different observational facts, such as the distribution of eccentricities of the S- stars and the absence of Wolf-Rayet and O-stars that has had a very good reception in the community (as, for instance, my invitation to deliver an invited talk at the upcoming Aspen Workshop in February 2016 proves).

In cosmology, I have studied the possibility of using compact objects as a probe to Dark Matter crests at the centers of dense stellar systems. A link to the Galactic Center is the existence and detection of scalar fields, which could provide solutions to long-standing puzzles about the nature of dark matter. Interacting galaxies often have complexes of hundreds of young stellar clusters in regions that are a few hundred parsecs across. These cluster complexes interact dynamically, and their coalescence is a candidate for the origin of ultracompact dwarf galaxies. This is also directly related to multiple populations in globular clusters.

I have been devoting more and more time to the formation and evolution of planetesimal systems with my novel hybrid code. My new algorithm is a composite one and benefits from direct- summation tools and statistical methods and adds a new algorith for fragmentation based on Voronoy tessellation. The recent selection of PLATO -in which I am official member of the Science Team Member- by the ESA has very promising applications to my studies.

Resumen del Currículum Vitae:

Soy un científico internacionalmente reconocido, con una gran producción científica. Lidero varias líneas de investigación y estoy involucrado en proyectos y comisiones claves internacionales. En esta sección destaco aspectos importantes de mi CV:

1- La división dirigida por el director del Max Planck, el Prof. Bernard Schutz, tenía inicialmente dos subgrupos. Gracias a mis proyectos, conseguí financiación por más de 800000 EUR, por lo que el director decidió crear un tercer grupo, "Astrofísica" (http://www.aei.mpg.de/astrophysics), y me puso a cargo del mismo. Después de su jubilación, con la nueva dirección, mi grupo ha sido el único de los tres que se ha mantenido.

2- Docencia: A todos los niveles, desde inicio de carrera a cursos avanzados internacionales. He sido el mentor de 3 doctorandos, 4 postdocs y 4 undergrads. Desde el 2011 formo a estudiantes de doctorado con una serie de "clases magistrales" en la International Max Planck Research School. Los estudiantes tienen una formación muy diversa. Participé también en la Escuela de Primavera de Jürgen Ehlers, http://ferienkurs.aei.mpg.de abierta solo por concurso a los estudiantes internacionales de doctorado que obtengan las mejores calificaciones, fueron 50. El 2015 me invitaron a impartir yo solo un curso intenso sobre ondas gravitacionales a alumnos de doctorado en Concepción, Chile. He dado clases en la universidad de Potsdam durante dos semestres. Esta docencia forma parte del trabajo que me

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llevará a completar la "habilitation" en la misma universidad. En las clases ha participado el 50% de todos los estudiantes de astronomía de Potsdam.

3- Divulgación/Outreach: He escrito artículos en alemán e inglés para la revista de la sociedad Max Planck (el 2015, 2011, 2009). El 2014 di una charla a 60 profesores de secundaria alemanes en alemán, y el 2013, 2014, 2015 y el 2016, en Alájar, un pueblo de 700 habitantes de Huelva, donde di charlas divulgativas sobre el centro galáctico y relatividad general. También he participado en varias entrevistas en medios alemanes, incluyendo TV. He dado charlas de motivación en institutos de secundaria en Berlín para que las niñas comprendan que la ciencia no es sólo cosa de hombres.

4- He dado 69 charlas invitadas en centros tales como Princeton, Harvard, NASA, Caltech etc. Como muchas de estas visitas no ha superado el mes, no he encontrado lugar donde especificarlo. En todos los casos se me cubrieron todos o una parte importante de los gastos (vuelo, alojamiento).

5- Acumulo según la NASA ADS 84 trabajos, 52 con árbitro, en revistas en el 25% de las más prestigiosas con, típicamente, pocos colaboradores. Tengo unas 1500 citas (1879 según Google Scholar), 302 normalizadas, con un factor h de 22.

6- Soy miembro del comité científico de la Evolved Laser Interferometer Space Antenna (eLISA, L3 del Cosmic Vision Program) y de su Consortium y "Chair" de dinámica y "extreme-mass ratio inspirals". Soy miembro del comité científico de Planetary Transits and Oscillations of stars (PLATO, M3), del Einstein Telescope, del Design Study Team y del Science Team, miembro del EPTA (European Pulsar Timing Array) y del Virgo-EGO -European Gravitational Observatory- Scientific Forum, y The Virgo Collaboration and the CNRS/INFN EGO Consortium.

7- En mi carrera he organizado 19 congresos internacionales (Europa, China, Estados Unidos, Chile, Brasil)

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Turno de acceso general

Nombre: **MERLO , LUCA**
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Título:

Higgs, Flavour and Dark Matter Phenomenology

Resumen de la Memoria:

I am a particle phenomenologist deeply interested in the interplay between theory and experiments.

Despite its spectacular success, the Standard Model (SM) of particle physics cannot be considered the final theory describing the interactions of bosons and fermions. Several key aspects are still not clear and they have driven my research in the past years. My varied research activity shows my ability to address distinct subjects and to switch among different arguments, and it can be summarised as follows:

HIGGS: Study of the EWSB mechanism, both for the SM Higgs and for alternatives, spanning from formal aspects to data analysis.
-Construction for the first time of the complete bosonic effective operator basis for a light dynamical Higgs, dubbed HEFT.
-Study of the connections between the HEFT and the SM effective construction and specific composite Higgs models.
-Construction of the fermionic effective operator basis for a light dynamical Higgs in the context of the Minimal Flavour Violation ansatz.
-Study of Higgs constraints at LEP and LHC (present and expected future data) and flavour data, to disentangle an elementary Higgs from a composite one or an impostor, as well as to tell its SU(2) character, doublet or singlet.
-Clarification of the counting rule for a linear and a chiral Higgs expansion.

These analyses complete the tool needed to explore the connection between linear and non-linear realisations of the EWSB mechanism with a light Higgs-like particle. Indeed, besides possible direct searches at collider, the study of deviations from the SM predictions as described in the HEFT is a promising strategy to identify the origin of the EWSB mechanism. This research attracted much attention in the community as shown by more than 300 inSPIRES citations in only 3 years for the articles published on this topic, and by the fact that I have been invited to present talks in several conferences and to lecture twice on this. Moreover, I am participating in the Higgs Cross Section Working Group 2 and in the write-up of its Yellow Report.

FLAVOUR: Study of the origin of fermion masses and mixing patterns, for both the lepton and quark sectors.
-Use of flavour symmetries to explain the flavour puzzle, in the framework of the SM and of GUTs with and without Supersymmetry.
-Analysis of the Minimal Flavour Violation ansatz in beyond SM theories, especially in the context of gauge flavour symmetries and in scenarios where the EW symmetry is non-linearly realised.
-Analysis of the experimental signatures of flavour physics in BSM theories.

I have been working on this topic since my Ph.D. training and I dare to say that I am considered an expert in the field shown by ~1500 citations for the articles on this subject, by having written two review articles and presented several plenary and parallel talks in conferences and a lecture in an International Neutrino School. Moreover, I was awarded the "Sergio Fubini" prize for my results on this topic.

DARK MATTER:
-Study of connections between flavour symmetries and Dark Matter and leptogenesis.
-Construction for the first time of the effective Higgs Lagrangian describing a non-linear Higgs portal to a scalar Dark Matter.

These studies attracted the attention of members of the ATLAS collaboration, who are now performing a detailed analysis on the signals predicted in this context.

Resumen del Currículum Vitae:

UNDERGRADUATE:
Degree in Physics at Padova Univ. in 2006, supervised by Prof. F.Feruglio, and with topic on flavour model building. Maximum grade.

GRADUATED:
Ph.D. in Physics at Padova Univ. in 2007–09 under the supervision of Prof. F.Feruglio. The thesis was on flavour model building and on analyses of flavour signatures. Thesis defence on 25/03/2010 with the maximum grade. I was awarded the "Sergio Fubini" prize of the Italian INFN (given every year to the three best Ph.D. theses in Italy).

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POSTDOCTS:
-March-Sept. 2010, I was awarded two fellowships by the &#65533;Della Riccia&#65533; and &#65533;Gini&#65533; foundations to do research at the CERN theory group (mainly collaborating with Prof. G.Altarelli) and at the Universidad Autonoma de Madrid (mainly collaborating with Prof. B.Gavela). -2010-12, postdoc at the Technische Universität München in the group of Prof. A.Buras and G.Isidori. Besides the research activity on model building, I performed detailed analyses on flavour observables, in particular of radiative meson decays and oscillations. I was organiser of the pheno-coffee meetings. Although mainly based in Munich, I often visited the Italian Frascati Laboratories.
-2012-15, Juan de la Cierva postdoc at the Universidad Autónoma de Madrid. Besides the collaboration with Prof. B.Gavela, I started new projects with other members of the Institute. In addition to projects on flavour physics, I started new research on Higgs and DM physics. I was in charge of organising the pheno-coffee meetings. I was organiser of HEFT2014 - Higgs Effective Field theories, and of the Invisibles15 school and workshop.
-from October 2015, Severo Ochoa postdoc at the Instituto de Física Teórica IFT of the Universidad Autónoma de Madrid. I am continuing the main research activity of the previous years.

TEACHING EXPERIENCES:
-AA 2013/14 at UAM, assistant at the 1st year physics laboratory.
-AA 2014/15 at UAM, assistant at the course of Nuclear and Particle Physics at the 4th year of the Physics degree.
-AA 2015/16 at UAM, assistant at the course of Nuclear and Particle Physics at the 4th year of the Physics degree.

I have co-supervised 7 Ph.D. students and supervised 4 Master students.

SCIENTIFIC ACTIVITIES:
From 2007, I participated in 7 international research projects. My production consists of 33 articles (25 NOT co-authored with my Ph.D. supervisor, testifying my research independence) published on scientific journals, 3 additional papers are waiting for publication, 1 monography and 14 proceedings of conferences. It has received much attention from the community, reflected by a total number of 1875 inSPIRES citations (55% for articles NOT co-authored with my Ph.D. supervisor), with 13 articles having more than 50 citations each, including 3 with more than 100 citations (h index 25). I have been invited to give 19 plenary and parallel talks (i.e. HEFT15, NuPhys14, Moriond 2013, GGI 2012, Planck 2012, Planck 2011) and 3 review talks (NUFACT2014, La Thuille 2012 and FLASY 2011). I gave 17 seminars in different research centres and three lectures.

I am currently referee for international journals: EPJC, JHEP, JPhysG, NPB, PLB, PRD, PRL, PTEP. I have been awarded the &#65533;Certificate of Excellence in Reviewing&#65533; by PLB and NPB in 2012, 2013 and 2014.

I was in the first positions in the reserve list of the previous two RyC calls.

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Nombre: **SANS TRESSERRAS, JUAN ANGEL**
Referencia: RYC-2015-17482
Área Científica: Física y Ciencias del Espacio
Correo Electrónico: juan.sans@uv.es

Título:

Study of physical properties of advanced materials under extreme conditions

Resumen de la Memoria:

My scientific career is mainly devoted to the study of Condensed Matter Physics and started in 2003, when I obtained a four-year FPI fellowship funded by the Spanish government at the Universidad de Valencia. During this pre-doctoral period, my research covered the study of the influence of different thermodynamic parameters in the growth of wide-band gap semiconductors. Besides, I studied the effect of doping on the electronic structure of host semiconducting materials under different conditions of pressure and temperature.

As post-doctoral staff for three years (2007-2010) at the European Synchrotron Radiation Facility (ESRF), I formed part of a multidisciplinary team in ID22 beamline. In this stage, I explored the chemical composition of alloyed compounds, the coordination of dopants and diluted elements, the nanometric distribution of optical emissions in nanoLEDs and the structure and composition of interstellar stardust by using synchrotron-based x-ray techniques. From this period, I would highlight my participation in the international Stardust Interstellar Preliminary Examination (SIPE) team where I collaborated in extracting the structural and compositional information of interstellar stardust collected by the NASA's Stardust mission. This collaboration has triggered the publication of 15 papers in Meteoritic and Planetary Science and a paper in Science. Moreover, our contribution was awarded with the NASA Group Achievement Award in 2013.

From 2011 on, as a postdoctoral researcher hired by MALTA Consolider Ingenio 2010 project and as a "Juan de la Cierva" fellow for three years at the Universitat Politécnica de Valencia, I focused my research on the Solid State Physics under extreme conditions of pressure and temperature. Since then, I have studied the effect of these two thermodynamic parameters on the structural, vibrational, optical and electronic properties in a variety of compounds. In particular, I have studied the effect of vacancies in the phase diagram of defect chalcopyrites at high pressures and the characterization of the physical properties of exotic phases of bulk and nanometric sesquioxides. In the last two years, my research is focused on the study of the properties of materials which are hot topics in Condensed Matter Physics, like topological insulators and molecular compounds. Specifically, I am studying materials which are either topological insulators or could behave as topological insulators by application of pressure. On the other hand, I have opened a new research line which aims at trapping gases in molecular compounds with the help of high-pressure techniques. In this respect, we have recently reported the effect of pressure-induced helium trapping and reaction with a solid molecular compound in their physical properties. In most of these studies, my experimental measurements have been complemented with state-of-the-art theoretical ab initio quantum mechanical calculations thanks to ongoing collaborations with theoretical physicists (Universidad de La Laguna and Universidad del País Vasco) and chemists (Université Pierre et Marie Curie de Paris). All these joint experimental and theoretical investigations of matter under extreme conditions have allowed me to complement my strong background in experimental techniques with a considerable basis in theoretical Solid State Physics.

Resumen del Currículum Vitae:

I got my PhD in Physics at Universidad de Valencia in 2007 thanks to a four-year FPI fellowship funded by Spanish government, with Cum Laude honors. In that period I performed two research stays abroad: 3 months in the Material- und Geowissenschaften center at the TU Darmstadt (Germany), and 3 months at the Université Montpellier II in Montpellier (France). Afterwards, I joined the European Synchrotron Radiation Facility (ESRF) as post-doctoral staff for 3 years participating in a multidisciplinary research covering different fields. At ESRF, I worked with some of the most reputed research groups in the world and became part of the International SIPE Team. This multidisciplinary collaboration gave rise to the publication of a paper in Science and 15 articles in Meteoritic and Planetary Science. My participation on this study was recognized with the "Group Achievement Award" in 2013 by NASA.

In 2011, I was hired at Universidad de Valencia in the framework of MALTA Consolider Ingenio 2010 project, as responsible for the FTIR spectroscopy facility and studied the phase stability, polymorphism and phase diagrams of different compounds. In 2012, I was awarded with a "Juan de la Cierva" fellowship to perform independent research at Universidad Politécnica de Valencia giving continuity to previous studies in Solid State Physics under extreme conditions. During this time, I consolidated the collaboration with several national and international groups working in high-pressure science: Universidad de La Laguna and ALBA-synchrotron (Spain); ESRF, Soleil-synchrotron and Université Pierre et Marie Curie (France); and Bayerische Geoinstitute (Germany).

I have published 82 SCI scientific papers (58 in the first quartile of their field) with 33 in journals with impact factor higher than 3.3. According to Scopus database, 76% publications are in the Physics and Astronomy subject area. Apart from NASA-related papers with a large number of coauthors, I was the first author in 25% of the published papers and first or second author in 35%. My publications have received 924 citations with more than 11 citations per paper on average resulting in an h-index of 16 (17 according to Google Scholar). ESRF has selected 5 of my scientific articles as Highlights and one of my papers as first author has appeared in ALBA news.

I have presented 66 contributions at research conferences (57 in international ones) with 24 as oral contributions (2 invited) and

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participated in 20 funded research projects, which include 11 accepted proposals to ALBA, ESRF and DIAMOND synchrotrons. Furthermore, I am referee of several prestigious physics journals and member of the editorial board of "American Journal of Geophysics, Geochemistry and Geosystems".

Regarding my teaching skills, I give lectures in university degree and master and participate in innovative teaching projects at the Universidad Politécnica de Valencia. Besides, I am currently co-supervising a PhD student and collaborating in preparation courses for the Physics Olympiad in the same university. Furthermore, I am involved in several projects for scientific divulgation like "Programa campus científico" and "EXPERIMENTA" fair as jury assistant. Finally, I should mention that I have a positive certification from ANECA for the positions of "contratado doctor", "ayudante doctor" and "professor de escuela universitaria".

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Nombre: **MUÑOZ DARIAS, TEODORO**
Referencia: RYC-2015-18148
Área Científica: Física y Ciencias del Espacio
Correo Electrónico: tmd.astronomy@gmail.com

Título:

The physics and observational properties of accreting black holes and neutron stars

Resumen de la Memoria:

My research career (7.1 years as a postdoctoral researcher; 5.3 years abroad.) has focussed on the study of accreting black holes and neutron stars in X-ray binaries. These binary systems allow us to scrutinize the behaviour of the matter under extreme conditions, driven by complex physics that cannot be studied anywhere else in the Universe. They can be also used to probe the nature of compact objects themselves, which has provided the most convincing proofs for the existence of black holes, and allowed a number of neutron star mass measurements. In my work [66 refereed publications, 13 as first author (+2 review papers, 38 as main author); >1200 citations, ~380 only in 2015; H=21] I exploited both approaches, making important contributions in both areas. I have written 2 review papers on different aspects of the accretion process and gave 7 invited talks/reviews (3 more are already scheduled for 2016). My work also had a very significant impact in national and international media for the general public (e.g. interviews in top national media).
I performed the PhD in Spain (Premio Extraordinario de doctorado) and then spent more than 5 years abroad working in 3 foreign institutions. In 2009 I moved to Italy as a postdoctoral fellow within the Marie Curie network "Black hole Universe". There, I worked on X-ray observations of black hole systems within a network of researchers based in several EU countries. In 2011, I moved to the United Kingdom (3 years at University of Southampton and University of Oxford) to work as Marie Curie fellow on accretion and jet physics. I have also been long-term visitor in the Universities of Amsterdam (2010) and Kyoto (2015).
This intense period has allowed me to learn all the relevant aspects of my field, and to develop an active network of scientific collaborations involving researchers from 10 different countries. I have supervised students, taught in Spanish and foreign universities, and obtained/managed my own funding from very competitive international and national programs. Now, I am aiming at building up my own research group in Spain, for which the long-term support of a Ramon y Cajal fellowship is an essential step. This will allow me to focus upon novel research lines that will play a major role during (at least) the next decade: (i) the transient sky, (ii) outflows from accreting compact objects and (iii) time domain astrophysics.

Resumen del Currículum Vitae:

*PhD at Universidad de La Laguna / Instituto de Astrofísica de Canarias: supervised by Dr. Jorge Casares and Dr. Ignacio G. Martínez-Pais. Premio Extraordinario de Doctorado.
*Marie Curie ITN fellow at Osservatorio Astronomico di Brera (Italy): ITN Marie Curie network "Black hole Universe". I worked within a network of researchers based in six different EU countries.
*Marie Curie fellow: In 2011 I moved to the United Kingdom (University of Southampton and University of Oxford) to work, first as a postdoc (ERC funded; PI Prof. Fender) and then as an independent Marie Curie fellow.
*International visitor. Besides my Marie Curie fellowships in Italy and the UK, I have been visitor in other ~10 international institutions for a week or longer, including Amsterdam (1 month in 2010) and Kyoto (2 months in 2015). During my PhD I spent 3 months at ESO-Chile thanks to an ESO studentship.
*Research fellow at IAC (2014): I am P.I. of a research project and I supervise two PhD theses.

Main outputs:

*Productivity: 66 refereed papers in journals with impact factor higher than three, including Science and Nature. Considering non-refereed publications such as proceedings and telegrams, I have more than 130 publications.
*Leadership: I am main author in 38 of these refereed papers (first in 13, second in 10 and third in 15). 4 second/third author papers have ≤ 3 authors. 4 second-author papers have been led by PhD students.
*Impact: My publications have collected more than 1400 citations (>1200 corresponding to the refereed publications), including more than 310 archived by first author papers. This results in H=21. Main author papers (38) have collected >640 citations (>200 in 2015) and H_main=16 .
*International expertise: I have 2 review papers, (i) Belloni, Motta & Muñoz-Darias (2011), (note alphabetic order; 60 citations), and (ii) Fender & Muñoz-Darias (2016) a new Springer book (Astrophysical Black Holes) written by world-class researchers. I referee several (>2) papers per year (e.g. MNRAS, ApJ, ApJL, AJ) and I have been referee of DDT proposals for GTC-10.4m and funding proposals for the Czech academy of Science. I am full member of the IAU since 2015.
*Usual invited speaker: 10 invited talks (including 3 already scheduled for 2016. I highlight the very prestigious 2015 talk in the Royal Astronomical society (London), the invited review on black hole and neutron star mass measurements (Italy, 2013) and the invited lecture

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in the conference Black hole variability (UK 2010). Similarly, in 2016 I will give an invited talk in the Cospar G. A. (Istanbul, August) and an invited Colloquium in Jodrell Bank (Manchester, April).
*Management / organiser experience: I managed (PI) a Marie Curie project (200 KEur) and a Marie Curie ITN fellow (10 KEur/year). I am internal PI of an IAC project (8 researchers; ~12 KEur/year). In 2015, I organised/chaired a special session in European Weak of Astronomy and Space Science and the XXVII Canary Islands Winter School.
*Outreach / General media: I have been interviewed by El Pais and El Mundo as well as by RNE (live in 24h national edition). Press released were broadcasted by media in virtually all Latin-American countries, several Europe and the US. I have supervised interviews during the 2015 Winter School and been interviewed myself (EFE press release in e.g. La Vanguardia).

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Nombre: **CERDA DURAN, PABLO**
Referencia: RYC-2015-19074
Área Científica: Física y Ciencias del Espacio
Correo Electrónico: pablo.cerda@uv.es

Título:

Numerical modelling of compact objects in astrophysics

Resumen de la Memoria:

The research career of Pablo Cerdá Durán has been devoted to the numerical modelling of astrophysical compact objects (neutron stars, core collapse supernovae and black holes) with strong involvement in providing observational constraints and templates (mostly in gravitational waves and x-ray emission). His main research activities are: i) main developer and maintainer of the numerical relativity code CoCoNuT, which involves an international collaborations of three European institutions and is used in a regular basis by 15 researchers across the world. This code is involved in the bulk of the research activity of the applicant (17 of the 24 refereed papers of PCD), and has lead to 46 scientific publications with more than 1800 citations. ii) Numerical modelling of the quasi-periodic oscillations observed during the giant flares in soft gamma-ray repeaters, as internal oscillations of strongly magnetized neutron stars. The applicant is worldwide reference in this field, and has performed magneto-hydrodynamics simulations including the effect of an elastic solid crust and a superfluid core. He is currently developing a Monte Carlo code to compute synthetic spectra of SGRs, which will allow interpreting observations of these objects. iii) General relativistic magneto-hydrodynamics with realistic microphysics. In the last years the applicant has focused in the magneto-rotational instability (MRI), a poorly understood process of major importance in the collapse of rapidly rotating stellar cores. He has been involved in local simulations of the MRI including resistive and viscous effects, which aim to understand the amplification of the magnetic field occurring at sub-grid scales in the core collapse context, and is the responsible for the origin on magnetic fields in neutron stars. iv) Development of new approximations of general relativity, including an extension of the CFC approximation by adding 2PN corrections (CFC+) and a reformulation of CFC (XCFC) solving a uniqueness issue of the equations. These developments have been crucial in understanding the CFC approximation and making it applicable to the study of the formation of black holes. v) Gravitational wave signatures from black hole forming core collapse, which could be detected by next generation of gravitational wave detectors. The applicant plans to extend these simulations in the future to study systematically the GW signatures associated and the possible optical counterparts (unnovae). Additionally, he plans to study the formation of tori around black holes and the collapsar scenario for long gamma ray bursts.

Resumen del Currículum Vitae:

Pablo Cerda-Duran obtained his PhD thesis at the University of Valencia in 2006 under the supervision of Prof. J.A. Font. He was postdoctoral researcher during 5 years at the Max-Planck-Institut für Astrophysik (MPA) in Garching (Germany), thanks to two consecutive postdoctoral fellowships of the Theoretical Astrophysics program of the MPA, won in open competition in 2006 and 2010. Since November 2011, he is senior postdoctoral researcher at the Dpto. de Astronomía y Astrofísica of the Universidad de Valencia, and member of the CAMAP group lead by Prof. M.A. Aloy, funded by an ERC-Starting Grant. His contract at the UV expires in February 2017, after which he and his family will have to emigrate abroad, again.

Pablo Cerda-Duran is a recognised expert in magneto-hydrodynamics in general relativity and has a wide experience in supercomputing in the field of relativistic astrophysics, including core-collapse supernovae, neutron star mergers and isolated neutron star.

His research career can be summarised in 44 publications, 24 of which are in peer-reviewed international journals (9 as first author and 11 times second) and 20 are conference proceedings. His publications add 571 citations and his h-index is 13 (source: NASA-ADS). He has given 11 invited research seminars in international research centres and 31 talks (6 invited) at scientific meetings. He has participated in the organisation of 9 scientific meeting (8 with international scope) and one school. He has participated as scientist in research projects financed by the Spanish Government (in particular in projects of the Plan Nacional AYA 2004, 2007 and 2010 and the project CONSOLIDER2007-00050), the Generalitat Valenciana, the German Government (SFB/TR7 y IKYDA D/05/50672) and the European Union (StG-ERC-259276-CAMAP). He is currently co-PI of an AYA project of the MINECO, granted with 194.000 EUR. He was PI of two activity periods at the Marenostrum supercomputer (BSC-CNS) and twice at the supercomputer Tirant of the Spanish Supercomputer Network (RES). He has participated in projects involving supercomputers in the top500: K-computer (#4, Japan), SuperMUC (#23, Germany) and Marenostrum (#93, Spain). Since 2008 Cerdá-Durán is the main developer and coordinator of the magneto-hydrodynamics numerical code CoCoNuT, that involves about 15 researchers in European institutions.

Cerdá-Durán has co-supervised the PhD thesis of Michael Gabler and Tomasz Rembiasz at the Technische Universität München (Germany). The former obtained the "Universe PhD Award" 2012 of the Excellence Cluster "Origin and Structure of the Universe(Garching). He participates currently in the co-supervision of 2 PhD thesis at the University of Valencia. He has been referee, among others, for CQG, ApJ,and MNRAS. He is currently member of the VESF council, participates in a scientific working group for the design of the XIPE satellite,

and is topic-leader in the working group "Astrophysics" of the COST action "New Compstar". He accumulates 246 hours of official teaching activity at the University of Valencia and since September 2015 has the accreditation to "Profesor Titular de Universidad".

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Nombre: **GONZALEZ DIAZ, DIEGO**
Referencia: RYC-2015-18820
Área Científica: Física y Ciencias del Espacio
Correo Electrónico: DiegoGlezDiaz@gmail.com

Título:

Development of gaseous detectors for nuclear and particle physics experiments

Resumen de la Memoria:

When in 2001 I met Paulo Fonte (LIP), a senior physicist formed in CERN's GDD group, I decided to focus my career on gaseous detectors, with the aim at gathering the necessary abilities to conceive and develop original experiments in fundamental physics. That's why, after being involved in all aspects of the HADES tRPC-based time-of-flight wall at GSI from its inception to its first physics run (2001-2010), I moved into different applications of gaseous detectors. Mainly through 2 consecutive projects that I coordinated as PI, I became involved in a broad and frenetic technological activity in hadron physics (CBM [44], STAR [46]), particle physics (J-Lab SOLID [36]), nuclear physics (R3B [55]), and applied physics (muon tomography [20]), until I finally moved into the field of Rare Interactions in 2012, where currently the gaseous technology is one of the leading choices. There I felt that my expertise could be maximally used to attack fundamental problems in particle and nuclear physics, related to the nature of neutrino and dark matter particles, and to the nuclear force. The decision turned right, and during my stay at Zaragoza University I introduced and demonstrated the "Penning-Fluorescent TPC" [1]. Such a "hybrid" TPC allows to simultaneously obtain high charge gains and scintillation, up to 10bar pressure, and has (in very little time) become the work-horse of the PANDAX-III 200kg-136Xe experiment for bb0. This development by itself led the NEXT experiment to pursue the search of admixtures enabling an enhanced topological signature, a challenging development that is now seemingly on the right track after [103].

My present choice of accepting an invited professor chair at Uludag University (Turkey) during 2017 allows me to spend long stays at the GDD group at CERN and is currently contemplated as a "buffer solution", while possibilities to develop my scientific goals become available world-wide. At GDD I enjoy a large freedom of research, with my own budget for the construction of Optical TPCs, which has recently allowed me to commission a ~5000cm3 ultra-pure device. With it I am, at the moment of writing, starting the evaluation of new additives (both as wavelength-shifters and electron coolers) as well as light-generation structures (eg. GEMs). This allows a highly synergic overlap with some of my interests, provided additives are needed to increase the topological information in both bb0-decay and nuclear recoils.

The study of Rare Interactions with TPCs is of contemporary interest, ranging from Dark Matter (XENON, LUX, IAXO), Neutrino (Dune, T2K, WA105, NEXT) to Nuclear Interactions (ACTAR"). I presently enjoy a leading position in gaseous instrumentation, from which I would like to contribute to strengthening the leadership of Spain in those fields. Realistically, for the next 2 years I would like to continue my NEXT activities. However, the situation is timely and I plan to actively engage in the exploration of collaborative options with groups researching in the aforementioned fields (activity that has already started). If this fructifies, it could lead to the construction of a small lab, where this germinal R&D effort can be consolidated and, in the long term, a next generation of particle and nuclear physicists capable of imagining and building their own experiments can be formed.

*All citations refer to CVN numbering.

Resumen del Currículum Vitae:

I have been working for 15 years in accelerator and non-accelerator based experiments, in the fields of nuclear and particle physics, currently having 103 scientific articles according to WoS, with an h-index of 19: http://www.researcherid.com/rid/K-7265-2014. More than 40 of my research articles are devoted to developments and technical innovations in gaseous detectors, my main line of expertise. I have made original contributions to technologies based on timing RPCs, MWPCs, Micromegas, GEMs and TPCs. Although not possible to detail all here, the following might be highlighted: i) the introduction of the tRPC technology for PET[99] (patent 1) and muon tomography[20], ii) the construction of a crosstalk-free single-strip tRPC wall for the HADES experiment in years 2001-2010 [96, 12 and references therein], iii) the introduction of the "warm" tRPC technology for high particle rates [93], iv) the introduction of a crosstalk-free transmission scheme enabling multi-strip tRPC readouts in large areas [61], v) the development and validation of a low resistive glass allowing a 100-fold increase of the rate capability of tRPCs [68] (patent 2), vi) the introduction of new models and simulation techniques for describing and optimizing the behavior at high rates in RPCs [90] , MWPCs [73] and GEMs [101], vii) the construction of the "Penning-Fluorescent" TPC in years 2012-2015 [1 and references therein] viii) the demonstration of a new concept for sub-100ps time resolution based on Micromegas [100] and ix) the first studies on the possibility of using semi-transparent graphene membranes coupled to GEM detectors [102].

I graduated and doctored as Doctor Europeaus for Santiago de Compostela University in 2006, after which I spent about 6 years in

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Germany (GSI) and nearly 1 year (not continuously) in Beijing (Tsinghua University), before moving to Zaragoza University in the period 2012-2015, in the context of the ERC-funded T-REX project for the development of TPCs for Rare Event Searches. Currently I am in leave at CERN from an invited professorship chair at the Uludag University in Turkey. At CERN, I am integrated in the Gaseous Detector Group (�aka Charpak�s group�) with a main project devoted to the optimization of Optical TPCs coupled to CCD readouts, which will be presented during the Vienna Conference of Instrumentation in February. Through this research project I can also work on central issues for next generation experiments, chiefly directional Dark Matter and low-diffusion Xenon gas mixtures for bb0 experiments.

In years 2010, 2011 I became PI of two projects sponsored by the NSFC, aimed at developing large area RPCs. This implied long stays in Tsinghua University, the prime technological center in China. During this very fruitful and dynamic period I worked with a strong group of master and PhD students to develop multi-strip counters for muon tomography[20], CBM[44], STAR[46] and JLab-Solid[36] experiments, while contributing to NeuLand [55].

As a result of these activities, I have developed a prominent international lead in the field of gaseous detectors, having won a number of prizes for my work, being regularly involved in the organization and chairing of workshops, scientific committees and refereeing activities for international journals, evaluation agencies and editorial groups.

*All citations refer to CVN numbering.