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CONVOCATORIA 2019

Turno personas con discapacidad

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Título:

Physics at 100 TeV c.m. scale with UHE messengers

Resumen de la Memoria:

Ultra High Energy Cosmic Rays (UHECR) are continuously bombarding the Earth's atmosphere, reaching energies much greater than those at the LHC.

Two are the fundamental questions:
1 What is their composition? How are they accelerated to such gigantic energies and where are their sources?
2 What are the details of the high energy physics involved? Are there new phenomena beyond the LHC energies?

The Pierre Auger Observatory is the largest cosmic ray facility ever, and tries to answer both questions by detecting the Extensive Air Showers of particles (EAS) produced by the UHECR. Auger has made outstanding breakthroughs, and now has reached a critical point: the astrophysical scenarios are hard to understand in terms of primary composition, which is interpreted by means of the extrapolations made from accelerator data to the highest energies. There are also strong indications that the models for those extrapolations are not accurate, as the predicted number of muons in air showers is too low, and the muon production depths are nor well described my models.

This impasse situation might turn into either the discovery of new astrophysics or new physics at the scale of 100 TeV. A deep scrutiny of the hadronic core of EAS will break the degeneracy between particle physics and composition.

My specialisation is on the understanding of the shower physics, and in particular the muonic component. I started by studying the behaviour of muons and their distributions within the air shower. This served to connect the muon production depth with the arrival time distribution at ground. A model for the time distributions was used in the simulation and reconstruction of air showers. Special mention deserves the inclined showers, which is the background to detect neutrinos.

In addition, I have also calculated neutrino acceptance, devised methods to calculate limits from neutrino point sources, and finally it deserves special mention my contributions to the field of the anisotropies studies, which direct implication in two Science Journal papers in 2007 and 2017. Now, the Auger Observatory has participated in the first multi messenger observations, to which many of the techniques developed in the early days were used.

I have lead the measurements of the hadronic core through the EAS muons with Auger, connecting the distribution of muons at production (energy, transverse momentum and production depth) with the parent hadronic cascade. This is allowing to measure and constraint different high energy interactions characteristics, and mass of the primaries. The relation to the electromagnetic component of EAS is also connected to the hadronic core by the decay of high energy neutral pions and it has been also investigated to complete the circle to break up the degeneration in the measurements.

Thanks to my previous work, a project to equip some surface detectors with RPCs has been approved and it is under way, MARTA, and Auger has decided to make an upgrade to enhance the muon sensitivity of the surface detector by means of Scintillators in the full surface array.

I have lead the creation of a multidisciplinary group of Muon Tomography, which seeks for a different applications in mining, geology and civil engineering: I have also have created synergies with the industry trhough Data Science activities.
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Resumen del Currículum Vitae:

I graduated in physics (Optoelectronics) at the U. of Santiago de Compostela (USC), receiving the prize to the best scores (Galician Government 1998) and I specializated in Particle Physics in 1999. In 2000 I joined the astroparticle physics group at USC, lead by E. Zas, and in 2002 the Pierre Auger Observatory, the most ambitious facility to detect Ultra High Energy Cosmic Rays (UHECR). In 2005 I defended my PhD on a model for muons in air showers from UHECR, obtaining a distinction (Cum Laude), still used for the reconstruction of inclined showers. I developed a pioneering method to explore muon production in showers used for composition and hadronic model studies.

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In 2005, I implemented some of the PhD results as a post-doc at KIT, Germany and moved to join the group of the Nobel Prize winner, J. Cronin, and A. Olinto, chair of the Astronomy and Astrophysics Dep. (U. of Chicago). I took a leading role in the study of the UHECR arrival directions, and coordinated a group of 30 people from 12 international institutions within Auger. We have published 18 papers on this topic, including the correlation of arrival directions with the position of Active Galactic Nuclei (cover in Science with over 1000 citations). I also became part in Auger North design group and got involved in the AIRFLY experiment, establishing the fluorescence yield with unprecedented precision, and thus the energy scale of UHECRs. I also developed a method, which resulted in the first observation of a muon excess in data and I started collaboration with the U. of Granada providing guides for theses based on my early work on muons.

In 2009 I moved to Portugal and focused on muon phenomenology to obtain more accurate measurements. I fully supervised 1 PhD and 1 master theses, closely advised other 2 PhD, tutored other 8 PhD students and was invited to give numerous talks. I became aware of the LIP expertise on Resistive Plate Chambers (RPCs) and realized about its potential for muons in Auger. Thanks to all this, muons became the main motivation for AugerPrime, the proposal of the collaboration beyond-2015. In 2013 I was elected leader of the Air Shower Physics Task, one of the pillars of the science with Auger, and includes more than 100 scientists.

In January 2015 I started my current position as Principal Investigator, won in the competitive call Investigador FCT . I obtained the first position (shared with other 2 people) competing with more than 180 participants (maximum score, 9.0/9.0). The position included a 50k grant, with which I contracted F. Riehn as a post-doc and created of a small hadronic physics sub-group. In 2017 I became co-PI of the Portuguese Auger Group, and PI of a group on Muon Tomography, which is now competing for independent funding. In 2018 I became PI of the project UHECR Physics with the Auger Observatory funded with 75k and co-PI of the R&D counterpart project Enhancement of the measurement capabilities of the Auger Observatory .

In 2018 I designed a new format of event for technology transfer: Data Science in (Astro)Particle Physics and the Bridge to Industry which consists on a school and symposium to show the synergies between our field and the work in international companies and industry in general. It turned out to be most successful and it is now in its 3rd edition.

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Título:

Sensory and Consumer Science Researcher

Resumen de la Memoria:

<ESTA SOLICITUD PERTENECE AL TURNO DE DISCAPACIDAD>

My principal research interest is focused on understanding how we perceive food stimuli and how this affects food perception on a cognitive level. This knowledge allows me to understand the relationships between eating behaviour (based in consumer science) and the food properties determined by their composition and structure.
Initially, during my Ph.D. I aimed to relate food system characteristics (biscuits with fibre and less fat and sugar) by means of texture analysis, rheology of dough, and thermal analysis with sensory perceptions using descriptive analysis, temporal dominance of sensations and consumer analysis. Looking for new potential synergies, during my Ph.D. I interacted with several research groups and I completed three shorts stays in research institutions, abroad (Campden BRI, Bakery Department, Chipping Campden, UK; TNO Innovation for Living, Laboratory of Food Physical Properties, Zeist, The Netherlands and Purdue University, Laboratory for Sensory and Ingestive Studies, Indiana, USA).

I soon realised the importance of in-mouth food oral processing and the impact that ingredients and structure have on it. For this reason, I applied for a postdoc position at the University of Leeds. I learned to measure the physical capacities of elderly people when eating. These capacities linked several food properties with the easy for chewing , which in turn could be related to their food perception and liking, crucial for their wellbeing. Besides, due to the role of saliva during chewing, I begin to grow an interest in understanding the food-saliva interaction, especially in relation to food perception.
Therefore, my interest in saliva-food interaction made me seek a group working in systems where this knowledge was relevant, especially in relation to food perception. I returned to Spain and started to work at CIAL (CSIC-UAM), in the Research Group of Wine Applied Biotechnology (Juan de la Cierva-Formación). My research was focused on the understanding of the textural sensations of wine in the mouth. The principal aim was to explore those sensations and to establish the base for wine mouthfeel in terms of physical characterisation through tribology, density and electron transmission microscopy studies.
Beyond the understanding of the food properties and its changing in mouth, I realise how important is to identify, predict, and understand the behaviour of consumers. From its reported acceptance and emotions that food can elicit until the non-reported information that consumer does not express, which it is important to gather by using new physiological and neuroscientific measures. Therefore, In April 2018, I joined the Sensory and Consumer Science team at IATA, with a Juan de la Cierva- Incorporación contract. This group is one of the most relevant research groups in Sensory Science in Spain and it is a good frame for making new advances in my research line, incorporating new approaches and facing new challenges.
All of the previous knowledge set the basis for my current lines of research that are:
-Perception of Food Oral trajectory
-New approaches to fully understand and modify Food Choice and Consumer Behaviour
-Consumer-driven innovation
-Innovative uses and consumer s perspective of by-products and side-streams

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Resumen del Currículum Vitae:

<ESTA SOLICITUD PERTENECE AL TURNO DE DISCAPACIDAD>

I am a Sensory and Consumer Science Researcher, with special focus on the understanding of perception, structure and composition of foods.
During my Ph.D. (JAE-Predoc, 2009-2013), I investigated how different food physical properties are perceived. Later, I was hired by Leatherhead Food Research (UK) to develop dynamic techniques to study perception along mastication.
To further understand how food is transformed when eating, I moved to the laboratory, that leads Food Oral Processing worldwide at the University of Leeds (UL) (2013-2016). I was the first to develop a methodology to study elderlies eating abilities and to propose new food structural solutions for swallowing disorders.
After, with a Juan de la Cierva-Formacion contract, I studied in-mouth wine-saliva interactions (CIAL, CSIC-UAM, 2016-2018). Currently, I

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work at IATA (Juan de la Cierva-Incorporacion, 2018-2020) to understand food structure breakdown and perception.
Scientific contributions. 40 peer-reviewed papers (6 under revision, 22 in 1st quartile), 2 book chapters, 6 disseminations papers. 1 patent
I am part of the editorial board of two peer reviewed journals (Journal of Texture studies, Wiley; and Nutrition, Dietetics & Nutraceuticals, Research Open World)
International Activity. I conducted five different short research stays in the UK (Camden BRI 2010, UL 2016, UL 2019), at TNO (Holland, 2011) and at Purdue University (USA, 2012).
I worked in Leatherhead Food Research (UK) and at University of Leeds (UK).
I am one of the organizers and member of the scientific committee of the international conference Food Oral Processing (2020). I have also obtained 3 different international awards from Leeds University (2014), World Bulk Wine (2017) and Journal of Texture Studies (2019)
Leadership. I have participated in 7 national (co-IP of FOPSEN) and 3 international projects (activity leader of FOODMIO), and in 6 contracts with industries (leader of 1).
I obtained funding to further my research (APE program, GV) and I have applied to an ERC-Starting grant.
I supervised 5 masters and 9 undergraduate projects, I am the co-supervisor of a Ph.D.

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Título:

Astrophysics of X-ray emitting collapsed stars

Resumen de la Memoria:

<ESTA PROPUESTA ES PARA OPTAR A LAS 4 PLAZAS DEL TURNO DE DISCAPACIDAD>
* General:
- I am Principal Investigator (PI) of the 3 year-project (164 000 euro/total) entitled
Reverberation from black hole accretion discs funded by the Czech Grant Agency (GACR).
- I have participated in space missions such as ESA's INTEGRAL gamma-ray observatory.
- Currently I am serving at the ESA Science Study Team (SST) of the THESEUS (M5) mission
(through an ESA partnership with IAA-CSIC, Spain), where I am also Chair of its
Science Working Group (SWG) called "Time-domain Astronomy".
- I am also member of the Open Ligo/VIRGO ElectroMagnetic (OpenLVEM) forum , that is
the consortium of observers/scientists for the observation and understanding of Gravitational
Wave events (founded in Jan. 2018).
- I am co-I of the world-wide network of robotic telescopes (BOOTES) led at IAA-CSIC (Spain).
- In total I have participated in > 10 projects (funded by FP7 EU, STFC, INAF, GACR, ESA, etc.) in
5 different countries (including Spain at U. of Barcelona and CSIC).
* Journal Peer-Reviewed Publications:
- I have published a total of > 100 publications (https://orcid.org/0000-0001-7920-4564
including publications in the form of proceedings and conference contributions).[>80 in Publons].
In 47 of them I am the corresponding author and they have been published during the last 10 years (14 of these have been published in high-impact journals, such as ApJ, MNRAS, A&A, etc.). Among all my publications I have co-authored TWO in Nature (2009,2019) plus TWO in Nature Astronomy (2018,2019). I have also participated/co-authored the publication for the discovery of the first electromagnetic counterpart of a Gravitational Wave event (Abbott et al., 2017).
- Participation/authorship in ESA internal documentation for INTEGRAL (M2) and THESEUS (M5) missions.
* Scientific production:
The quality indicators referred to my research excluding the big LIGO Scientific Collaboration (LSC) publications are shown and marked (as without LSC).
Number of papers: 118 (total), 48 (refereed)
Total number of citations: >2400 (ADS)
Total number of citations (without LSC): >800
H-index: 15 (total), 15 (refereed), 13 (without LSC)
i10-index: 20 (total), 18 (refereed), 15 (without LSC)
H1-index (corresponding author): 8
g-index (without LSC): 29 (total), 29 (refereed)
* Conferences and participations:
- I have participated in a total of > 70 conferences and/or scientific events with contributions in
the form of a talk/seminar for > 50 of them (>10 as an Invited Talk in international symposia,
including EAS and IAU).
- Member of Science Organizing Commitees (SOC) in different conferences/symposia during the last years (including EAS, THESEUS Science Workshop, ASTROROB series).
* Editing of journals or proceedings (membership of editorial board of journals):
- Two Books of proceedings for the Fourth, Fifth and Sixth Workshops on Robotic Autonomous
Observatories (ASTROROB series), held in Andalusia (Spain).
- I have been the reviewer of high-impact refereed journals such as Monthly Notices of the Royal Astronomical Society (MNRAS), Astrophysical Journal (ApJ), Astronomy and Astrophysics (A&A), Publications of the Astronomical Society of Japan (PASJ) and Revista Mexicana de Astrofisica (RMxA) proceedings papers for the Proceedings of Science (PoS), Astronomische Nachrichten (AN), Acta Polytechnica (AcPol).
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Resumen del Currículum Vitae:

<ESTA PROPUESTA ES PARA OPTAR A LAS 4 PLAZAS DEL TURNO DE DISCAPACIDAD>
My research work (since 2006) has mainly focused in the study of X-ray emission of compact objects (BH, i.e. black holes) both from an observational and a theoretical point of view. Previously, I obtained my master thesis on 2003 working in the development of the "Input Catalogue for the Optical Monitoring Camera on-board the INTEGRAL satellite". I obtained the PhD in 2008 (max. qualification Cum-Laude) working at the European Space Astronomy Centre in Madrid (ESA) and studying the hard X-ray emission from BHs (thesis entitled "Study of galactic black holes with the INTEGRAL mission" with J. M. Mas-Hesse as my thesis supervisor).
I have developed my career through 5 postdocs at U. of Cambridge (UK), U. of Crete (Greece), O. Astronomico di Brera (Italy) and in Prague (Czech Republic) first at the Czech Technical University and secondly at the Astronomical Institute of the Czech Academy of Sciences. During this time I have become an specialist in X-ray astronomy of accreting BHs (stellar, medium size and supermassive), with a special emphasis in the (X-ray spectroscopy and timing) analysis of their X-ray data from X-ray missions (INTEGRAL, XMM-Newton, Suzaku, Swift, etc.). As a result of this research I have > 100 publications with > 2000 citations from which 2 are in Nature and 2 in Nature Astronomy (in 2009, 2019 and 2018, 2019 respectively, covering the topic of my current grant as a PI). In total I have participated in > 10 projects (funded by FP7 EU, STFC, INAF, GACR, ESA, etc.) in 5 different countries (including Spain; U. of Barcelona and ESA-INTA-CSIC in Madrid) acting as a PI in two of them. I have given > 70 talks in international conferences, with > 10 Invited (including IAU and EAS). Recently, my academic degree has been upgraded to "Senior Scientific Researcher" (5B) by the Czech Astronomical Evaluation Committee (Jan. 2018).
I am the Principal Investigator (PI) of the 3 year-long GACR project, GA18-00533S (164000 euro/total) entitled Reverberation from black hole accretion discs funded by the Czech Grant Agency (GACR) held in Prague (ASU-CAS, Czech Republic) until Dec. 2020 (starting date: 1 Jan. 2018). With this grant I am extending my observational work helping in the development of a new code for the study of the physical processes occurring in the close vicinity of BHs, where effects due to General Relativity are important.
It recently has led to a paper published in Nature Astronomy (2019). I am also serving to the Science Study Team (SST, which is a group of leading experts) of the pre-selected ESA M5 mission THESEUS where I am also Chair of its Science Working Group called "Time-domain Astronomy" representing Spain.
Additionally I am participating in the optical follow-up of Gravitational Wave Source events detected by the LIGO/VIRGO experiment and in the understanding of physical processes leading the extreme X-ray emission from other highly energetic astrophysical transient events.
* Teaching:
- Supervisor of the PartIII project (i.e. Master Thesis) at U. of
Cambridge; Course of Accretion onto black holes (Master in Astrrophysics) in 20-22
Dec. 2010, Universitat Autònoma de Barcelona; Member of the reviewer panel of the Master
Universitario de Astronomia y Astrofisica from Valencia's International U. (2015, 2016); Summer School FEL (Faculty of Electronics, Czech Technical University), Masarykova
Kolej (CR).