UNIVERSIDAD DE GRANADA

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I am an experimental physicist that has been working for many years at the borderline between atomic physics, and nuclear physics, studying the fundamental properties of particles and matter in extreme conditions, by performing very accurate experiments at very low energies. For this kind of experiments, one needs to store and cool charged particles in ion traps, Penning (magnetic and electrostatic fields) or Paul (radiofrequency fields). The cooling can be performed using for example buffer-gas atoms, applied in many traps at radioactive ion beams laboratories, or lasers, as I started since 2012 at the University if Granada. Although there are many outstanding results from ion-trap experiments at accelerators, there is a strong effort by several groups including the one I am responsible for, to improve the sensitivity of the techniques, to extend the applicability to very exotic nuclei, at existing facilities like SHIPTRAP at GSI (Helmholtzzentrum für Schwerionenforschung) in Darmstadt (Germany), or for future ones like MATS (precise Measurements on very short-lived nuclei using an Advanced Trapping System) at FAIR (Facility for Antiprotons and Ion Research). I consider myself pioneer in bring quantum-optics techniques for precision Penning-trap experiments applied to nuclear physics topics.

I am working in the field of ion traps since April 1999. I did my PhD work at GSI -Darmstadt (Apr1999-Dec2003) building up the SHIPTRAP facility, and occasionally I was at CERN for mass measurements with the pioneering facility ISOLTRAP. I defended my PhD thesis, entitled "An RFQ buncher for accumulation and cooling of heavy radionuclides at SHIPTRAP and high precision mass measurements on unstable Kr isotopes at ISOLTRAP" in November 2003 at the IFIC-CSIC in Valencia. In January 2004, I moved to Caen (France) to work as postdoc at LPC (Jan2004-Sep2006), where I was in-charge of the commissioning of an ion trap facility at GANIL. In France, I had an individual Marie Curie fellowship (2005-2006) with the project "Standard Model Tests Using Beta Decay and a Novel Transparent Paul Trap". Back to Spain I joined the MATS collaboration, and I took over the coordination of the Technical Design Report (TDR) of this facility and LaSpec, which is another facility for laser spectroscopy. Both facilities gather more than 100 scientists, including the leading ones in the field. The MATS and- LaSpec TDR (MATS and LaSpec: High-precision experiments using ion traps and lasers at FAIR) was approved by the FAIR steering committee in May 2010 and it was published in a review article in 2010. Thereafter I was elected spokesperson of the MATS collaboration twice, for a total period from December 2010 to March 2015. In Spain I have been Juan de la Cierva fellow (Oct2006- Sep2009), and Ramón y Cajal fellow (Nov2009-May2012), until I became Profesor Titular de Universidad at the UGR. Between 2008 and 2009 I received a José Castillejo fellowship for a five-month stay at the Max Planck Institute for Nuclear Physics to work on the project "Commissioning

of a 3-pole Penning trap for the KATRIN experiment". The Karlsruhe Tritium Neutrino Experiment aims at measuring the mass of the electron antineutrino with a sensitivity better than 0.2 eV.

In January 2011 I started, as principal investigator, the first project, funded at that time by the Spanish Ministry of Science and Innovation, (now Science Innovation and Universities-MICIU) with the title "Developments for High-Accuracy Experiments Using Ion Traps: Fundamental Physics and Applications" (FPA2010-14803). The major boost for this activity at the UGR came when I was awarded with a Starting Grant from the European Research Council for the project TRAPSENSOR entitled "High-Performance Mass Spectrometry Using a Quantum Sensor". In the framework of the protect TRAPSENSOR I started to equip the laboratory and build up the different systems, with graduate students. In the period 2012-2015, I was also PI of the project "Developments for High-Accuracy Experiments Using Ion Traps: Fundamental Physics and Applications" from MICIU (FPA2012-32076). I am currently PI of another project from MICIU entitled "Developments for fundamental nuclear physics and applications" running until June 2020. Besides the laser activities we have also developed for the first time in Spain, amplifiers for the detection of the current induced by trapped ions in a Penning trap. For the first time we have performed measurements using a quartz crystal to build a resonant circuit. In 2017 the "Ion Traps and Laser Laboratory at the University of Granada was distinguished as singular laboratory in advanced technologies" at the University of Granada, and I have been appointed director of this laboratory in March 2017. I am coauthor of more than 60 publications. From the activities I initiated in Granada I would like to mention 1 Scientific Reports in 2017, 1 New Journal of Physics in 2019. Technically it worth mentioning our paper on Review of Scientific Instruments showing the first measurements of current induced by trapped ions using a quartz amplifier.

My research is still in connection with matter in extreme cases (superheavy elements) but also, I am very much pushing in Granada what I call Quantum Mass Spectrometry aiming at applications in several realms of science including nuclear physics. Other platforms in the laboratory will be soon available for experiments related to quantum technologies. I held several responsibilities in Spanish and European networks.