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Einladung zum Vortrag

From exotic atoms to impossible atoms with advanced radiation detector systems

von

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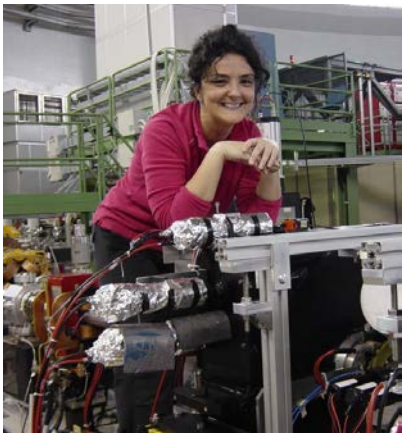
Abstract:



I shall review my main research activities and achievements in more than 25 years of career in the fields of experimental hadron and nuclear physics research and foundation of physics, in particular tests of quantum mechanics.
In hadron and nuclear physics, after my PhD dedicated to the study of exotic mesons at LEAR (CERN) with the OBELIX detector, I pioneered and lead an experimental research program on exotic atoms, in particular measurements of X-ray transitions in light kaonic atoms, at the DAFNE collider of the LNF-INFN in Frascati (Italy). Within the DEAR and SIDDHARTA collaborations we achieved unique measurements in the world of kaonic hydrogen, helium and nitrogen, which play a fundamental role in understanding QCD in low-energy regime and the equation of state for neutron stars.
In recent years I proposed and lead experimental tests of fundamental principles of physics and of quantum mechanics at the underground laboratory of Gran Sasso (Italy), with focus on the Pauli exclusion principle (PEP), within the VIP Collaboration, and on spontaneous collapse models, within a project financed by FQXi, being spokesperson of the collaborations. We achieved the strongest limits on the probability of violation of PEP and also on the collapse model parameters in a broad parameter-space range. I will briefly review, in this context, recently initiated projects related to tests of quantum mechanics in space and of quantum biology.
The reported achievements were possible due to the development of dedicated advanced radiation detectors, such as Charge Coupled Devices, spectroscopic Silicon Drift Detectors and, more recently, Transition Edge Sensors and Crystal Spectrometers.
I shall also briefly introduce my rich activity in the educational and dissemination sectors, including the events I organized, the awards which I obtained and also the grants and projects, European and International, which I lead.
Last but not least I shall present my vision and plans for the future.