NITheP Colloquium
Monday, 10 May 2021, 16h00

Prof Nico Orce | University of the Western Cape

"How atomic nuclei polarize?"

.

Our understanding of the nuclear force remains elusive 110 years after the discovery of the nucleus by Ernest Rutherford. Hans Bethe once stated that "more man-hours have been given to this problem than to any other scientific question in the history of mankind". This presentation will emphasize the current status of the nuclear force and shed light upon how the atomic nucleus polarizes throughout the nuclear chart. Relative enhancements of the nuclear polaraizability are found for light nuclei as the nuclear symmetry energy decreases and, within a nucleus, as its excitation energy increases. These two properties are related by a diminishing binding energy of the nuclear system. Contrarily, hindrances of nuclear polarizability are observed in the photo-neutron cross-section data and photon-strength functions of semi-magic nuclei with N=28, 50 and 82, which support the presence of shell effects. These features assign the nuclear dipole polarizability as a sensitive measure of the long-range correlations of the nuclear force, and provide a new spectroscopic probe to investigate collective phenomena, shell closures, and the elusive nuclear symmetry energy; relevant to neutron-rich matter in neutron-star mergers and the interior of supernova. Astrophysical properties such as elemental abundances can also be interpret within the new scheme presented by the nuclear polarizability.

Part of this work was recently highlighted in a collection of articles in World Scientific for "long-standing value and importance in their fields and provide readers with free access to these publications".

https://mailchi.mp/wspc.com/30th-anniversary-editors-picks-international-journal-of-modern-physics-e-fy2a88c1si?e=c148749b39&fbclid=IwAR37VHWNfUQ_2rLiTnBsuy81Fb-ycVNx-Mh5ipCB3X5JLXExqpLHkIliE_4

BIOGRAPHY

Nico Orce is a nuclear physicist whose passions are quality science and transformation. Nico's research mainly involves fundamental and applied nuclear physics, but also astronomy and mathematical modelling. He has broadly explored the nuclear chart using a wide variety of nuclear techniques and theoretical calculations, and discovered new types of collective excitations and shell phenomena in nuclei. Nico is leading research proposals at different laboratories and observatories around the world, including MANDELAb, iThemba LABS, SALT, MLL, TRIUMF and CERN, and has secured research funds worth > R50M.

He is the leading Investigator and spokesperson of the GAMKA spectrometer, chair of the Tastes of Nuclear Physics, Referee of most nuclear physics journals, and Honorary Visiting Professor at the University of York. Nico has graduated 20 MSc and PhD students with research projects generally approved by international committees. His students have travelled the world to gain hands-on experience, presented at international conferences, run their own experiments in world-class facilities such as TRIUMF and CERN and led publications in top international journals such as Physics Letters B and Nature Communications. For more information about Nico's work please visit: http://nuclear.uwc.ac.za/

CLICK TO REGISTER

WANT TO FIND OUT MORE?

Contact our Communications Officer: T: +27 (0)87 702 9364 | E: rene.kotze@nithep.ac.za