NITheCS
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Theoretical and Computational Sciences

NITheCS Colloquium
Monday, 6 December 2021, 16h00 – 17h00

Prof Steven Karataglides (UJ)

"Two problems of nuclear structure in the sd shell"

ABSTRACT

Presently, the limits of so-called "no-core" nuclear shell models are at the lighter end of the sd shell. The limitations are due to the sizes of the Hamiltonian matrices involved once the particle number becomes large, and computing power is no longer capable of performing the diagonalisations to obtain relevant eigenenergies and eigenstates. While some attempts have been made at performing no-core calculations above this shell, they are subject to severe approximations, calling into question the validity of such approaches in those regimes.

This talk will concentrate on two problems in the sd-shell:
a) the no-core description of ^{16}C; and
b) a study of mass-19 mirror nuclear pairs.

The first uses a no-core shell model approach while the second also entails the use of the Multi-Channel Algebraic Scattering (MCAS) method. Both examples suggest that far more detailed structure models are required than are presently in the literature.

BIOGRAPHY

Prof Karataglidis' field of research is Theoretical Nuclear Physics, specifically those aspects of nuclear physics dealing with low-energy nuclear reactions, scattering, nuclear structure and the areas of overlap between them. He also devotes much of his research to the study of exotic nuclei and their reactions.

Complementary to those fields, Prof Karataglidis also conducts research in mathematical physics at the fundamental levels of nuclear physics and quantum mechanics.

He is Professor of Physics at the University of Johannesburg. He is also an adjunct member of staff at the School of Physics, University of Melbourne, Australia. In a previous life he was the Head of Department and Associate Professor at Rhodes University.

He also held Postdoctoral Fellowships at Michigan State University (USA), TRIUMF (Canada), and Los Alamos National Laboratory (USA), as well as a visiting staff member, CEA/Bruyeres-le-Chatel (France).

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