Contribution ID: **234** Type: **Invited Talk**

Complementarity and Future Prospects on experiments using the high-resolution magnetic spectrometers at RCNP and iThemba LABS

Monday, 20 September 2021 11:30 (30 minutes)

Studies of nuclear excited states using High-resolution light-ion reactions have extensively been performed at RCNP and iThemba LABS in the past decades. Both facilities are unique for realizing zero-degree inelastic scattering experiments using proton or alpha particles and for the high-resolution capability of 20 keV.
For example, the proton-scattering experiment at zero degrees [1] has enabled the studies of electric dipole (E1) strengths of the giant and pygmy dipole resonances by Coulomb excitation, gamma-strength function, and spin-M1 excitations by nuclear excitation. Fluctuation analysis of high-resolution spectra has provided information on the level density above the neutron threshold. Isoscalar excitation strength distribution, e.g., giant monopole resonance, has been measured by inelastic alpha scattering [2].
We have recently started a joint project, PANDORA (Photo-Absorption of Nuclei and Decay Observation for Reactions in Astrophysics) [3], among RCNP, iThemba LABS, and ELI-NP, aiming to study photo-nuclear reactions below a mass of A=60. The primary motivation of the project is to measure reliable systematic data on the photo-absorption cross-sections and p-, alpha-, n- and gamma-decay branching ratios by combining Coulomb excitation and real-gamma beam experiments. Both the RCNP and iThemba LABS employ the Coulomb excitation by proton scattering. The former facility can measure excited states up to the higher energy of 32 MeV, but the latter is advanced for the efficient charged-particle and gamma detectors.
At the conference, I plan to introduce the unique features and the highlights of the RCNP and iThemba LABS facilities, including the advantages of each facility and the complementary future projects.

[1] P. vonNeumann-Cosel and A. Tamii, Eur. Phys. J. A 55, 110 (2019).

[2] U. Garg and G. Colò, Prog. in Part. and Nucl. Phys. 101, 55 (2018).

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Session Classification: Session 2

Track Classification: Nuclear Structure, Reactions and Dynamics