

# Low-Energy Nuclear Physics Beamline at the iThemba LABS' Tandetron facility

Friday, 19 April 2024 10:40 (20 minutes)

The Low-energy Nuclear Astrophysics Beamline at the Tandetron facility, iThemba LABS, is designed to study indirectly radiative capture reactions through measurements of statistical properties. These reactions involve the capture of a charged particle, either a proton or an  $\alpha$ -particle, by the nucleus, resulting in the emission of gamma-ray photons. This process plays a pivotal role in stellar nucleosynthesis, contributing to the formation of heavier elements in the universe [1].

Extracting the photon strength function from these measurements is crucial for not only calculating nucleosynthesis reaction rates but also for studying the underlying nuclear structure. The scarcity of such data underlines the challenges in obtaining experimental results and emphasises the need to measure proton or alpha capture rates [2].

In this presentation, I will introduce the newly built experimental setup, putting emphasis on its specifications and discuss as well preliminary results on  $(p, \gamma)$  and  $(\alpha, \gamma)$  measurements.

[1] M. Arnould and S. Goriely, Phys. Rep. **384** (2003) 1–84.

[2] S. Goriely *et al.*, Eur. Phys. J A **55**, 172, 2019

This work is based on the research supported by the National Research Foundation of South Africa Grant Number 133636 and 118846.

**Primary authors:** Dr MALATJI, Kgashane (iThemba LABS); Prof. WIEDEKING, Mathis (Lawrence Berkeley National Laboratory); Prof. ADSLEY, Philip (Texas A&M University); Dr BAHINI, Armand (University of the Witwatersrand, Johannesburg); BEKKER, Jacob (University of the Witwatersrand); BINDA, Sifundo (iThemba LABS and Wits University); DONALDSON, Lindsay (iThemba Laboratory for Accelerator Based Sciences); HART, Shanyn-Dee (University of Cape Town); JONES, Pete (iThemba LABS); KHESWA, Bonginkosi (University of Johannesburg); KHUMALO, thuthukile (iThemba LABS); MAGAGULA, SEBENZILE PRETTY ENGELINAH (iThemba Labs and University of the Witwatersrand); NETSHIYA, Adivhaho (iThemba LABS, WITS, WSU); NEVELING, Retief (iThemba LABS); PELLEGGRI, Luna (University of the Witwatersrand and iThemba LABS); JAFTA, Lesedi (University of the Western Cape); JONGILE, Sandile (iThemba LABS)

**Presenter:** Dr MALATJI, Kgashane (iThemba LABS)

**Session Classification:** Nuclear Structure Studies