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OPTIMIZATION OF ELECTRON SPECTROMETER IN LENS-MODE OPERATION

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The study of monopole transitions via excited 0^+ states requires the measurement of internal conversion electrons and internal pair formation using an electron spectrometer. Such a spectrometer, consisting of a solenoid magnet transporter and a Si(Li) detector with an array of LaBr₃, is undergoing development at iThemba LABS. Performance of the electron spectrometer has been investigated using radioactive sources produced at iThemba LABS. The spectrometer has been used in lens mode with the field swept under computer control. Transmission and efficiency, as well as the momentum resolution of the swept lens, are presented. Commissioning experiments are due to take place in July 2018 using an alpha beam at a maximum of $E_\alpha = 30$ MeV with a beam current of 10 nA on isotopically enriched ⁷⁰Ge which will provide an opportunity to investigate $E0$ transitions in the target nucleus. This serves as a sensitive probe for the study of shape coexistence in nuclei since the monopole strength parameter is related to the change in mean square radius between the initial and final 0^+ states.

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Dr Usman Iyabo. University of the Witwatersrand, Johannesburg.
Iyabo.Usman@wits.ac.za and Dr Pete Jones. iThemba LABS. pete@tlabs.ac.za

Primary author: Mr AVAA, Abraham (Wits/iThemba)

Co-authors: Mr ZIKHALI, Bonginkosi (University of Western Cape physics); Dr USMAN, Iyabo (University of the Witwatersrand, Johannesburg); Prof. CARTER, John (University of the Witwatersrand); Dr JONES, Pete (iThemba LABS); Mr CHISAPI, Vernon, Maluba (Physics Department, Stellenbosch University)

Presenter: Mr AVAA, Abraham (Wits/iThemba)

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