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SPATAFORA**

## **MULTI-CHANNEL STUDY OF DIRECT NUCLEAR REACTIONS: A TOOL TO PROVIDE DATA DRIVEN INFORMATION ON NEUTRINO-LESS DOUBLE-BETA DECAY**

The search for neutrino-less double beta decay has attracted much interest in the last years due to the extraordinary consequences that could derive from its observation. In the view to provide experimental information on the nuclear matrix elements involved in this process, the NUMEN project is measuring cross-sections of double charge exchange (DCE) and other quasi-elastic nuclear reactions using the MAGNEX magnetic spectrometer. In this framework, a systematic study of networks of nuclear reactions at 15.3 AMeV incident energy will be presented. In particular, the newly proposed multichannel approach, applied both to the experimental and theoretical analysis, will be discussed. The holistic nature of this technique is the main feature and novelty of this work together with the first experimental measurement of the absolute DCE cross section for these systems.

The on-going upgrade of the INFN-LNS facilities is intimately connected to the NUMEN project with the goal to develop suitable technologies allowing for the measurements of the tiny DCE cross-sections under extremely high beam intensities. Several solutions emerged from the R&D activity performed during the recent years and some of them will be presented during the second part of the seminar. Importance will be given to the particle-identification wall made by 720 SiC-CsI telescopes and to the digitally based front-end and read-out fast electronics devoted to process the signals coming from the future MAGNEX detectors.

**ESPRESSO SEMINARS**

**18 LUGLIO 2023 | ORE 15:00**

**AULA AZZURRA - LNS**

