



Contribution ID: 221

Type: **Poster**

FRAISE: The New Fragment In-Flight Separator at INFN-LNS

Thursday, 23 September 2021 15:30 (2 hours)

The study of exotic nuclei is presently a challenge for nuclear physics. Indeed, exotic nuclei properties are useful to investigate nuclear structure models, features of the nuclear force and nuclear reactions important for nuclear astrophysics. These investigations can be helpful also to add a further constraint to the knowledge of the Equation of State of nuclear matter. Within this framework, various facilities have been developed worldwide with the aim to deliver Radioactive Ion Beams (RIBs) [1]. In the last 15 years, at Laboratori Nazionali del Sud of INFN (INFN-LNS) RIBs have been produced through the In-Flight Fragmentation method, using the in Flight Radioactive Ion Beams at LNS (FRIBs@LNS) facility [1-3]. Presently, the ongoing project of the LNS (POTLNS), based on an upgrade of the Superconducting Cyclotron, aims to deliver light and medium masses nuclei with a power up to ≈ 10 kW. This project has brought a new perspective also for the production of RIBs. Indeed, the building of a new fragment separator, named FraISE (Fragment In-flight Separator), is underway to exploit primary beams with power of 2-3 kW for the production of high-intensity RIBs [1-3]. We report the status and the perspectives of the FraISE facility. Moreover, R&D studies for new diagnostics and tagging devices will be also discussed.

[1] Russotto P. et al., Jour. of Phys. Conf. Ser., 1014 (2018) 012016 and references therein.

[2] Russo A.D. et al., NIM B, 463 (2020) 418.

[3] Martorana N.S., Il Nuovo Cimento 44 C (2021) 1.

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Session Classification: Poster Session 2

Track Classification: New Facilities and Instrumentation