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Type: **Invited Talk**

## Cyclotron-Production of Innovative Radionuclides: Direct Activation and ISOL Technique Experience at INFN-LNL

Thursday, 30 November 2023 14:00 (25 minutes)

### Introduction

The cyclotron-based production of radionuclides for medicine is one of the research activities carried out in the framework of the SPES (Selective Production of Exotic Species) project at the Legnaro National Laboratories of the National Institute for Nuclear Physics (INFN-LNL). The heart of SPES is the 70 MeV proton-cyclotron with a dual-beam extraction, installed in 2015 in a new building equipped with ancillary laboratories currently under completion.

### Description of the Work or Project

The SPES project aims at the construction of an advanced ISOL (Isotope Separation On-Line) facility for the production of re-accelerated exotic ion beams for nuclear physics studies. The double-beam extraction of the cyclotron also allows to perform multidisciplinary activities, such as radionuclides production for medical applications and neutron-based research. This work will mainly present the activities carried out in the unit "Radionuclides for medicine and applied physics", showing the major results obtained with the interdisciplinary projects LARAMED (LABoratory of RADionuclides for MEDicine) [Esposito et al.] and ISOLPHARM [Andrighetto et al.]. LARAMED is based on the direct-activation method, and it includes the proton-based production of  $^{99m}\text{Tc}$ ,  $^{67}\text{Cu}$ ,  $^{52/51}\text{Mn}$ ,  $^{47}\text{Sc}$  and recently Tb-isotopes, from the nuclear cross section measurements to the preclinical studies. ISOLPHARM uses the ISOL technique for the development and the production of radioisotopes with high-specific activity, such as  $^{111}\text{Ag}$ , going beyond the state-of-art in the field.

### Conclusions

Thanks to a consolidated network of collaborations with national and international facilities, including the PRISMAT European consortium and several Italian universities and hospitals, the ongoing research activities on radionuclides production and their perspectives at the INFN-LNL will be presented at the African Nuclear Physics Conference (ANPC2023).

### References

- J. Esposito et al. (2019), LARAMED: a LABoratory for Radioisotopes of MEDical interest, *Molecules* 24(1), 20, <https://doi.org/10.3390/molecules24010020>  
A. Andrighetto et al., ISOLPHARM website, <https://isolpharm.pd.infn.it/web/>

## Attendance Type

Remote

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