

## RESEARCH ACTIVITIES ON THE CYCLOTRON-BASED PRODUCTION OF INNOVATIVE RADIONUCLIDES: THE EXPERIENCE AT THE LEGNARO NATIONAL LABORATORIES OF INFN

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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. The 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 results obtained with the interdisciplinary projects LARAMED (Laboratory of RADionuclides for MEDicine) and ISOLPHARM (ISOL technique for radioPHARMaceuticals). The first one is based on the direct-activation method, and it includes the proton-based production of <sup>99m</sup>Tc, <sup>67</sup>Cu, <sup>52/51</sup>Mn, <sup>47</sup>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 <sup>111</sup>Ag, going beyond the state-of-art in the field. A consolidated network of collaborations with national and international facilities, including universities and hospitals, characterizes the research activities on radionuclides production at the INFN-LNL.