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Radionuclides: state of the art, INFN research and perspectives in production and medical applications (Invited)

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Radionuclides and radiopharmaceuticals are fundamental tools in nuclear medicine, by enabling imaging and treatment in tens of millions of procedures performed worldwide on a yearly basis. In Europe, 9 million patients benefit from nuclear medicine procedures per year, including 1.5 million patients requiring radionuclide therapy against cancer. The production of medical radionuclides is thus a key aspect and emerging radionuclides are being playing a key role in the development of innovative radiopharmaceuticals. The availability of new research infrastructures dedicated to this goal is thus crucial for Europe. For such a reason, in 2021 the PRISMAP consortium was established as Horizon2020 call, to gather the European research community, first, working in this field. The INFN-LNL takes part in the PRISMAP consortium as an emerging facility, including both the direct activation method (LARAMED project, acronym for LAboratory of RAdioisotopes for MEDicine) and the ISOL (Isotope Separation On-Line) technique (ISOLPHARM project, acronym for ISOL technique for radioPHARMaceuticals), both based on the SPES infrastructure. The ongoing INFN research activities on medical radionuclides production using cyclotrons will be presented, as well as the future perspective of this interdisciplinary research field that presents a strong connection with the nuclear physics community.

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