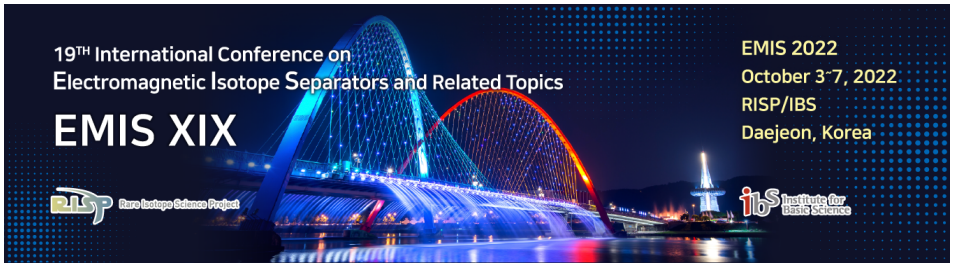

Contribution ID: **95** Type: **Oral Session**

Production of innovative radioisotopes for medical applications at the CERN-MEDICIS facility

Friday, 7 October 2022 14:50 (20 minutes)

Since its commissioning in December 2017, the CERN-MEDICIS facility has been providing non-conventional radioisotopes for research in nuclear medicine. Benefiting from decades of experience in the production of radioactive ion beams and in the mass separation process from the ISOLDE facility at CERN, CERN-MEDICIS quickly became a worldwide key player on the supply of of novel medical isotopes dedicated to research in the fields of cancer imaging, diagnostics, and radiation therapy.

The isotope production is performed using a target either placed in the radiation field generated from the 1.4 GeV proton beam delivered by the CERN Proton Synchrotron Booster scattered from the ISOLDE target, or using radioactive sources provided by one of the MEDICIS collaborating facilities. This later mode of operation allows CERN-MEDICIS to be among the only facilities running during CERN's long shutdowns. Following laser and/or surface ionization, acceleration/extraction and mass separation, the isotope of interest is implanted on metallic foils. The resulting high molar (specific) activity product undergoes a radiochemistry purification process and is finally shipped to one of the medical laboratories from the MEDICIS collaboration (medicis.cern).

After a few years of operation, collections have been performed on a large panel of radionuclides such as ^{128}Ba ^{149},^{152},^{155}Tb, ^{153}Sm, ^{167}Tm, ^{169}Er, ^{175}Yb, ^{191}Pt, and ^{255}Ac. A couple of milestones have been achieved on the output of the facility, such as the collection of 500MBq of ^{175}Yb, and a total separation efficiency of 50% reached in 2020 for ^{167}Tm. These collections led to notable recent successes such as in-vivo and first proof-of-concept preclinical results in targeted radionuclide therapy obtained for high molar activity ^{175}Yb and ^{153}Sm products.

Constant developments are ongoing, such as innovative targets designs, in-target molecular formation to improve the release of specific isotopes, laser development in the dedicated MELISSA laboratory, study of new implantation materials, and post-collection radiochemistry.

Finally, CERN-MEDICIS is at the heart of the *European medical isotope programme* PRISMAP, which consists in a 23 institutes consortium, aiming at accelerating the research in nuclear medicine by providing a single hub for the medical community supplied with innovative radionuclides with high purity grade (prismap.eu, H2020 grand #101008571).

Primary authors: Mr DORSIVAL, Alexandre (CERN); Dr BERNARDES, Ana-Paula (CERN); BERNERD, Cyril (KU Leuven - CERN); CREPIEUX, Bernard (CERN); MARSH, Bruce (CERN); DUCHEMIN, Charlotte (KU Leuven - CERN); MAMIS, Edgars (University of Latvia); Mrs AUBERT, Elodie (CERN); CHEVALLAY, Eric (CERN); POZZI, Fabio (CERN); Mr RICCARDI, Francesco (CERN); Mr RINCHET, Jean-Yves (CERN); VOLLAIRE, Joachim (CERN); RAMOS, João Pedro (SCK CEN); Mr THIBOUD, Julien (CERN); CHRYSALIDIS, Katerina (CERN); LAMBERT, Laura (CERN); DESCHAMPS, M (CERAP); KHAN, Moazam (Pakistan Atomic Energy Comission); Mr MENAA, Nabil (CERN); Mr FERNIER, Pascal (CERN); Mr BERTREIX, Philippe (CERN); KHAN, Qaiser (Pakistan Atomic Energy Commission); HEINKE, Reinhard (CERN); Mr CATHERALL, Richard (CERN); PRVAKOVA, Slavka (CERN); Mr MARZARI, Stefano (CERN); STORA, Thierry (CERN); COCOLIOS, Thomas Elias (KULeuven); KHALID, Umar (Pakistan Atomic Energy Comission); FEDOSSEEV, Valentine (CERN)

Presenter: BERNERD, Cyril (KU Leuven - CERN)

Session Classification: Session 17