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Development of a β imaging detector tailored to Ag-111 for the ISOLPHARM project

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Targeted Radionuclide Therapy (TRT) is an emerging technique for cancer treatment. Radionuclides suitable for this technique could be produced at the Legnaro National Laboratories of the National Institute for Nuclear Physics (INFN-LNL), where a new facility for the production of Radioactive Ion Beams (RIB) called SPES is under construction. The production of radionuclides of medical interest through the ISOL technique is being studied by the ISOLPHARM project.

At the same time, the project is specifically researching Ag-111 as an innovative radionuclide for nuclear medicine. Ag-111 has an interesting theranostic potential because its half-life is about 7 days and it emits both low energy electrons and γ rays. Research on Ag-111 by the ISOLPHARM collaboration started six years ago and has continued with a series of experiments funded by the INFN.

A three-years CSN5 experiment called ADMIRAL is currently ongoing on this topic. One of its goals is to develop a β detector (sensitive to β radiation from Ag-111) that can be used in preclinical experiments. The core of this detector is the ALPIDE chip developed for the ALICE experiment at CERN LHC. This contribution will present a first performance study based on Geant4 simulations together with a preliminary experimental validation obtained with standard β sources.

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