

## **Outlook of production of radioisotopes and radiopharmaceuticals at HIL**

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The Heavy Ion Laboratory (HIL), University of Warsaw currently is equipped with the only one in Poland heavy ion cyclotron U-200P. It was constructed in collaboration with Dubna and Polish scientific institutions in the seventies and eighties of the 20th century. This  $K_{max}=160$  isochronous cyclotron allows to accelerate beams (gaseous and metallic) from  $Q/A=1/5$  to  $Q/A=1/2$  with energies up to 10 MeV/amu. The experimental infrastructure allows to implement the research program of HIL focused not only on nuclear physics, solid state physics, biology, detector testing but also on medical radioisotope production using an alpha beam. To extend the possibilities of radioisotope production, the old target station for internal beam irradiation will be replaced by a new experimental set-up. This will enable us to irradiate solid state targets of metallic Bi with maximum  ${}^4\text{He}^{+1}$  beam current available from U-200P cyclotron and the future cyclotron. Realization of the above project is necessary as a part of the wider program of production radiopharmaceuticals containing  ${}^{211}\text{At}$  isotope in which HIL is involved. The system should allow to produce not only a singular patient dose but multi patients dose of medical radioisotopes.

In 2012 HIL completed a project of a new facility - the Radiopharmaceuticals Production and Research Center. This is a fully GMP compliant production facility of radiopharmaceuticals for PET medical technology. It operates a General Electric PETtrace 840 cyclotron and a complete production line of FDG medicine. To overcome a limitation of available isotopes from the PETtrace existing targets, i.e.  ${}^{11}\text{C}$ ,  ${}^{15}\text{O}$ ,  ${}^{18}\text{F}$  an external beam line with a target system for solid state targets has been constructed. It allows us to execute a few research projects in the frame of consortium with financial support from the National Centre for Research and Development. This extension system of PETtrace cyclotron will be also using for medical radioisotopes production in future.

Having two cyclotrons, light ions and heavy ions, will enable us to develop research programs, in particular the use of existing beams for the production of radioisotopes, which may possibly be used as components of new radiopharmaceuticals.