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Extension of JULICs irradiation capabilities

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At the Forschungszentrum Jülich (FZJ) the variable energy cyclotron JULIC is used as injector of the Cooler Synchrotron (COSY) and performs well for low to medium current irradiations. Main task is to support the FZJ radionuclide research programme of the Institute for Neuroscience and Medicine INM-5 for medical imaging approaches and radioligand development for decoding the complex functions and structure of the human brain (JARA-BRAIN). Target holders of the INM-5 were implemented to the external target station of JULIC to obtain reliable irradiations with 45 MeV protons and 76 MeV deuterons for nuclear reaction cross section measurements and medical radionuclide production. For testing of radiation effects, displacement damage DD and single event effects SEE, with energetic protons for electronics used in space and accelerators the beam can be extracted to a dedicated test stand, e.g. used by Fraunhofer INT. A new external target station is set up inside the BigKarl-Experimental area offering huge space for complex detector setups. This will mainly be used for neutron yield investigations and neutron target development with high power proton or deuteron beam in perspective of a high brilliance accelerator based neutron source (HBS) with the Juelich Center for Neutron Science JCNS-4. In this type of compact neutron sources the neutrons are produced exposing light beryllium targets to proton or deuterium particles of relative low final particle energy in the MeV range and will be optimized for neutron scattering on small samples and to be realized at reasonable costs. But the new target station will be used for other purposes like electronic or detector test and irradiation as well. This report briefly summarizes the history of JULIC and the technical activities for its future perspectives.

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