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Progress Report for the LvB HCANS Project in Martonvásár

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The compact neutron source project LvB is being completed by a consortium of Mirrotron Ltd and HUN-REN Center for Energy Research and will be operated by Mirrotron Ltd. The construction project is supported by important grants for development of regional industry, amounting to a total equivalent of 4.5 million €. The total project costs until the end of 2025 will amount to about 7.5 million €. The difference is private funding contribution by Mirrotron Ltd. At this stage the facility will consist of a 2.5 MeV linear accelerator and two target stations, that will be used alternatively. The first target station will provide cold and thermal bi-spectral neutron beams for material studies, primarily for industrial use, by a reflectometer with polarized neutron capability and a large solid angle powder diffractometer. The second target station will produce a broad epithermal neutron beam spectrum for the development of cancer therapy and neutron irradiation applications. A foreseen, not-yet funded upgrade is to add a DTL type accelerator afterburner in front of the materials target station in order to enhance the accelerated proton energy to above 5 MeV. This can enhance the generated neutron intensity by an order of magnitude by switching to Be target, while the 2.5 MeV proton energy and Li target will be maintained for the beam for healthcare related irradiation purposes. By now the installation of the 2.5 MeV RFQ accelerator together with its RF power supply, with 300 kW peak power in 1.25 ms long pulses of 40 Hz repetition rate is completed, together with the proton beam target with Li coated copper blocks and a combined cold and thermal neutron beam moderator. The proton beam deflector and focusing magnets are designed and in the manufacturing process. The reflectometer and the diffractometer, together with the beam delivery by choppers and a guide system are designed and manufacturing is largely completed. The neutron detector systems to these instruments have been acquired in connection with the replacement of two old instruments at ILL. The physical design of a substantial part of the proton and neutron optical aspects of the epithermal irradiation target system have been completed very recently, resulting in some innovative solutions. The one outstanding difficulty in our progress was due to the failure of the company which has won the public procurement tender in 2021 for providing the proton ion source for the RFQ accelerator. Alternative efforts are being pursued, with the initial goal of being able to start before long the accelerator system, with a fraction of the designed 20 mA peak proton beam current in the pulsed operation.

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