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Status of High Intensity Low Energy Injector for Jinping Underground Nuclear Astrophysics Experiments

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China Jinping Underground Laboratory (CJPL) is currently the deepest underground Lab in the world. By taking advantage of the ultralow background in Jinping underground lab, a 400 kV high voltage accelerator driven by a 2.45 GHz ECR ion source and highly sensitive detectors are planned to be used to study directly a number of important nuclear reactions. A compact and intense 2.45 GHz permanent magnet ion source with a low energy beam transport system (LEBT) will be served as injector source to produce high intensity ion beams, such as 10 mA H⁺, 10 mA He⁺ and 2 mA He²⁺ to be delivered into high voltage acceleration tube. The compact LEBT consists of two 600mT maximum magnetic field solenoid lens integrated steering magnets, a 30 degree dipole magnet and two diagnostic chambers. The ion source and LEBT system have been successfully developed and commissioned on a stand along test bench, and is now connected to the 400 kV high voltage platform accelerator system in a ground level test laboratory. In this paper, the studies of this intense beam injector system, for instance, beam intensities, species and ratio, beam transmission efficiency in LEBT and also the beam matching to the downstream accelerator system will be presented.

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