

Recent developments in Accelerator Facilities for Nuclear Physics

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In India, the accelerator facilities for pursuing experimental nuclear physics research using stable ions now exist at IUAC, New Delhi, BARC TIFR, Mumbai and at VECC, Kolkata. A high current injector (HCI) based on a high temperature superconductor ECR source, capable of producing metal and inert gas ions with higher beam current, is in the final stage of commissioning at IUAC. The design goal of HCI has been successfully validated and has been integrated with the SC LINAC. HCI beam acceleration test with SC LINAC is in progress. The Pelletron facilities provide heavy ion stable beams at energies of 5-6 MeV/A for projectiles up to $A \sim 50$. K-130 cyclotron provides 7-15 MeV proton beam, 28 - 60 MeV alpha beam and 8 - 10 MeV/A heavy ion beams. All three facilities provide heavy ion beams with energies in the region of the Coulomb barrier. In addition to all these, there are small accelerators in universities, such as the 3 MV Pelletron accelerator at Guru Ghasidas University and Institute of Physics, 1.7 MV Tandetron at IIT Kanpur, and an old variable energy cyclotron at Panjab University, which have also contributed to nuclear physics research in the country. A superconducting K-500 cyclotron has been built at VECC, Kolkata, which provides beams of still higher energies in the range 10 - 40 MeV/A. A 30 mA, Low Energy High Intensity Proton Accelerator (LEHIPA) is being built at BARC, Mumbai. It consists of a 50 keV ECR ion source, a 3 MeV CW RFQ and a Drift Tube LINAC (DTL). The ion source and the RFQ are already developed, and 3 MeV proton beam has been extracted from RFQ, to do some material irradiation experiments. More recently, the beam from RFQ has been accelerated to 20 MeV through the four tanks of DTL. A Facility for Research in Experimental Nuclear Astrophysics (FRENA) at SINP, Kolkata will provide opportunities for research in the field of low energy nuclear astrophysics for the first time in India.