

Proposal to develop an accelerator facility for NE region by CUPAC NE Collaboration

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The CUPAC NE Collaboration involves 20 universities, institutes and colleges from the North Eastern states of India. Our collaborators from Indian national laboratories (BARC, IUAC, UGC-DAE CSR) and International laboratories# bring much needed experience and expertise in experimental techniques and stellar model

codes critical to success of CUPAC mission. The long term goal of CUPAC is to construct a world class accelerator

facility in the NE region [1]. The proposed accelerator is a 5 MV Pelletron accelerator with an ECRIS injector. Research domains include PIMS (Positive Ion Mass Spectrometry), nuclear astrophysics, neutron science including

AD-BNCT (Accelerator Driven Boron Neutron Capture Therapy) and SHIM (Swift Heavy Ions in Materials) with

high intensity inert/heavy ion beams.

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The proposed accelerator could uniquely augment national research capabilities in investigation of nuclear astrophysics reactions at (i) Gamow peak in ~200 keV to 100 MeV energy range and (ii) Inert isotopes like Ne, Ar etc and providing high intensity heavy ion beams including group-VIII elements @ ~100 MeV for SHIM studies.

Currently, the collaboration is implementing R & D projects in AD-BNCT, PIMS and investigation of neutron source in AGB stars [2, 3]. Considerable efforts were also put in designing a gas jet target coupled with RMS for nuclear astrophysics, ion optics of accelerator and kinematically focused neutron source at IUAC.

References:

- [1]. "Developing a Discovery Class Particle Accelerator Facility at Cotton University by CUPAC - North East Collaboration" by G. C. Wary , M Patgiri , A. Barthakur , K. Boruah , J.J. Das, V. M. Datar, B.M. Jyrwa , P. C. Rout , S. Santra, D. Sarma, N. Nimai Singh in Proceedings of the DAE Symp. on Nucl. Phys. 65 (2021) 5-14
- [2]. "The Importance of the $^{13}\text{C}(\alpha,n)^{16}\text{O}$ Reaction in Asymptotic Giant Branch Stars" by S. Cristallo et. al. in The Astrophysical Journal, 859:105 (14pp), 2018 June 1
- [3]. n_ToF: Measurements of key reactions of interest to AGB stars by C. Massimi et. al. in Universe 2022 8

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