

Japanese Program Overview on HIF and Related Research Activities

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Recent research activities relevant to heavy ion fusion (HIF) in Japan are reviewed briefly. During the past two years from the last HIF conference, significant progress in HIF and high-energy-density physics research has been made by a number of research groups in universities and accelerator facilities in Japan.

There are strong space charge issues in ion injectors and the final stage of the high power accelerators. Although a critical issue of HIF is to transport the beams without degrading the phase space density, longitudinal beam manipulation, which is essential for the generation of energetic beams, is inevitably accompanied by a dilution of particle distribution in the phase space. Evolutions and beam dynamics in the phase space were discussed at BNL and TIT-NUT, in ion injectors and during the final bunching stage of the high power ion accelerators.

Beam-plasma interaction experiments and related theoretical studies are in progress at RLNR-TIT. In the interaction experiments, a shock-heated gas was used as a well-defined dissociated hydrogen. New schemes of beam driven fusion target have been proposed and discussed by the groups at UU and ILE. A new illumination scheme was found to improve the implosion uniformity of directly-driven fusion target. As the properties of matter under high energy density/warm dense states are critically important to evaluate the hydrodynamic response of fusion pellet, dense plasmas were characterized by pulse power devices at NUT and TIT.

The KEK group upgraded their induction synchrotron using 500MeV booster ring of the 12GeV synchrotron. With this system, they are planning to accelerate all species of ions without injector. When the second phase of R&D is completed, we can expect ion beams with 10¹⁰ particles per bunch regardless of ion species.

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