

## JAPANESE PROGRAM OVERVIEW

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Fundamental issues for HIF research are intensively studied at several universities and institutes as collaborating works of domestic and international forms.

Beam dynamics in the final beam bunching from 1.6 kA to 40 kA with induction modulators and FODO transverse focusing structure, is simulated using a PIC code. Emittance growth of 20% is observed which is independent of the initial particle distribution. The emittance growth during the bunch compression is attributed to the flute perturbation instability for the KV and Waterbag distributions. The other activity on the beam dynamics is the study of high current bunch compression in the storage ring project at RIKEN which is presently under the discussion stage.

Heavy-ion beam irradiation onto the fuel targets is simulated to study the influence of non-uniformity of energy deposition on the target implosion. The calculation is carried out as a function of beam non-uniformity such as Gaussian shape or semi-Gaussian shape, beam number, reactor-chamber radius and so on. The RMS non-uniformity of beam irradiation is reduced when the calculation includes the beam temperature.

A driver system based on controllable repetitive induction modulators is studied to accelerate and bunch the intense heavy-ion beams. A basic concept proposed is to synthesize the desired shape of voltage pulse from sinusoidal waveforms. A small-scale test has successfully proved to operate the module elements with a rep-rate of 1 MHz at 2.5 kV.

The beam-plasma interaction experiments are to be extended to the non-ideal target plasma. Calculation with a particle code predicts that the non-linearity effect in the stopping power is observable even for the plasma of coupling constant  $\Gamma < 1$  if the low-energy ( $\sim 100$  keV/u) and highly-charged ( $> 25+$ ) ions are available. The non-linearity of the stopping power can be discussed by introducing a beam-plasma coupling constant. To perform the interaction experiments, plasma targets based on the shockwave drive and the exploding wire are developed. As a fundamental experiment of the interaction of heavy ion beam with the laser induced plasma, Xe and Kr beams are used at RIKEN linear accelerator facility. The enhancement of stopping power was observed comparing with ones at cold matter case.