

## Investigations on the interaction between the low energy heavy ion beams and hydrogen plasma

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The investigations on the interaction between ion beam and matter is one of the most important topics in atomic physics and nuclear physics. It is indeed a requirement for a deeper understanding of the interaction processes. Especially the energy deposition by an intense heavy ion beam with the low energy impinging into a degenerate matter, which is related to the topics of warm dense matter, fast ignition process and helium ions self-heating in the fusion process.

The study on the energy loss of the low energy protons and helium ions in a hydrogen plasma target which is produced by an electrical discharge in hydrogen gas at Institute of Modern Physics is carried out [1-3]. With the independent laser interferometry measurement, the linear electron density of the plasma column is obtained. The energy loss for the ions in the low energy regime with linear electron density of  $10^{17}\text{cm}^{-2}$  is compared. It is found that the enhanced energy losses in plasma than that in cold gas for both of proton and helium ions. In the proton case, the results can be well described by the Bethe, Standard Stopping Model (SSM), Li-Petrasso and Vlasov models, respectively. The energy loss in plasma is enhanced by a factor of 2.8 to that in

cold gas; the Bethe-Bloch Coulomb logarithm term of the stopping equation is larger by a factor of 4 for free electrons as compared to the situation where bound electrons prevail. In helium ions case, not only the enhancement of energy loss is found, but also the effective charge states of helium ions in plasma and in cold gas are compared.

More experimental details and the discussions will be presented in the conferences.

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