§2. Single-elctron Loss Cross Section of H^- Colliding with He

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The injection of powerful and fast neutral hydrogen(H^0) atomic beams into plasmas, called NBI scheme, is often used for plasma heating. One of effective methods for producing such fast neutral atoms above a few 100keV is the electron loss process from negative hydrogen(H^-). In order to develop the effective NBI scheme, we have calculated the single-electron loss cross section from H^- ions colliding with He.

The reactions in the single-electron loss considered here are

$$H^- + He \rightarrow H^0 + e^- + He \quad (1)$$

$$H^- + He \rightarrow H^0 + e^- + He^*. \quad (2)$$

The process (1) indicates that target atoms remain in the ground state during the collision. On the other hand, the process (2) indicates that target atoms are excited to higher states after the collision. The initial states of electrons in H^- are approximated by (1s,1s') orbitals[1]. The ionized electron is described by the Coulomb wave function. The present calculations have been carried out based upon the first Born approximation over the incident energy range of 2keV-10MeV. We used the closure approximation, which is summed over all the excitation states of He target[2], in the process(2). The average excitation energy of He target has given the expression by Montenegro *et al.*[2].

Our calculated results for the process(1), for the process(2), and for the total summed over (1) and (2) are shown in Fig.1 with the dotted, dashed and solid lines together with experimental data[3-9] available, respectively. The present calculated results are in general agreement with experimental data in high energy region, but significant difference is easily noted between the present results and experimental data in low energy region(below 10keV), which seems to already be outside of validity of the Born approximation and the average exicitation energy of He by Montenegro *et al.*[2].

We are trying to develop more accurate approximation.

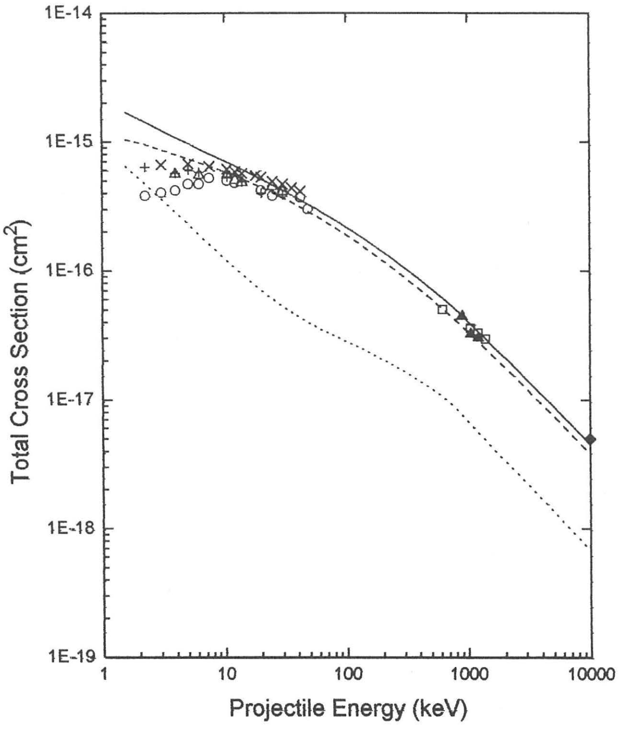

Figure 1: Comparison the present calculated results with the experimental data. The symbols represent experimental data and are taken from Ref[3](open circles), Ref[4](open triangles), Ref[5](pluses), Ref[6](crosses), Ref[7](open squares), Ref[8](solid triangles) and Ref[9](solid dimond)

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