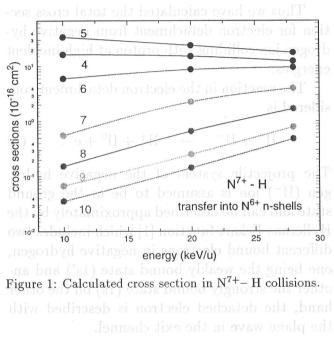
Single Electron Detachment from Negative Hydrogen fon in Collisions with Positive fon at High Energies

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The injection of fast and powerful neutral hydrogen beam (11°) is believed to be one of the most efficient methods for plasma heating. The detail understanding of the electron detachment processes from acgative hydrogen ion is important for Neutral Beam Injection (NBI) for plasma heating.



Our present calculation is based on the four-body Continuum-Distorted-Wave (CDW-(B) approximation [2,3].

Figure 1 shows comparison of our calculated results of reaction (1) with experimental data [4]. In the intermediate energy region, our result is close to experimental data. Unfortunately, there is no experimental data in high energy region so far.

In order to compare with the present results, we also show the calculated results for

 $\mathbf{B} + \mathbf{H}^* \rightarrow \mathbf{B} + \mathbf{B}^* + \mathbf{e}^*.$

These results clearly show that the cross see. (1) is a factor of أحدّ bigger في المح

§3. Slow Collisions between N⁷⁺ Ions and H or He Atoms

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In our continuing effort to contribute to the data basis of atomic collision processes we have studied electron transfer and excitation in collisions between N^{7+} ions and H or He atoms. These calculations are performed within the close-coupling method with atomic-orbital basis sets. Their main thrust lies in the determination of cross sections for the population of high-*n* states of N^{6+} in these collisions. Such results have been derived earlier for collision with hydrogen on the basis of a simplified model [1] in which only selected couplings between (n, l, m) and (n', l', m') states have been considered. Recent observations [2] in the JET diagnostics group seem to be slightly inconsistent with results from the earlier theoretical work.

As it turns out for N^{7+} - H collisions, the transfer cross sections from the simplified model are confirmed in our new study which includes *all* couplings within the basis sets. Such studies have been performed for a small number of systems, see our review [3] and references therein. They are believed to be very reliable except for the cross sections for transitions into the states with the highest principal quantum number *n* that is included in the basis. A subset of results for N^{7+} -H collision is shown in figure 1. The full set of results for this system will be discussed elsewhere, as well as the results for high-*n* population in N^{7+} - He collisions for which there is as yet no other information available.

Other collisions that are being studied now include slow N^{4+} - H and Be^{2+} - H collisions. Such work is being done as part of an IAEA Coordinated Research Project on Charge Exchange Cross Section Data for Fusion Plasma Studies.

References

[1] Fritsch, W., Phys. Rev. A 30 (1984) 3324.

- [2] M. von Hellermann, private communication.
- [3] Fritsch, W., Tawara, H., NIFS-DATA-39 (1997) 89.