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Resolving remaining discrepancies between H_3^+ recombination cross sections obtained by ion storage rings, plasma afterglow experiments, and theory RAINER JOHNSEN, University of Pittsburgh — While theoretical Jahn-Teller calculations of the dissociative recombination of H_3^+ ions with electrons agree well with the binary rate coefficients obtained in ion storage rings, some plasma afterglow measurements have consistently yielded either much lower (by factors of 10 or more) or higher values (by factors of 3 to 4). The origin of these disturbing discrepancies has not been clearly identified. I will show that the very low values obtained in afterglows at low concentrations of neutral hydrogen simply reflect recombination of ion species other than H_3^+, rather than being due to H_2-assisted recombination, different spin modifications, or vibrational excitation of H_3^+, as has been suggested. Also, the mechanisms that have been proposed to account for the apparent recombination enhancement due to neutral atoms (helium in particular) are not convincing. I will show here that a modified form of "collisional dissociative recombination" can account for the observed faster recombination rates in plasma experiments at high helium densities. In this model, the enhancement of the recombination results from three-body electron capture into Rydberg states of high angular momentum l, followed by l-reducing collisions with neutral atoms that induce predissociation. I conclude that there is no true "discrepancy" between afterglow and storage ring H_3^+ recombination coefficients

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