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TI Branching fractions in the dissociative recombination of NH4+ and NH2+ molecular ions
SO ASTRONOMY AND ASTROPHYSICS
LA English
DT Article
DE ISM : molecules; ISM : clouds; molecular processes
ID HIGH-RESOLUTION MEASUREMENT; ABSOLUTE CROSS-SECTIONS; DIELECTRONIC RECOMBINATION; INTERSTELLAR CLOUDS; ABUNDANCES; EXCITATION; ELECTRONS; GAS
AB Branching fractions in the dissociative recombination of NH4+ and NH2+ molecular ions with electrons were measured using the CRYRlNG heavy ion storage ring. We have determined complete branching fractions for NH4+ at 0 eV and 2 meV collision energies, and at 0 eV collision energy for NH2+. We found the dissociative recombination of NH4+ to be dominated by the two body, 'ammonia' channel. The branching fractions we obtained at 0 eV are 0.69 +/- 0.03 for the NH3 + H channel, and for the breakup into the NH2 + H-2 and NH2 + 2H channels 0.10 +/- 0.02 and 0.21 +/- 0.03, respectively. The values we obtained for 2 meV are about the same as at 0 eV. For the NH2+ ion we obtained 0.66 +/- 0.01 for the three body N + H + H channel, 0.34 +/- 0.02 for NH + H, and no breakup into the N + H-2 channel. Dissociative recombination of NH4+ and NH2+ is important as a potential source of some neutral molecules found in the interstellar clouds (NH3, NH2, and NH) and the measured branching fractions have important implications for modelling the chemistry of these clouds. We report also on the relative dissociative recombination cross sections for NH4+ and NH2+ for collision energies below 60 eV.
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