

Hydrogen atom and ion source

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Hydrogen Atom and Ion Source, R.J. SEVERENS,
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High intensity hydrogen atom and ion beams can be obtained by expansion of a cascade arc plasma in a low pressure vessel. At intermediate ambient pressure anomalous recombination results from charge exchange of H^+ with H_2^v to H_2^+ , conversion to H_3^+ and subsequent dissociative recombination. The required H_2^v reenters the atomic plasma beam from wall association and recirculation. At lower pressure (10 Pa) in a confining magnetic field this recombination is much less effective and a highly ionised plasma beam results; then the ro-vibrational excitation of the residual $H_2^{v,r}$ molecules favour negative ion formation. Applications in ion sources and archeological artefact restoration are discussed.