Hydrogen atom and ion source

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PLEASE TYPE NAME, ADDRESS, TELEPHONE NUMBER AND E - MAIL

Prof.dr.ir. D.C. Schram
Eindhoven University of
Technology
Department of Physics
P.O. Box 513
5600 MB Eindhoven
The Netherlands
Tel: (+3140)474369
E-mail: schramd@etprs.phys.tue.nl

AUTHORS: PLEASE NOTE

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Hydrogen Atom and Ion Source, R.J. SEVERENS, M.J. DE GRAAF, Z. QING, D.K. OTORBAEV, R.P.DAHIYA, J.WEVERS, R.F.G. MEULENBROEKS, M.C.M. VAN DE SANDEN, and D.C. SCHRAM, EUT –

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 restauration are discussed.