

Table of Contents

SESSIONS I AND II - FUNDAMENTAL PROCESSES - (K. Wiesemann, Chairman)	1
Fundamental Atomic Collisional Processes in Negative Ion Sources for H^-	3
D.H. Crandall and C.F. Barnett	
D^- Production by Multiple Charge-Transfer Collisions in Metal-Vapor Targets	11
A.S. Schlachter	
D^- Formation by Double-Electron Capture in Alkaline-Earth Vapors: Recent Results	24
T.J. Morgan	
Production of Negative Hydrogen Ions in Low Pressure Hydrogen Plasmas	26
M. Bacal, E. Nicolopoulou, and H.J. Doucet	
Confinement of Negative Ions in Hydrogen Plasmas	35
H.J. Doucet, E. Nicolopoulou, and M. Bacal	
Formation Processes and Secondary Emission Coefficients for H^- Production on Alkali-Coated Surfaces	42
J.R. Hiskes and A. Karo	
Work Function Dependence and Isotope Effect in the Production of Negative Hydrogen Ions During Sputtering of Adsorbed Hydrogen on Cs Covered Mo(100) Surfaces	48
M.L. Yu	
Experimental Measurements of Negative Hydrogen Ion Production from Surfaces	53
W.G. Graham	
Activation of Molybdenum Surface by a Hydrogen Plasma to Obtain H^- Ions by Secondary Ion Emission	60
Ye. D. Bender, M. Ye. Kishinevskiy, and I.I. Morozov	
D^- Production by Backscattering from Clean Alkali-Metal Surfaces	63
P.J. Schneider, K.H. Berkner, W.G. Graham, R.V. Pyle, and J.W. Stearns	
Discussions	70

SESSIONS III AND IV - ION SOURCES - (K.W. Ehlers, Chairman)	77
Physical Principles of the Surface Plasma Method for Producing Beams of Negative Ions	79
Yu. I. Bel'chenko, G.I. Dimov, and V.G. Dudnikov	
Some Physical Aspects of H^- Sources	97
K. Wieseemann	
H^- Ion Source Diagnostics	105
M.W. Grossman	
Development of H^- Sources at Brookhaven National Laboratory	111
K. Prelec	
Experimental Investigation of Negative Ion Sources for Obtaining Tubular Beams	118
V.L. Komarov and A.P. Strokach	
Experiments with a Dudnikov-Type H^- Ion Source	119
P.W. Allison	
An H^- Ion Source for Accelerator Use	123
C.W. Schmidt and C.D. Curtis	
Production of Low Energy Positive Ions Suitable for Double Electron Capture Systems	129
J.H. Whealton, C.C. Tsai, L.R. Grisham, and W.L. Stirling	
A Multidipole Negative Ion Source	136
K.N. Leung	
Cathode Cooling Systems for the Magnetron and Penning H^- Sources. A Progress Report of Work at BNL	140
R.B. McKenzie-Wilson	
Discussions	145
PANEL SESSION - PRODUCTION OF NEGATIVE IONS, ION SOURCES (J. Hiskes, K. Prelec, Moderators)	149
SESSION V - DOUBLE ELECTRON CAPTURE - (J. Osher, Chairman)	161
Sixty keV D^- Beams Using Double Charge-Exchange System	163
E. B. Hooper, Jr., O.A. Anderson, T.J. Orzechowski, and P. Poulsen	
Production of Negative Hydrogen Ion Beams by Double Charge Exchange	170
N.N. Semashko, V.V. Kusnetsov, and A.I. Krylov	
A Low Energy D_0 Source for the Production of D^- by Double Electron Capture	173
R. Geller, C. Jacquot, and P. Sermet	
Discussions	179
SESSION VI - NEUTRALIZERS - (J. Osher, Chairman)	183
Efficient Production of Neutral Beams by Photo-Detachment of Negative Ions	185
J.H. Fink and G.W. Hamilton	
Plasma Neutralizer for H^- Beams	189
M.W. Grossman	
Neutralization of H^- Beams with Gas Jets	195
C.K. Lam	
Discussions	199

SESSION VII - ACCELERATION, TRANSPORT AND SPACE CHARGE NEUTRALIZATION - (R. Geller, Chairman) ...	203
Plasma Production and Flow in Negative Ion Beams O.A. Anderson, and E.B. Hooper, Jr.	205
Present Status of Negative Ion Acceleration and Transportation from SP Sources Th. Sluyters and C.K. Lam	211
Space Charge Neutralization of Positive and Negative Ion Beams J.M. Dolique	215
Neutralization of Positive Particle Beams by Electron Trapping R.B. Mobley, A.A. Irani, J.L. LeMaire, and A.W. Maschke	224
Some Comments on Space Charge Neutralization of Positive and Negative Ion Beams T.S. Green	228
Stability of Space-Charge Neutralized Beams R.J. Turnbull and E.B. Hooper, Jr.	236
Discussions	244
PANEL SESSION - TRANSPORT PROBLEMS - (E.B. Hooper, Moderator)	249
SESSION VIII - NEUTRAL BEAM SYSTEMS - (G.H. Miley, Chairman)	257
Neutral Beam Systems for the Magnetic Fusion Program J.W. Beal and <u>H. Stanley Staten</u>	259
Possible Neutral Beam Requirements for TFTR Upgrades B.A. Prichard, Jr., R. Little, D.E. Post, and J.A. Schmidt	269
Comparison of Methods for the Production of Neutral Beams L.D. Stewart	276
High Energy Neutral Injectors Based Upon Negative Ion Plasma Sources Th. Sluyters and K. Prelec	280
Negative Ion Beam Considerations for Advanced-Fuel Fusion G.H. Miley	284
Evaluation of Beam-Line Components for use in a Large Neutral-Beam Injector J.H. Fink	290
Discussions	295
PANEL SESSION - NEUTRAL BEAM SYSTEMS (Th. Sluyters, Moderator)	301
SESSION IX - ADVANCED METHODS FOR PRODUCTION OF NEGATIVE HYDROGEN IONS - (A.Y. Wong, Chairman) ..	313
Negative Hydrogen and Deuterium Ion Production by a Laser Irradiation of Alkali Hydride/Deuteride Targets V. Vanek, W. Gekelman, and A.Y. Wong	315
Negative Hydrogen-Ions Produced from Clusters for Plasma Heating E.W. Becker, H.D. Falter, O.F. Hagena, W. Henkes, <u>R. Klingelhöfer</u> , H. Moser, W. Obert, and I. Poth	322

Electron Gun Negative Ion Source Experiments	326
L.D. Singletary and J.M. Sellen	
Methods for Independent Plasma Production and Beam Injection for $H^+ \rightarrow H^-$	
Surface Conversion	340
C.C. Tsai, W.L. Stirling, and R.C. Davis	
Discussions	346
PANEL SESSION - ADVANCED METHODS - (A.Y. Wong, Moderator)	349
CONCLUDING REMARKS - (K.W. Ehlers)	357
LIST OF ATTENDEES, INDEX OF AUTHORS	361