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Nota di contenuto	The Physics and Technology of Ion Sources; Preface; Contents; List of Contributors; 1 Introduction; 2 Plasma Physics; 2.1 Introduction; 2.2 Basic Plasma Parameters; 2.2.1 Particle Density; 2.2.2 Fractional Ionization; 2.2.3 Particle Temperature; 2.2.4 Particle Energy and Velocity; 2.2.5 Collisions; 2.3 The Plasma Sheath; 2.3.1 Debye Length; 2.3.2 Charge Neutrality; 2.3.3 Plasma Oscillations; 2.4 Magnetic Field Effects; 2.4.1 Gyro Orbits; 2.4.2 Gyro Frequencies; 2.4.3 Magnetic Confinement; 2.4.4 Magnetic and Plasma Pressure; 2.5 Ionization; 2.5.1 Electron Impact Ionization; 2.5.2 Multiple Ionization; 2.5.3 Photoionization; 2.5.4 Ion Impact Ionization; 2.5.5 Negative Ions; 2.5.6 Field Ionization; 3 Elementary Ion Sources; 3.1 Introduction; 3.2 Terminology; 3.3 The Quintessential Ion Source; 3.4 Ion Beam Formation; 3.5 Ion Beam Parameters; 3.6 An Example; 3.7 Conclusion; 4 Computer Simulation of Extraction; 4.1 Introduction; 4.2 Positive Ion Sources; 4.2.1 Filament Driven Cusp Sources; 4.2.2 Duoplasmatrons and Duopigatrons; 4.2.3 Vacuum Arc Ion Sources; 4.2.4 Laser Ion Sources; 4.2.5 ECR Ion Sources; 4.2.6 Penning Ion Sources; 4.3 Negative Ion and Electron Sources; 4.3.1 Hot Cathode Electron Sources; 4.3.2 Plasma Electron Sources; 4.3.3 H(-) Sources; 4.4 Conclusion; 5 Ion Extraction; 5.1 Introduction; 5.2

Fundamentals of Ion Beam Formation in the Extraction System; 5.3 Beam Quality; 5.4 Sophisticated Treatment of Ion Beam Formation in the Extraction System; 5.5 Multi-Aperture Extraction Systems; 5.6 Starting Conditions; 6 Beam Transport; 6.1 Introduction; 6.1.1 Drift; 6.1.2 Extraction System and Acceleration Gap; 6.1.3 Low Energy Beam Line; 6.2 Current Effects; 6.3 Space-Charge Compensation; 6.3.1 Residual Gas Collisions; 6.3.2 Sputtering; 6.3.3 Preserving Space Charge Compensation; 6.3.4 Influence of Space Charge Compensation; 6.4 A LEBT System for the Future Proton Linac at GSI; 6.4.1 Compound System; 6.4.2 Pentode or Two-Gap System; 6.4.3 Triode System and DC Post-Acceleration; 6.4.4 Discussion; 7 High Current Gaseous Ion Sources; 7.1 Introduction; 7.2 Basic Types of High Current Ion Sources; 7.2.1 Filament Driven Ion Sources; 7.2.2 High-Frequency Ion Sources; 7.2.3 Cold Cathode Ion Sources; 7.3 Conclusion; 8 Freeman and Bernas Ion Sources; 8.1 Introduction; 8.2 The Freeman Ion Source; 8.3 The Bernas Ion Source; 8.4 Further Discussion of the Source Plasma; 8.4.1 Plasma and Sheath Potentials; 8.4.2 Effect of Sputtering on the Plasma; 8.4.3 Ion Heating of the Cathode and Anticathode in the Bernas Source; 8.4.4 Current Balance in the Freeman Source; 8.4.5 Current Balance in the Bernas Source; 8.5 Control Systems; 8.5.1 Freeman and Bernas Controls; 8.5.2 Bernas Indirectly Heated Cathode; 8.6 Lifetime and Maintenance Issues; 8.6.1 Use of BF(3); 8.6.2 Use of PH(3), AsH(3), P(4), and As(4); 8.6.3 Use of Sb, Sb(2)O(3), and SbF(3); 8.6.4 Use of SiF(4) and GeF(4); 8.6.5 General Guidelines for the Use of Other Organic and Inorganic Compounds

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## Sommario/riassunto

The first edition of this title has become a well-known reference book on ion sources. The field is evolving constantly and rapidly, calling for a new, up-to-date version of the book. In the second edition of this significant title, editor Ian Brown, himself an authority in the field, compiles yet again articles written by renowned experts covering various aspects of ion source physics and technology. The book contains full chapters on the plasma physics of ion sources, ion beam formation, beam transport, computer modeling, and treats many different specific kinds of ion sources in sufficient

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