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Energy Distribution and Bremsstrahlung Spectra of Energetic Electrons Escaping from the ECR Plasma with High Energy Input

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Electron energy distribution function (EEDF) is an important parameter that defines the processes of plasma confinement and ionization. Understanding such processes is crucial for the tuning of ion sources. In the ECR plasma, the EEDF takes a significantly non-Maxwellian shape that still remains unknown. As the continuation of this problem solving, the energy distributions of the electrons lost from the magnetic mirror trap were directly measured in a wide range of neutral gas pressures and gyrotron powers along with bremsstrahlung spectra. A series of experiments was performed on the newly constructed Gasdynamic Ion Source for Multipurpose Operation (GISMO) facility allowing record-breaking specific energy input into the plasma. Obtained distributions showed unconventional behavior as the function of external parameters. The EEDF shape and the bremsstrahlung spectra showed a significant qualitative change with the gyrotron power as a result of the development of kinetic instabilities

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