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Spectroscopic Diagnostics of a Plasma Cathode Electrode (PCE)

source TSITSI MADZIWA-NUSSINOV, ISR-6, Los Alamos National Laboratory, MAX LIGHT, PAT COLESTOCK — The EBIT experiment at Los Alamos National Laboratory is a new idea using a plasma cathode electron source to generate a highly energetic electron beam for ionization in a downstream chamber. The physics of plasma cathodes is well known and has already been utilized for electron beam generation in other capacities [1], [2]. We employ an ECR source at 2.45GHz, (described in detail in another presentation at this conference) by biasing a conducting plasma chamber to negative voltages up to -140V. We have a small aperture of 2cm in diameter through which an electron beam is extracted into a downstream Pyrex glass chamber with magnetic coils for plasma confinement. The plasma-electron beam system was diagnosed using three methods: a Langmuir probe (for electron temperatures, space potentials and electron densities), spectroscopy (for electron temperatures) and a retarded electron potential energy analyzer (for electron energies and space potentials). In this presentation we will focus on the spectroscopy diagnostics of the EBIT experiment. We will go into the different plasma equilibriums that we can work on and compare the results with the other 2 diagnostics we have in place.

[1] Yu. E. Kreindel, *Plasma Cathode Electron Sources* ~Atomizdat, Moscow, 1977, p. 144.

[2] E. M. Oks, *Plasma Sources Sci. Technol.* **1**, 249 ~1992.

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