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Helium temperature measurements in a hot filament magnetic mirror plasma using high resolution Doppler spectroscopy. S. KNOTT, P.J. MCCARTHY, A.A. RUTH, University College Cork — Langmuir probe and spectroscopic diagnostics are used to routinely measure electron temperature and density over a wide operating range in a reconfigured Double Plasma device at University College Cork, Ireland[1]. The helium plasma, generated through thermionic emission from a negatively biased tungsten filament, is confined by an axisymmetric magnetic mirror configuration using two stacks of NdFeB permanent magnets, each of length 20 cm and diameter 3 cm placed just outside the 15 mm water cooling jacket enclosing a cylindrical vacuum vessel of internal diameter 25 cm. Plasma light is analysed using a Fourier Transform-type Bruker spectrometer with a highest achievable resolution of 0.08 cm^{-1}. In the present work, the conventional assumption of room temperature ions in the analysis of Langmuir probe data from low temperature plasmas is examined critically using Doppler spectroscopy of the 468.6 nm He II line. Results for ion temperatures obtained from spectroscopic data for a variety of engineering parameters (discharge voltage, gas pressure and plasma current) will be presented.

[1]PJ Mc Carthy et al., 30^{th} ICPIG, Belfast, 2011

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