

## Electron-impact excitation and ionisation R-matrix calculations in support of Tungsten tokamak diagnostics.

*Tuesday, 30 March 2021 12:15 (30 minutes)*

Dirac Atomic R-matrix calculations (DARC) for level-resolved electron-impact excitation of neutral and singly ionised tungsten have been carried out. These models include several hundred levels in the close-coupling expansion of each scattering model. Where NIST experimental energy level identifications are available for each ion stage, these have been adopted within the our models. For electron-impact ionisation we shall discuss a term-resolved RMPS (R-Matrix with Pseudo-States) model which may be statistically split to provide level-resolved ionisation. Impurity influx from tungsten plasma facing components may be associated with an SXB 'ionisations per photon' ratio. The atomic structure, electron-impact excitation and ionisation underpin the ratio of the effective ionisation to the photon emissivity coefficient. I will show that the electron-impact excitation calculations reproduce spectra from laboratory plasma devices such as the Compact Toroidal Hybrid (CTH), Auburn University, but the confidence in the effective ionisation rates, dependent on excited-state ionisation is not as high.

**Primary authors:** BALLANCE, Connor (Queen's University of Belfast); Prof. LOCH, Stuart (Auburn University); Ms DUNLEAVY, Nicole (Queen's University of Belfast); Dr SMYTH, Ryan (Queen's University of Belfast); Dr CURTIS, Johnson (Auburn University); Prof. ENNIS, David (Auburn University)

**Presenter:** BALLANCE, Connor (Queen's University of Belfast)

**Session Classification:** CR