Contribution ID: **56** Type: **invited**

Recent progress of collisional radiative modelling of H2 with Yacora and steps needed for D2

Monday, 15 July 2024 11:45 (25 minutes)

Collisional-radiative (CR) models for atomic and molecular hydrogen are essential for quantitative interpretation of atomic and molecular emission in low temperature plasmas such as the divertor plasma of fusion devices or negative hydrogen ion sources for the neutral beam injection systems for ITER. Moreover, CR models provide effective rate coefficients for neutral models, like the EIRENE code, to identify the role of hydrogen opacity in the analysis of Balmer line radiation and the role of molecules contributing to the high-recycling regime. In particular, the transition from ionising to recombining plasmas involves a complex interaction of molecular and atomic species. Using the Yacora solver [Wünderlich et al., J. Quant. Rad. Transfer 110 (2009) 62], several CR models are constructed based on a unique database compiled for this purpose. (i) Yacora-H: atomic hydrogen, which is coupled to molecular species, (ii) Yacora-H_2: molecular hydrogen with the electronic states resolved, (iii) Yacora-H_2(X1,v): molecular hydrogen for predicting the vibrational population of the ground state, (iv) Yacora-H_2(v): vibrationally resolved model for molecular hydrogen, and (v) Yacora-H_2(v,N)-Fulcher: ro-vibrational corona model for the Fulcher band. The contribution highlights the enormous progress achieved since the last IAEA Decennial Meeting in 2014, gives application examples together with a discussion on the steps needed for the deuterium molecule.

Primary author: FANTZ, Ursel (Max-Planck-Institut für Plasmaphysik)

Co-authors: BERGMAYR, Richard (Max-Planck Institut für Plasmaphysik, Garching); WÜNDERLICH, Dirk (Max-Planck-Institut für Plasmaphysik)

Presenter: FANTZ, Ursel (Max-Planck-Institut für Plasmaphysik)

Session Classification: A+M modelling