Contribution ID: **3684** Type: **not specified**

P5.3015 Vibrational excitation of the electronic ground state of H2 via electron-impact excitation and radiative decay

Friday, 12 July 2019 14:00 (2 hours)

See full abstract here http://ocs.ciemat.es/EPS2019ABS/pdf/P5.3015.pdf

Electron-impact excitation of the singlet states of H2 will either lead to dissociation through the excited singlet spectrum, or radiative decays to the vibrational levels of the ground electronic state. Decays to bound levels are one of the dominant processes by which vibrationally-excited H2 is formed in plasmas, which is of considerable importance as excitation cross sections depend strongly on the initial vibrational state of the molecule. Cascades to continuum levels, on the other hand, are an important process for dissociation of H2.
As with many vibrationally-dependent processes in e-H2 scattering, the previously available theoretical data has been almost entirely produced using the impact-parameter method, which is known to be inaccurate except at high incident energies [1]. The present calculations [2], which have been performed using the adiabatic-nuclei convergent closecoupling method, are a significant improvement in accuracy over the previous theoretical data.
In Fig. 1 we present the cross sections for electron-impact excitation and radiative decay to the bound and continuum (dissociative) vibrational levels from all vi = 0–14 initial vibrational levels of H2. There is a strong dependence on the initial vibrational state, particularly for the decays leading to dissociation, where there is a significant enhancement in the cross section for scattering on the higher levels.

References
[1] R. Celiberto et al, At. Data Nucl. Data Tables 77, 161 (2001)
[2] L. H. Scarlett et al, Plasma Sources Sci. Technol. 28, 025004 (2019)

pppo

Presenter: FURSA, D. (EPS 2019)

Session Classification: Poster P5