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Vibrationally-resolved electron-impact excitation of molecular hydrogen[1] LIAM SCARLETT, JONATHAN TAPLEY, DMITRY FURSA, JEREMY SAVAGE, IGOR BRAY, Curtin University, MARK ZAMMIT, Los Alamos National Laboratory — Molecular hydrogen and its isotopologues are present in a range of vibrationally excited states in fusion, atmospheric, and interstellar plasmas. Electron-impact excitation cross sections resolved in both final and initial vibrational levels of the target are required for modeling the properties of many low-temperature plasmas. Measurements of excitations in H_2 are typically limited to scattering on the ground vibrational state, and hence there is significant demand for accurate theoretical calculations of scattering on excited states. At low to intermediate energies, the currently recommended data are up to a factor of two higher than the available measurements for scattering on the ground vibrational state. Recent calculations performed using the convergent close-coupling (CCC) method have demonstrated the convergence of excitation cross sections with respect to the number of coupled channels, and yielded good agreement with experiment for scattering on the ground vibrational level of H_2. Here we extend the CCC method to provide a fully vibrationally-resolved description of e-H_2 scattering, providing results for excitation of all vibrational levels in several low lying singlet and triplet states, from all vibrational levels of the ground state.

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