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Two-Centre Convergent Close-Coupling Approach to Ion-Atom Collisions: Current Progress¹ ALISHER KADYROV, ILKHOM ABDURAKHMANOV, JACKSON BAILEY, IGOR BRAY, Curtin Univ of Technology — There are two versions of the convergent close-coupling (CCC) approach to ion-atom collisions: quantum-mechanical (QM-CCC) and semi-classical (SC-CCC). Recently, both implementations have been extended to include electron-transfer channels. The SC-CCC approach has been applied to study the excitation and the electron-capture processes in proton-hydrogen collisions. The integral alignment parameter A_{20} for polarization of Lyman- α emission and the cross sections for excitation and electron-capture into the lowest excited states have been calculated for a wide range of the proton impact energies. It has been established that for convergence of the results a very wide range of impact parameters (typically, 0-50 a.u.) is required due to extremely long tails of transition probabilities for transitions into the $2p$ states at high energies. The QM-CCC approach allowed to obtain an accurate solution of proton-hydrogen scattering problem including all underlying processes, namely, direct scattering and ionisation, and electron capture into bound and continuum states of the projectile. In this presentation we give a general overview of current progress in applications of the two-centre CCC approach to ion-atom and atom-atom collisions.

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