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Contemporary Methods and New Phenomena in Atomic Collisions¹

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In recent years, with the increasing availability of powerful high performance computers, the direct numerical solution of time-dependent Schrodinger equation has become a desirable theoretical technique for investigating atomic and molecular collision processes. This quantitative and rigorous approach has been applied to solve various non-perturbative problems such as in electron-impact ionization, photoionization, heavy particle collision processes and laser-matter interactions. In this talk, we focus on ion collisions with ions and atoms. We review our recent theoretical advancements and latest calculations for a wide range of inelastic processes, ranging from charge transfer, excitation and ionization cross sections to ejected electron momentum spectra to vortex creation and dynamics in time-dependent potential fields.

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