Jakub Benda

Astrophysically important processes in collisions of electrons with hydrogen atoms

This thesis focuses on calculations of the cross sections and other scattering quantities that characterize the outcome of collisions of electrons with hydrogen atoms. For the chosen energy range and atomic transitions the scattering process is solved within the non-relativistic quantum mechanics by discretization of the Schrödinger equation in the basis of B-splines, which transforms the equation into a linear-algebraic problem. The thesis discusses the boundary conditions, methods of solution of the linear system, preconditioning of the system and interpretation of results, including several original ideas that proved to be very beneficient for the calculations. The calculated data are provided by means of graphs at the end of the thesis. Also, a custom web-based scattering database containing the results has been set up, freely available to the expected audience of this project.