Sistematic studies of atomic spectra based noSQL databases

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R-matrix theory in atomic physics has been developed into a highly efficient computational technique for studying collisions of electrons and photons with ions, atoms and molecules. Some observations on the characteristic of this class of scattering problem are noted in this work. Most importantly, the majority of linear differential equation solvers which are used involve effective general algorithms but take no explicit account of the fact that the interaction potentials typically vary slowly as function of the radial distance (especially at larger distances from the target). This property yields time-consuming part of the propagation that an analytic solution to the problem could be obtained. We investigate the usage of noSQL databases for data applications used in fusion research. These are new and innovative technologies for high performance databases, easily scalable for both storage and high speed requirements.
The particular variant chosen has not been used previously. The Co III and Co IV ions considered in this paper have received much interest in the last decade given their role as impurity in the reactor plasma diagnostics. The proposed method is a powerful framework for systematic studies of atomic spectra. Several sets of atomic data calculation have been performed with three independent atomic structure codes with increasing amount of configuration interaction. It becomes clear that the use of such large or even larger set of configurations would lead to a prohibitive number of levels that makes very difficult further analysis. We propose here the usage of noSQL databases for systematic spectra studies.