

ROLE OF POLARIZATION IN THE MULTIPLE IONIZATION BY AN INTENSE RADIATION

Wednesday, 13 July 2022 15:40 (20 minutes)

When an atom is irradiated by intense electromagnetic field, the first photoionization act initiates the variety of competitive processes, such as sequential ionization, Auger decay, radiation decay and other [1]. As a result, the sample evolves and its evolution depends on radiation parameters: intensity, pulse duration and polarization. The last is often left behind the scenes, in particular, because accounting for the polarization increases number of degrees of freedom enormously. Here we present an approach based on a system of equations for statistical tensors [2], which are equivalent to a system of rate equations for population, but allows to shorten the number of equations noticeably.

The approach is applied to investigate the sequential multiple ionization of krypton at photon energy range 50-80 eV as an illustrative example. The calculations are performed for the pulse parameters close to modern free-electron laser facilities.

This research was funded by the Russian Foundation for Basic Research (RFBR) under project No. 20-52-12023 and Russian Ministry of Science and Education grant No. 075-15-2021-1353. The work of M.D.K. is supported by the Ministry of Science and Higher Education of the Russian Federation (project No. 0818-2020-0005) using resources of the Shared Services "Data Center of the Far-Eastern Branch of the Russian Academy of Sciences".

1. E.V. Gryzlova, M.D. Kiselev, M.M. Popova, A.A. Zubekhin, G. Sansone, A.N. Grum-Grzhimailo, MDPI Atoms, 8, 80 (2020).
2. V.V. Balashov, A.N. Grum-Grzhimailo. Polarization and Correlation Phenomena in Atomic Collisions. A Practical Theory Course. — NY.: Kluwer Academic / Plenum Publishers (2000).

The speaker is a student or young scientist

No

Section

1. Synchrotron and neutron radiation sources and their use in scientific and applied fields

Primary authors: GRYZLOVA, Elena (Skobeltsyn Institute of Nuclear Physics Lomonosov Moscow State University); Dr GRUM-GRZHIMAILO, Alexei (Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University); Ms POPOVA, Maria (Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University); Mr KISELEV, Maksim (Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University)

Presenter: GRYZLOVA, Elena (Skobeltsyn Institute of Nuclear Physics Lomonosov Moscow State University)

Session Classification: Synchrotron and neutron radiation sources and their use in scientific and applied fields