



Contribution ID: 66

Type: Poster

Stark effect for relativistic heavy Li-like ions planar channeled in a crystal, resonant coherent excitation and corresponding radiation

Monday, 7 September 2015 16:30 (2 hours)

The Stark effect causing splitting and mixing of electronic levels in the channeled relativistic heavy ions (RHI) is investigated. For hydrogen-like RHI the linear Stark effect in the electric field of the crystal planes, along with a fine splitting of the electronic levels of channeled RHI, is the main reason of the Resonant Coherent Excitation (RCE) peaks broadening.

Recent experiments on RCE have been performed with beams of heavy ($Z \gg 1$) He and Li-like Argon and Uranium RHI at HIMAC and at SIS-18 GSI. To correctly explain the experimental data, it is necessary to calculate the Stark effect, mixing and splitting the electronic levels of channeled RHI in the electric field of the crystal planes, which in turn effects the broadening of radiation spectra from coherently excited in a crystal RHI. In this work, we studied the depending on the position in the channel Stark effect for channeled Li-like RHI. The results of calculations are compared with experimental data. Moreover, since the dependence on relativistic factor of channeled RHI is different for linear and quadratic Stark effects, we predict some new peculiarities of RCE and corresponding radiation spectra.

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Session Classification: Poster Section

Track Classification: 7. Processes with Crystalline Targets