**Numerical Modeling of Radiative Kinetic Plasmas**

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Ultra-intense laser interactions with high-Z target materials generate high energy density plasmas in which radiative processes become interesting and important, e.g., energy transport by radiation and K-α and γ-ray emissions. The high intensity X-ray lasers (XFELs) are now available and are becoming alternative way of producing hot dense plasmas, e.g. solid materials beyond a million degrees (~100eV). For understanding of the characteristics of radiative plasmas and using these features, the numerical simulations play an important role. The numerical study of the radiative plasmas has been done using radiation-hydro codes. However, there is no simulation code available to study the radiation processes in kinetic plasmas. In order to evaluate the radiative properties in kinetic plasmas, we have developed a two-dimensional (2D) radiation transport (RT) code, where the transport equation is directly solved with the the following numerical schemes; multi-group, Sn discrete ordinates [1] and CIP [2] methods, and implemented it in a 2D collisional particle-in-cell code, PICLS[3]. The code uses a database of emissivities and opacities as functions of photon frequency, created by the non-equilibrium, collisional-radiative atomic kinetics 0-D code FLYCHK together with its postprocessor FLYSPECTRA [4]. Using the developed 2D RT-PICLS code we have studied the X-ray transport in an ultrafast heated high-Z materials, the characteristic emission (K-α and K-α) driven by fast electrons, γ-ray emission from relativistic laser-matter interaction, and XFEL-matter interaction (photoionization and relaxation processes of photoelectrons) in a solid target. After brief introduction of the radiation transport model and the implementation of the radiation transport into the PICLS code, we will present the obtained results in the workshop.