A FAST ATOMIC PHYSICS MODEL FOR Z-PINCH SIMULATIONS

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Solving detailed Atomic Physics equations of plasmas represents a very computationally expensive task. In the case of Z-pinch simulations, such a solver must be coupled with a multi-dimensional magnetohydrodynamic code, a constraint that puts special emphasis on optimization. Indeed, the strong x-ray sources that Z-pinches constitute can undergo frequency dependent transitions from optically thin to optically thick regime, affecting the dynamics of the whole system.

We introduce a new Screened-Hydrogenic Model (SHM) with nl splitting that can be run in-line with the 3D resistive Eulerian MHD code GORGON developed at Imperial College. Preliminary results have shown good agreement for LTE conditions with commercial packages (e.g. Spect3D). Frequency dependant volumetric radiation maps, synthetic XUV images and time dependant spectra are produced. Comparison with data from High Energy Density Plasma Physics (HEDP) experiments at Imperial College, Sandia National Laboratory and Centre d'Etudes de Gramat is presented.