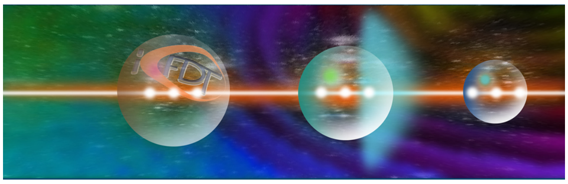

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Streak camera diagnostic for high-power laser-matter interactions

Tuesday, 22 October 2024 16:45 (10 minutes)

The use of streak cameras in inertial confinement fusion (ICF) and generally in laser-matter interaction experiments dates back to the 1960s. Nowadays such instruments can provide accurate time-resolved information about the evolution of laser-generated of plasma plumes.
Converting the streaked image in quantitative data about plasma parameters, such as plasma density and temperature, requires an accurate modeling of the plasma emissivity and of the efficiency of the instrument, which in general depends on the wavelength of the collected radiation.
In this contribution the development of a synthetic streak camera for the FLASH code, at the moment widely used in the community, will be discussed, with the aim of reproducing experimental streaked images starting from simulation data. The modeling will be developed both for visible and x-ray streak cameras, as the one for example in [1]. The first part of this work is dedicated to the study of the radiative mechanisms responsible for the leading components in plasma emissivity and absorption for appropriate wavelength ranges. These results will then be coupled with the known technical parameters of the diagnostics.
One of the final results of this work will be the time-resolved sampling of the ion speed of sound to estimate the plasma temperature locally in time. The long-term development of this tool can potentially lead to the capability of streamlining the interpretation of the raw data from the instrument and be of use in experiments across the field.

References

[1] Cipriani, M., Gus'kov, S. Y., De Angelis, R., Consoli, F., Rupasov, A. A., Andreoli, P., Cristofari, G., & Di Giorgio, G. (2018). Laser-driven hydrothermal wave speed in low-Z foam of overcritical density. Physics of Plasmas, 25(9). https://doi.org/10.1063/1.5041511

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