Magnetized radiative Shocks: their role in global evolution of the interstellar medium

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Radiative Shocks (RS) can be found in many astrophysical scenarios [1,2], injecting energy into the interstellar medium (ISM) and having an important impact on a multitude of phenomena. Furthermore, recent astronomical observations highlight the role of magnetic fields shaping these interactions [3], making them an essential part of understanding the many related processes. However, as the shocked structure becomes optically thick, giving its own radiation [4], quantitative data is hard to obtain. Thus, it becomes essential to study RS in laboratory. Under this context, experiments at high-power laser facilities confirms the impact of radiation effects [5] over the structure, dynamics and properties of the system [6], but until now the influence of magnetic fields in RS has not been study experimentally in detail. Hence, including those effects in this framework is essential.

In our work, carry out in LULI2000 facility, we generated a strong shock into a solid multi-layer target drive by two lasers beams (2ω, 400-600J, 1.5ns FWHM each one) that produced a high RS in a gas cell filled with xenon at different initial pressures. An external pulsed B-field up to 21T is added. The main diagnostics were a combination of visible interferometry, spectroscopy and optical emission, which allowed us to estimate crucial parameters as electron density, radiative precursor length and shock velocity. In this poster we will present preliminary experimental analysis aims to show how depending of the orientation and amplitude of the B-field the RS structure was modified, having an impact on its dynamics and comparing these results with analytical models [7,8].

This new platform paves the path for future developments to complement these results to theoretical models and hydrodynamics/radiative simulations. It is also expected to carry future experimental campaigns on large facilities such as NIF or LMJ.

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