Megajoule designs relevant to study radiative accretion shocks in magnetic accreting white dwarfs

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Magnetic accreting white dwarfs are perfect laboratory objects to study the high-energy processes in extreme astrophysical regimes. These objects are part of complex binary systems and they accrete matter from a low-mass companion star [1]. The radiation observed from these systems comes mainly from an unresolved area where the accretion flow impacts the white dwarf surface creating an accretion column [2, 3]. Based on the similarity properties of this high-energy environment [4], millimetre-sized models of accretion columns can be produced with powerful lasers and can give us new opportunities to study the radiative accretion processes in laboratory. For the first time, we will introduce a new target design to produce similar astrophysical regime which are only achievable on megajoule facilities (LMJ, NIF) [5]. The data obtained from such laboratory experiments will provide new insights and help clarify outstanding questions related to radiative transfer in accretion column models. By gathering astronomical observations, theoretical, numerical and experimental studies, we will improve our understanding of the radiative effects on both the post-shock structure and the accretion shock dynamics which are fundamental for the characterization of magnetic accreting white dwarfs systems.

References

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