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Study of the impact of the interstellar medium on the morphology of Supernova remnant from astrophysics to the laboratory

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Supernova remnants (SNR) play an essential role in the dynamic of our Universe. From enriching and stirring the interstellar medium (ISM) and triggering star formation to accelerating cosmic rays (CR), they are physical systems mixing both microphysics and magnetohydrodynamics (MHD). Numerous models of SNR evolution are based on astronomical observations, which are constrained by spatial and temporal limitations. That's why a complementary approach based on laser experiments is invaluable in benchmarking models and simulations.

In this presentation, the dynamics and morphology of SNR, as influenced by their interaction with a non-uniform ISM, are examined from the perspectives of both astrophysics and laboratory astrophysics. Numerical results from astrophysical studies are employed to inform discussions on experimental design, feasibility, and relevance. Initial numerical outcomes obtained through FLASH4 simulations for three laser facilities are presented, and preliminary experimental results, if available, are also reported.