REVERSE RADIATIVE SHOCK LASER EXPERIMENTS RELEVANT TO ACCRETING STREAM-DISK IMPACT IN INTERACTING BINARIES

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Abstract

In nonmagnetic cataclysmic variable (CV) systems, mass transfer via Roche lobe overflow onto an accretion disk occurs. The supersonic impact of the infalling matter with the rotating accretion disk can produce a radiative reverse shock, known as a 'hot spot'. This collision region has many ambiguities as a radiation hydrodynamic system. Depending upon conditions, it has been argued (Armitage Livio, 1998, ApJ, 493, 898) that the shocked region may be optically thin, thick, or semi-transparent, which has the potential to significantly alter its structure and emission.

We present the results from high-energy-density laboratory astrophysics experiments that explore the hydrodynamic and radiative properties of a reverse shock relevant to such CV systems. In this context, a reverse shock is a shock wave that develops when a freely flowing, supersonic plasma is impeded. In our experiments, performed on the Omega laser facility, a laser pulse is used to accelerate a Sn plasma ejecta through vacuum into an Al plate in front of which a shock forms in the rebounding plasma. We will discuss the experimental design and available data with complementing CRASH (van der Holst et al., 2011, ApJS, 194, 23) simulations.

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