

Outflow collimation by a poloidal magnetic field

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Abstract

At both extremes of their lives, protostars and evolved stars eject powerful outflows which inject matter and energy into the surrounding interstellar medium, and play an important role in the stellar life cycle.

These outflows are essentially multi-components, consisting of stellar winds, disk winds, and jets which may coexist, and interact between them and with magnetized envelopes. An important class of models, which will be the focus of our talk, have addressed the general issue of outflow collimation by a large scale poloidal magnetic field.

We will present MHD simulations of a series of proposed laser experiments aimed at studying the expansion and interaction of a laser plume with a strong (40 T) magnetic field. The numerical results show the formation of elongated outflow cavities and the launching of highly collimated jets by shock re-focusing. We will discuss the possible implications of these promising results to astrophysical systems.