Impact of variable jet bowshocks on protostellar outflows

While several mechanisms have been proposed to drive protostellar outflows, including magnetically driven winds and photo-evaporative flows, the role of collimated jets remains an open question. Indeed, protostellar jets often display time variability, producing a series of bowshocks with high kinetic energy as they propagate in the interstellar medium.

In this contribution, we explore how such variable jet activity may sweep up the ambient material and reshape the nearby protostellar structures, such as the envelope and the disk. Through hydrodynamical simulations, we study the interaction of jet-driven shocks in two separate scenarios: one with a hydrostatic disk, and a second with an infalling rotating envelope.

Finally, we assess the ability of variable jets to drive and sustain large-scale molecular outflows, by comparing the outputs with ALMA observations of DG Tau B, a class I protostar exhibiting such activity.