Pleasantness Review (Noam Soker)

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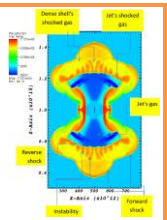
The role of jets in the death of stars: review of the most recent results

Abstract: **Jets** solve many puzzles in late stages of stellar evolution. Mostly **jets** operate in a negative feedback.
(Soker 2016, New Astronomy Reviews)

Summary: Having binary interaction without **jets** is like dancing without music

1. Shaping Planetary Nebulae

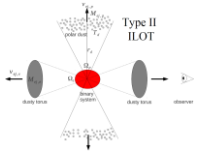


Many planetary nebulae are shaped by **Jets** the companion launches (poster by Muhammad Akashi).

2. Type Ia Supernovae (SNe Ia)

In the **core degenerate scenario** a white dwarf merges with the core of an AGB star, **jets** might shape the medium where the WD later explodes,
➔ polarization and *Ears* in SN Ia remnants.

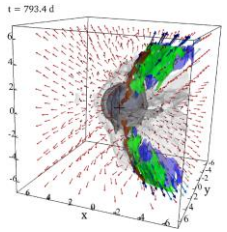
3. Intermediate Luminosity Optical Transients (ILOTs).



Many of these transients between novae and supernovae are powered by a companion that accretes mass and launches **jets** (Kashi & Soker past decade), e.g., Eta Carinae (poster by Muhammad Akashi).

4. Common Envelope Evolution

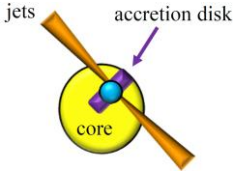
Jets that the companion launches can help in envelope removal (poster by Sagiv Shiber).



5. Grazing Envelope Evolution (GEE)

Occurs when **jets** very efficiently remove the envelope, and delay or prevent the common envelope phase while the companion orbits on the giant surface *(Soker 2015)* (poster by Sagiv Shiber).

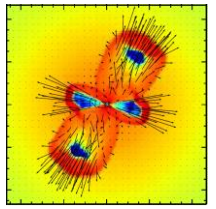
6. Common Envelope Jets Supernovae (CEJSNe)



A neutron star spirals inside the envelope of a giant star to the center and destroys the core. The **jets** that the neutron star launches explode the star (talk by Aldana Grichener).

7. Core Collapse Supernovae

Neutrino driven models cannot explain E(supernova)>2e51erg, and have difficulties at lower energies.



- The best alternative is the **jittering jets explosion mechanism** that works even for non-rotating pre-collapse cores.
- Supernova remnants tell us that **Jets** play crucial roles in the explosion process *(Grichener & Soker 2017).*
- **Jets** can be active for a longer time and explain super-energetic SNe *(Gilkis, Soker, Papish 2016)*, like **iPTF14hls** (poster by Roni Gofman), and some bumps in light curves (poster by Noa Kaplan).