



Envelope Removal by Jets in the Common Envelope Evolution

Sagiv Shiber

Technion, Israel moving to LSU, Baton Rouge, LA for a post-doc

In collaboration with R. Iaconi, O. De Marco, & N. Soker

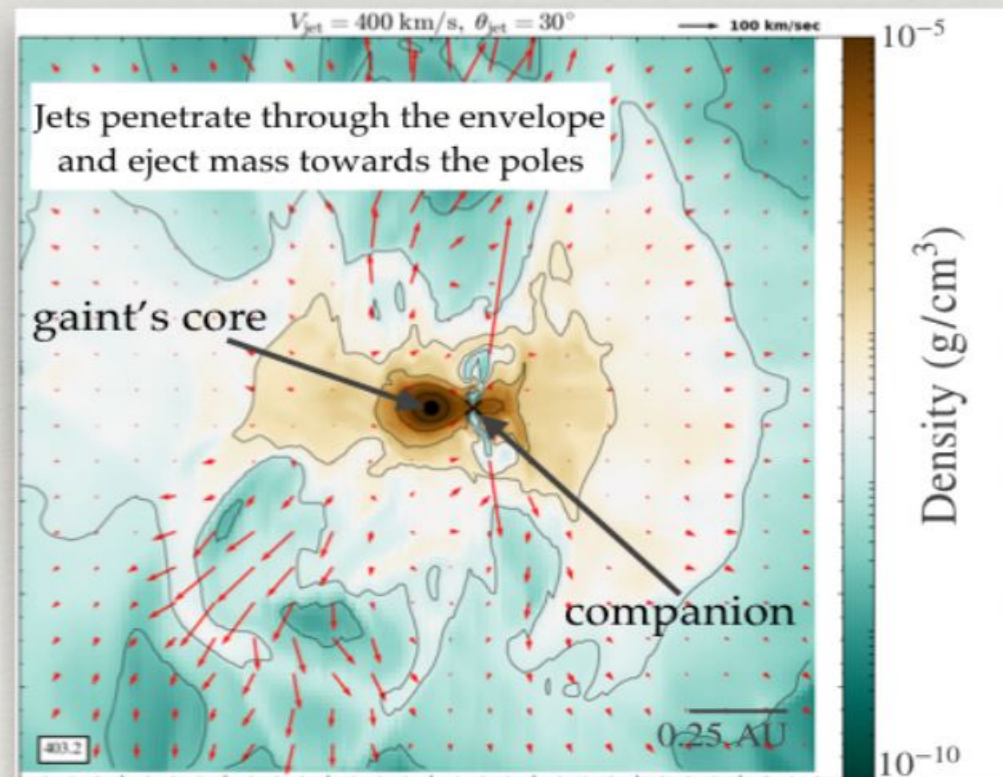
shiber@technion.ac.il



arXiv:1902.03931

Abstract. Companion launched jets aid in unbinding the envelope in the common envelope evolution (CEE) and in the grazing envelope evolution (GEE) and produce bipolar shape outflows.

Methods. We conducted novel 3D full CEE simulations which include a companion that launches bipolar jets and study the effect of jets on the dynamics and on the removal of the envelope.



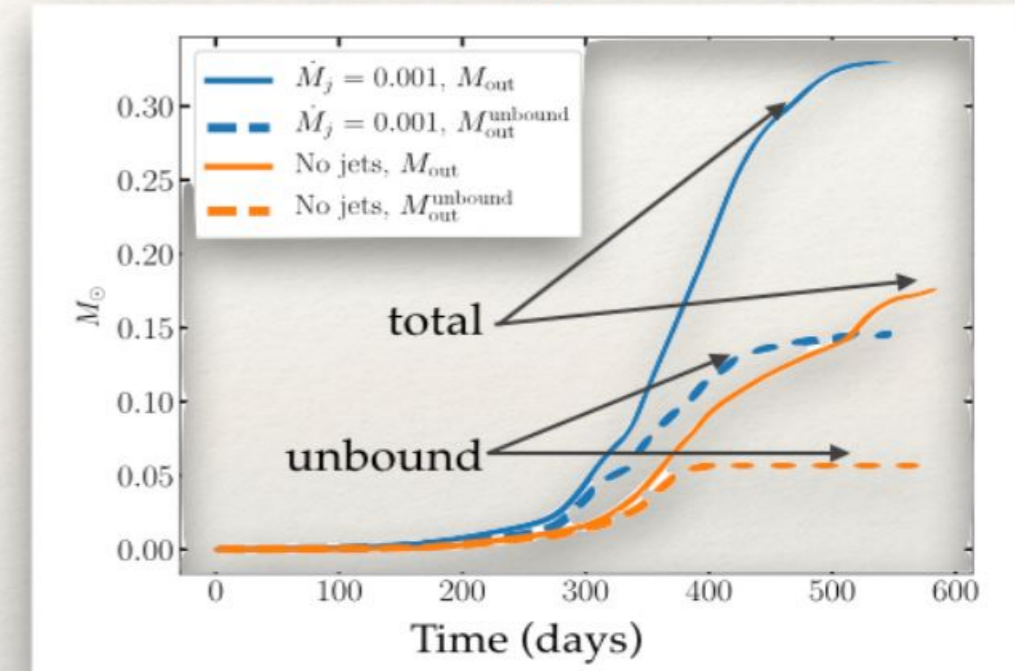
Density slice and velocity arrows of the meridional plane containing the companion at $t = 403$ d.

system properties:

$M_1 = 0.88M_\odot$
($0.39M_\odot$ core + $0.49M_\odot$ envelope)
 $R_1 = 83R_\odot$, Red Giant Branch star
 $M_2 = 0.3M_\odot$, main – sequence star
 $v_j = 400$ km/sec $\theta_j = 30^\circ$
 $\dot{M}_j = 0.001 - 0.003 M_\odot \text{ yr}^{-1}$
The jets are launched perpendicular to the orbital plane

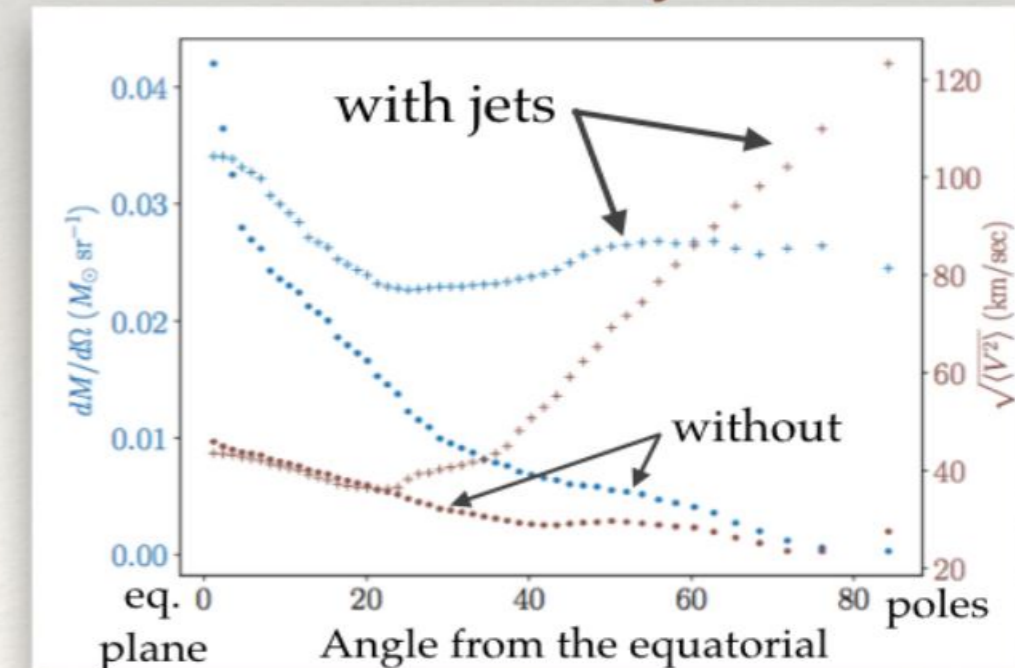
“Transforming a giant into a dwarf by a grazing companion...”

outflow mass **with jets** and **without**



Results. The jets unbind up to 50% of the envelope mass. Several times more unbound mass compared to simulations without jets.

outflow **mass** and **velocity** distributions



Fast bipolar outflow along with slower equatorial outflow. The descendant nebula should be bipolar.