From Common Envelope Evolution to Luminous Red Novae (arxiv:2510.14173)

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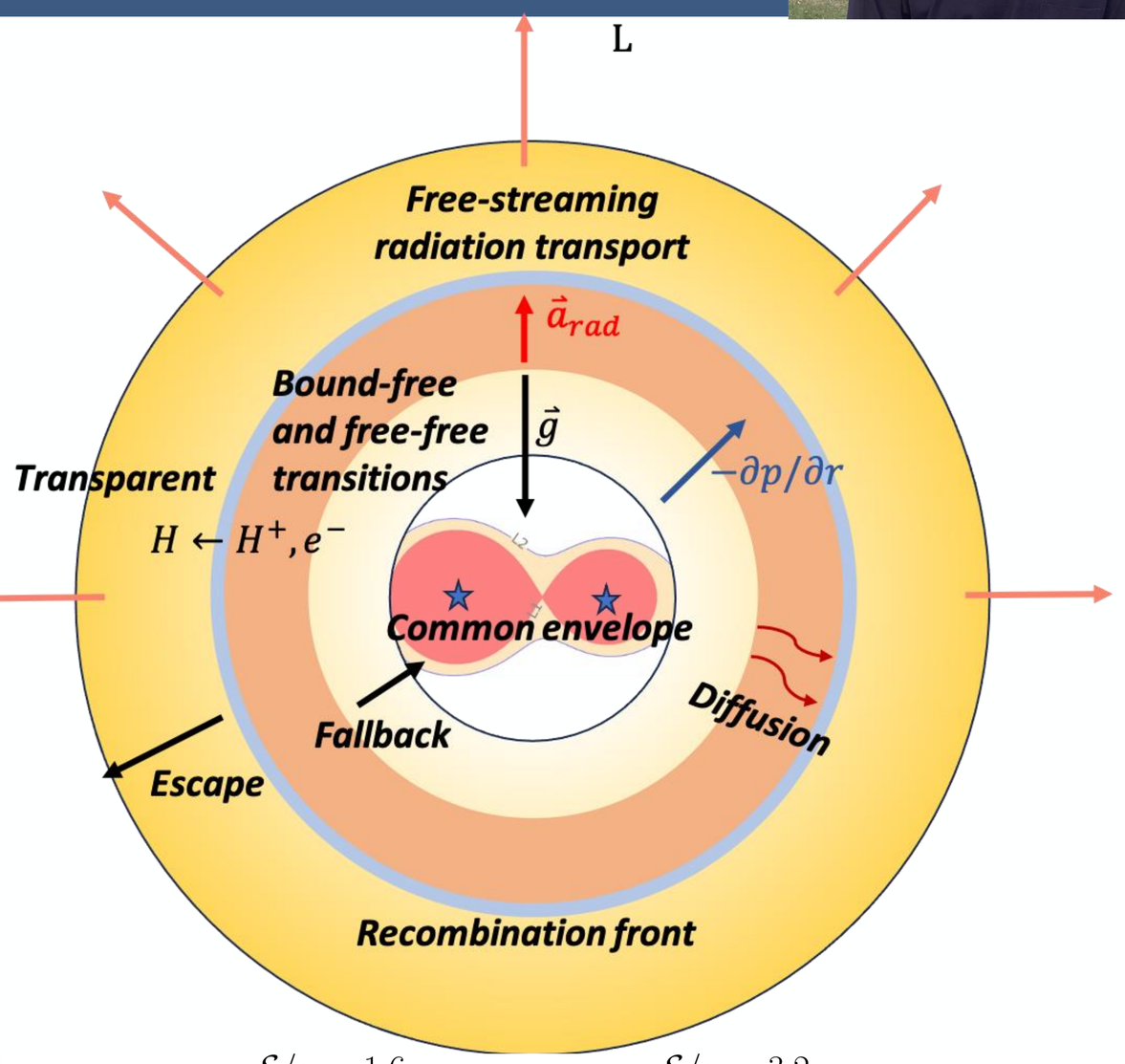
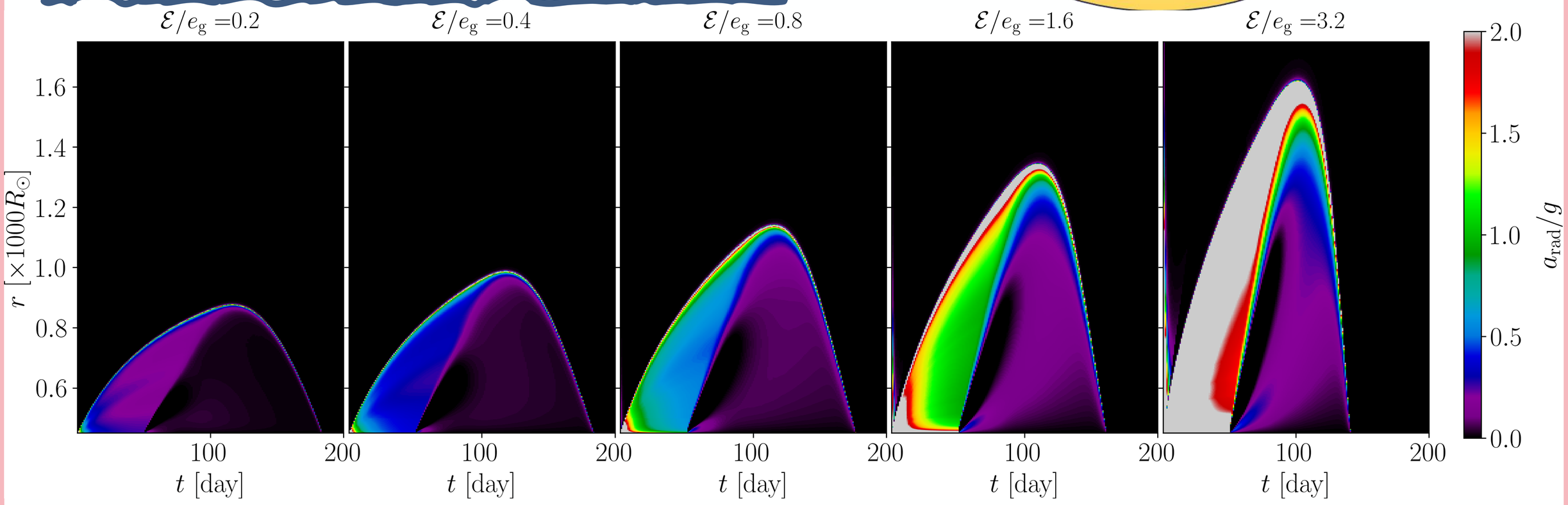
Take home message

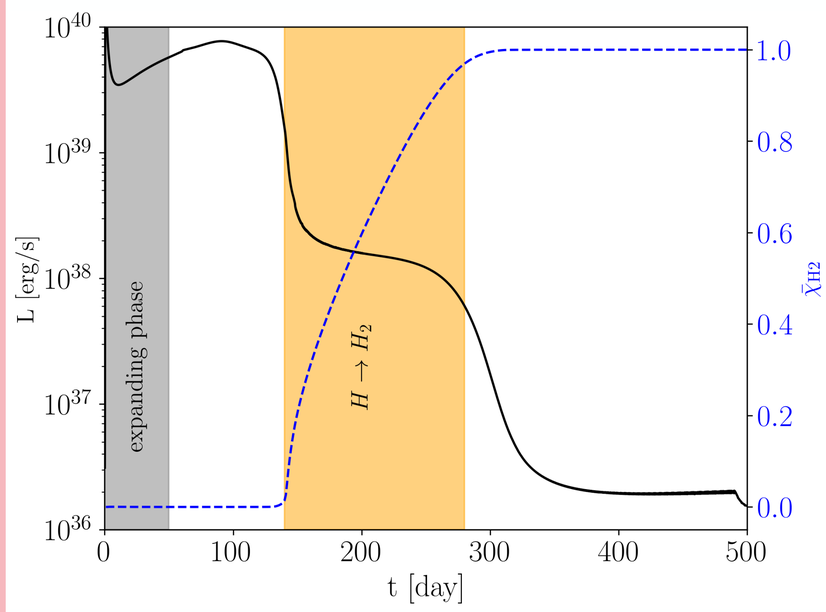
- Radiation pressure can significantly promote the envelope ejection in CEE of massive stars.
- There could be a secondary plateau due to the transiton from H to H2.
- The ejection efficiency is nonlinear with the outmost envelope total energy.
- AT2025abao likely ejected ~0.6Msun at the speed of ~150 km/s. The progenitor is likely a >7Mun AGB + <1Msun companion.

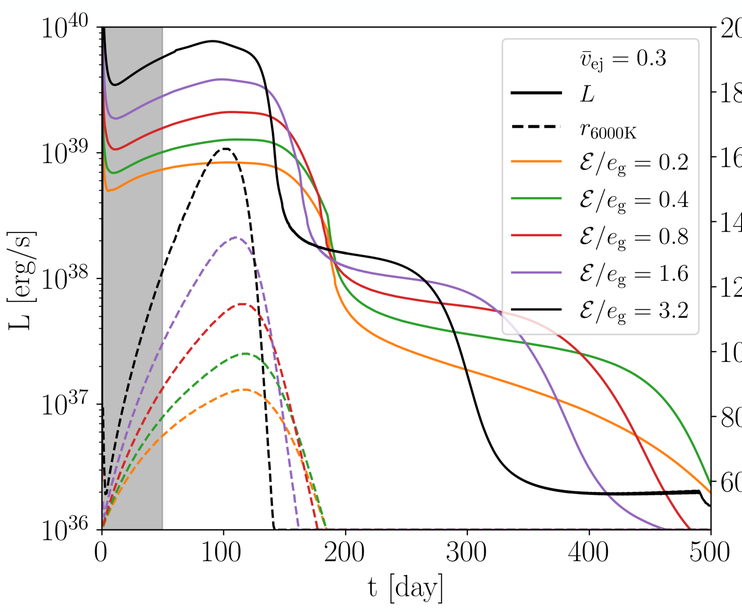
Physical Model

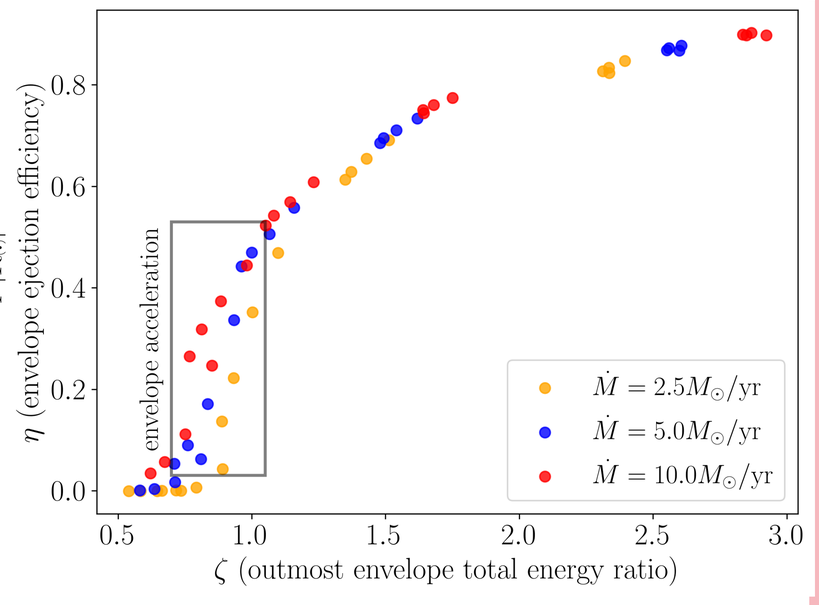
- 1D spherically symmetric fireball
- FLD approximation for radiation transfer
- Realistic hydrogen and helium EoS
- Central mass $m_{central} = 15\,M_{\odot}$
- Inner boundary $r_{in} = 450\,R_{\odot}$
- Outer boundary $r_{out} = 15000\,r_{\odot}$











Application to AT 2025abao