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Creating a Hydrodynamic simulation of Cygnus OB2

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Topical Overview on Star Cluster Astrophysics, 29/10/2024

Cygnus OB2

- The **gamma-ray signal from the Cygnus region remains unexplained**, especially above 1 TeV
- Acceleration at the CWTS could contribute to the population of nonthermal particles
- It is **unclear how massive stars interact** to produce strong shocks around Cygnus OB2 - investigating the **shock configuration and the formation of a putative CWTS** requires a detailed HD simulation

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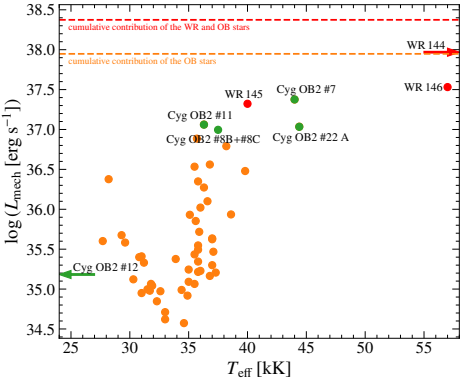
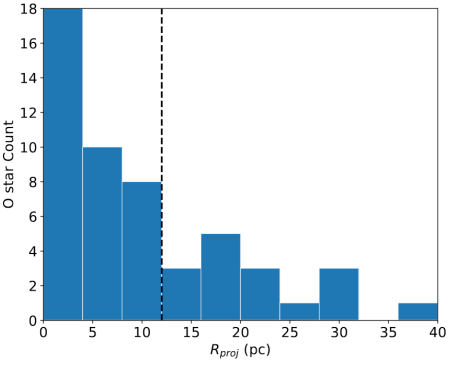
Simulation Setup

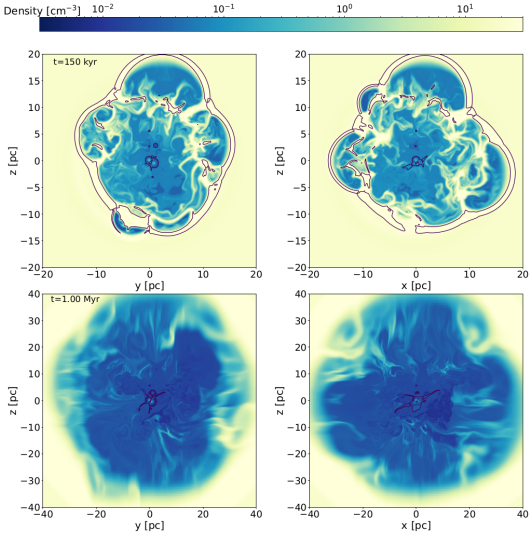




- $\boldsymbol{L_{\rm mech}}$ determines individual contribution to cluster wind
- **Star age** determines $L_{\rm mech}$ at a given time
- **Star position** in 3D determines efficiency of wind-wind interactions

Results - MS

- Low level of wind-wind interaction
- Quasi-stationary from 1 Myr
- Slow expansion of superbubble and individual WTSs, trans-sonic sheets and jets



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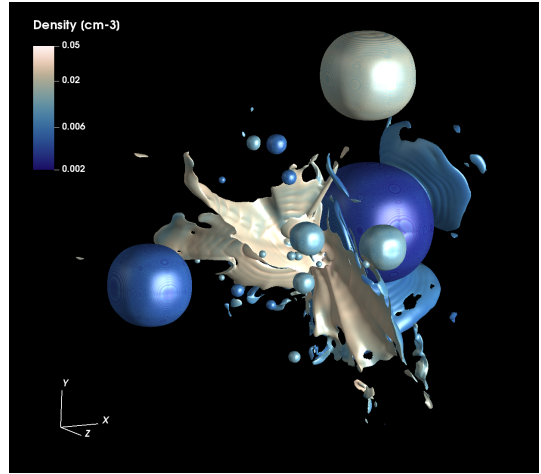
Results - WR

- Handful of powerful stars dominate the mechanical feedback
- WRs hinder collective effects
- Absence of any large-scale spherical shock in the system



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