

Figure 7. Luminosity vs  $v_{\perp}$  for WNH, O If\*/WN, and WNL single and binary stars, as shown, for objects with available luminosities from Hainich et al. (2014). The dashed line indicates the threshold luminosity  $\log L/L_{\odot} = 5.9$  adopted for VMS status. Objects with circles are binaries, with the circle color corresponding to the companion subtype.

いろいろある

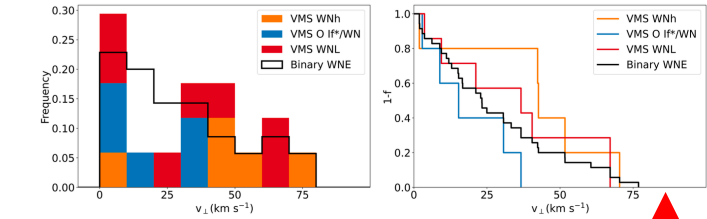
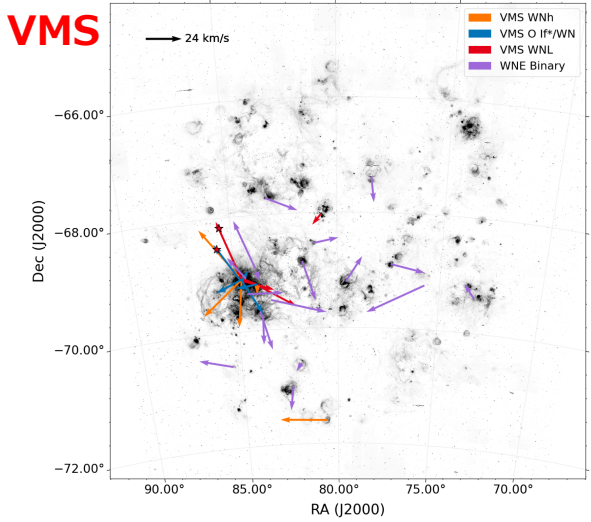


Figure 5. Left panel: Normalized velocity distributions for VMS subtypes, colored as shown; the black outline shows the overlapping distribution for binary WNE stars. The colored histograms are stacked and not overlapping. Right panel: Survival functions for the same four groups.

VMSはR136周辺に集中  
Walkaway成分がない

速い成分がない ← 寿命が短い  
(動いてない・加速してない)

LMCはlow metal

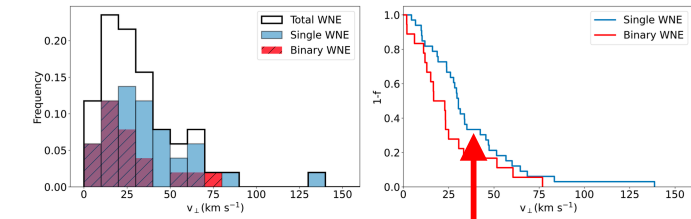
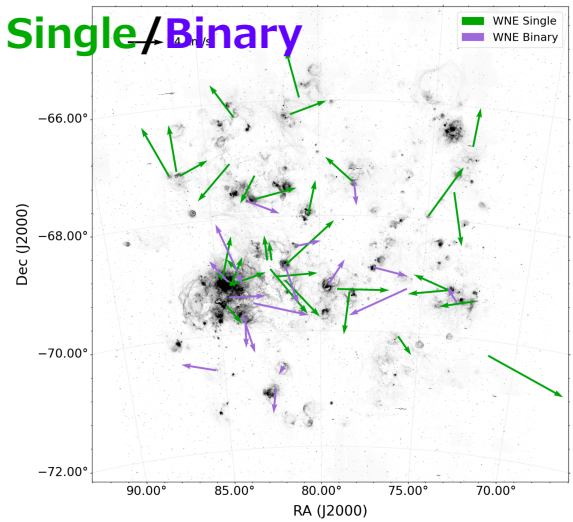


Figure 9. Same as Figure 4, but for WNE stars, showing that the single stars are dominated by runaways and the binaries are dominated by walkways.

Singleはバラけている &  
なんとなくベクトルが大きい  
→ 単独で生まれた

Binaryのほうが明るい  
→ 重い星ができる環境にある  
→ 連星系での質量転移/捕獲

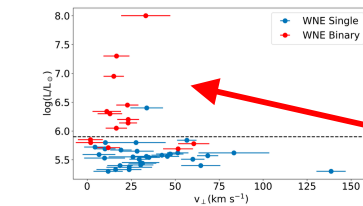


Figure 10. Same as Figure 7 for single and binary WNE stars.

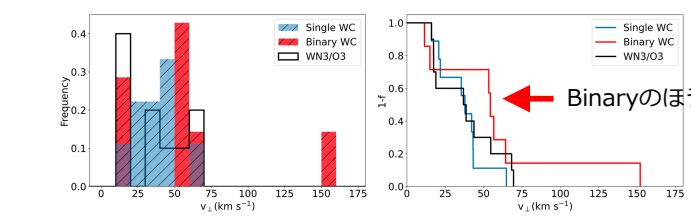
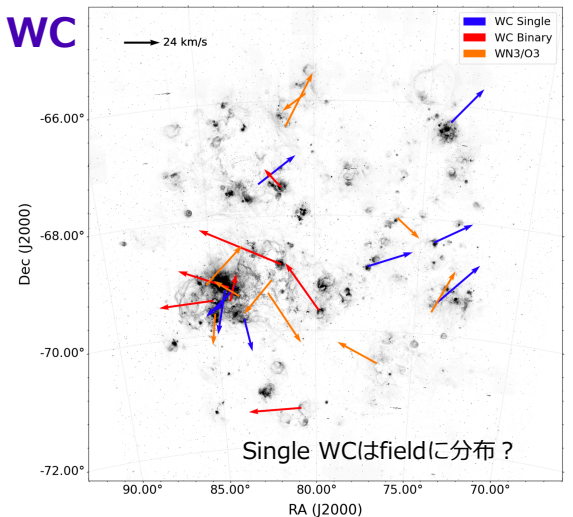


Figure 13. Left panel: Normalized velocity distribution for single (blue) and binary (red) WC stars. The black outline shows the distribution for WN3/O3 stars. Right panel: Velocity survival functions for the same groups, color-coded as shown.

Binaryのほうが速い (?)

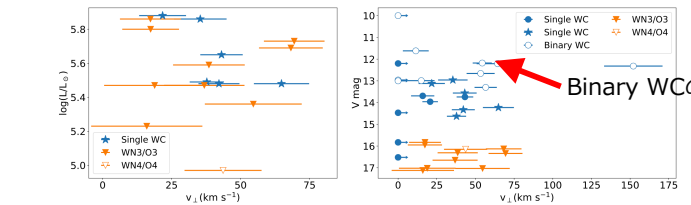


Figure 14. Left panel: Luminosity vs our measured  $v_{\perp}$  for the WC and WN3/O3 stars for which luminosity data is available in the literature from Aadland et al. (2022a,b) and Neugent et al. (2017), respectively, along with the WN4/O4 star studied by Massey et al. (2024). Right panel:  $V$  magnitude vs  $v_{\perp}$  for all of the WC stars and WN3/O3 stars in our Gaia samples. The blue stars show the single WC stars that appear in both panels. Arrows indicate lower limits for objects with no Gaia velocity measurements; these objects are likely still bound within clusters (see text).

Binary WCのほうが明るい

Single WCはfieldに分布?