Constraining GRB progenitors by studying WR wind geometries

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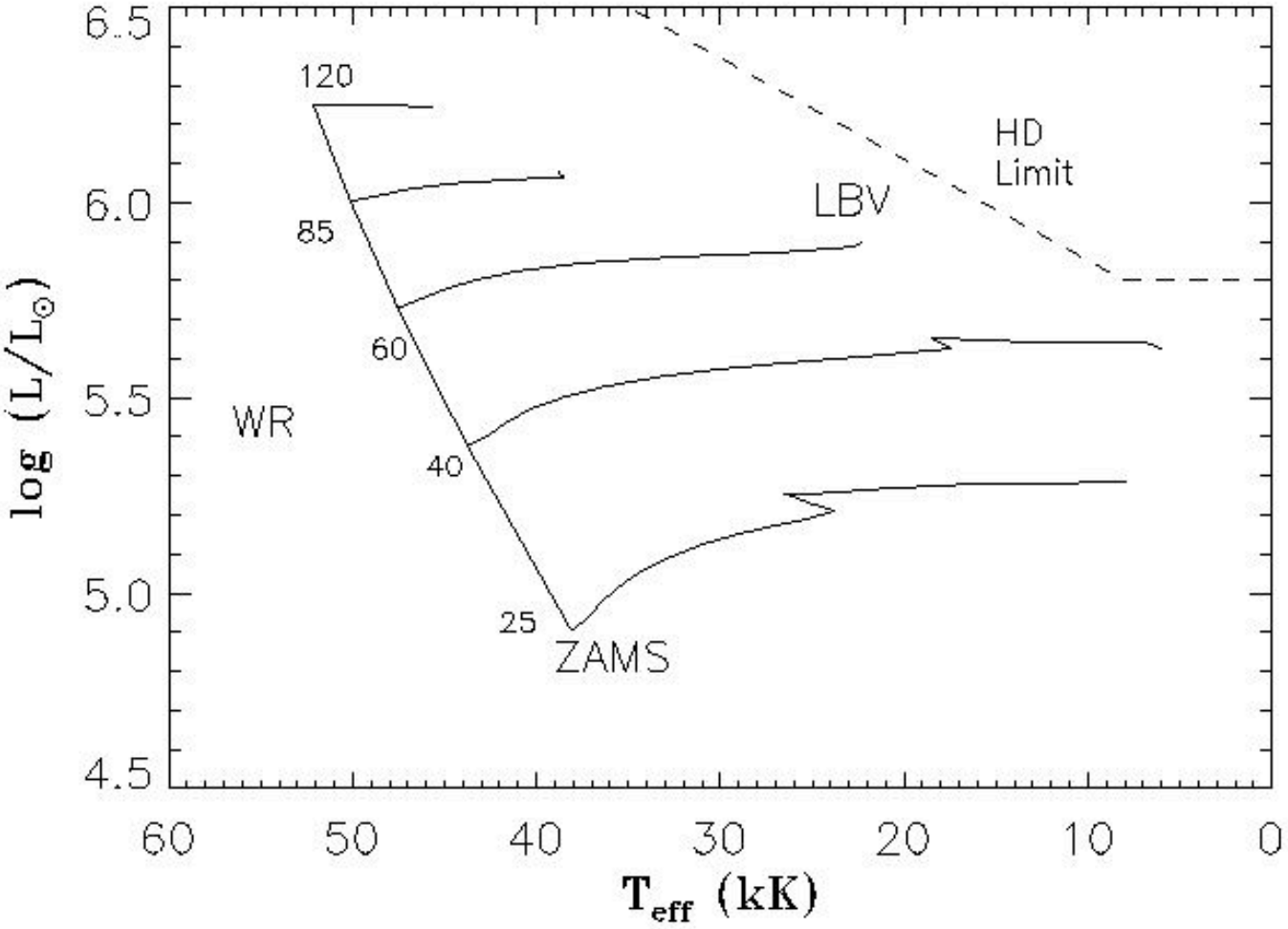
Vink (2007, A&A)

Outline

- Intro: WR as GRB progenitors
- Intro: linear polarimetry
- Survey of LMC Wolf-Rayet (WR) stars
- Conclusions

Where do WR stars come from?



GRB Progenitors

- SNe: massive star
- jet : WR star
- disk: rotating WR star

BUT ..... winds....

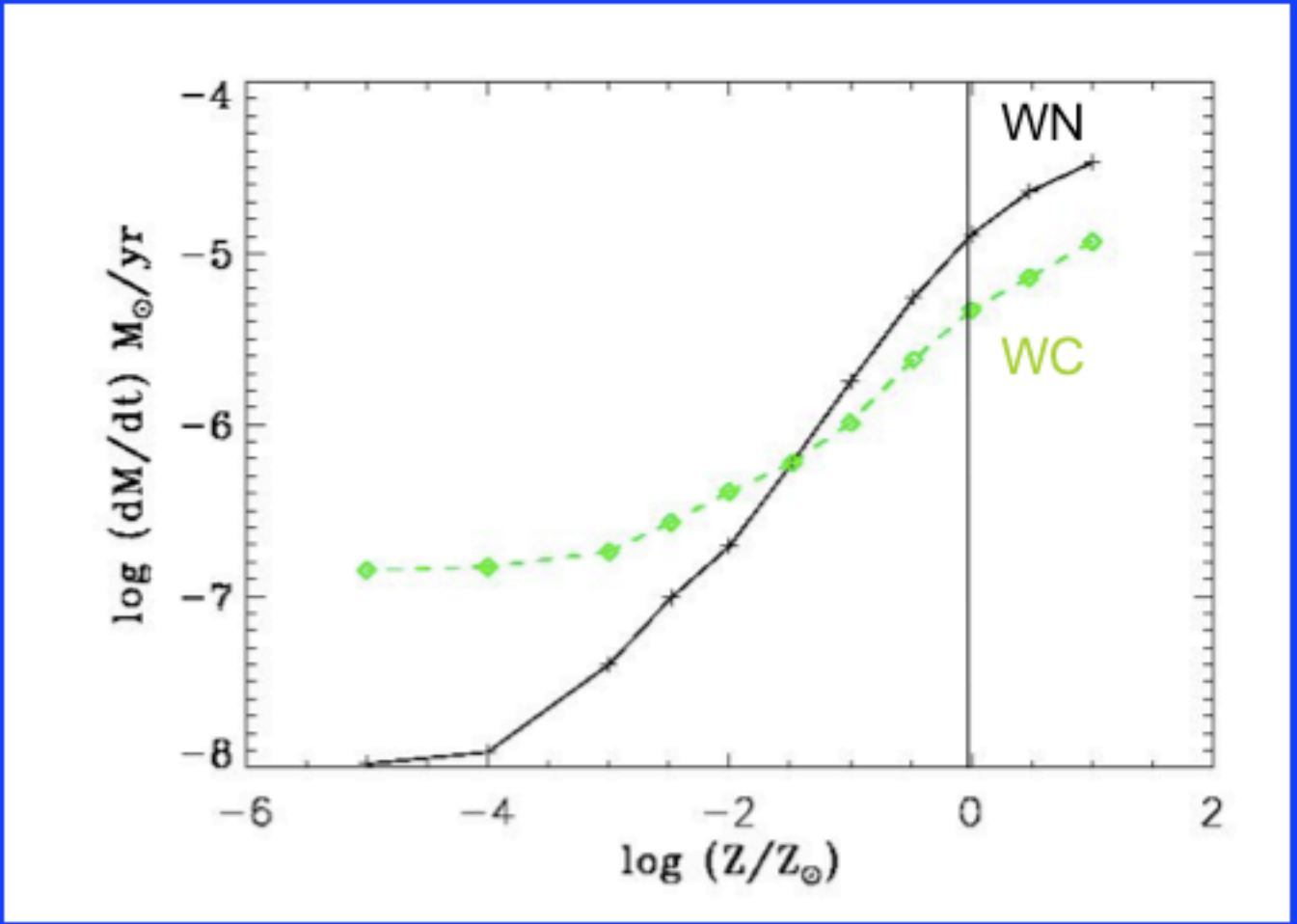
Solution?

- GRBs at low Fe/H
- Fe-dependent winds

- BUT: WR winds enriched with CNO
- Winds IN-dependent of Fe content host

> Unless Fe *is* important !?

Z-dependence of WR winds



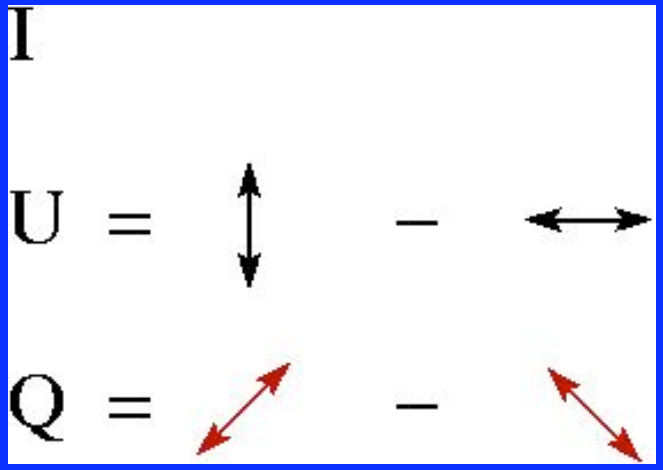
Vink & de Koter (2005, A&A 442, 587)

Are low Fe/H Wolf-Rayet stars fast rotators?

- No v sin i
- Are the winds aspherical?

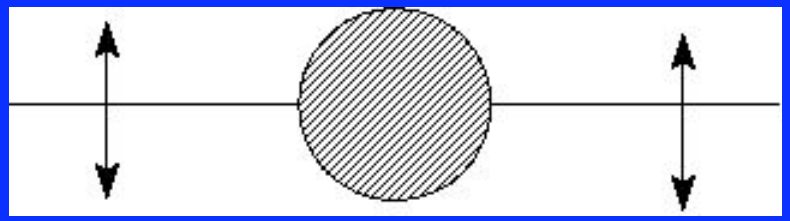
  > Linear Polarimetry

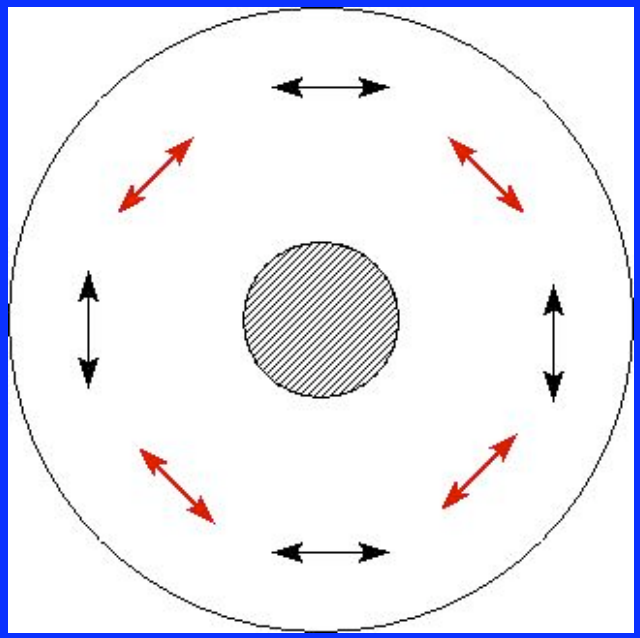
Polarimetry – asymmetry



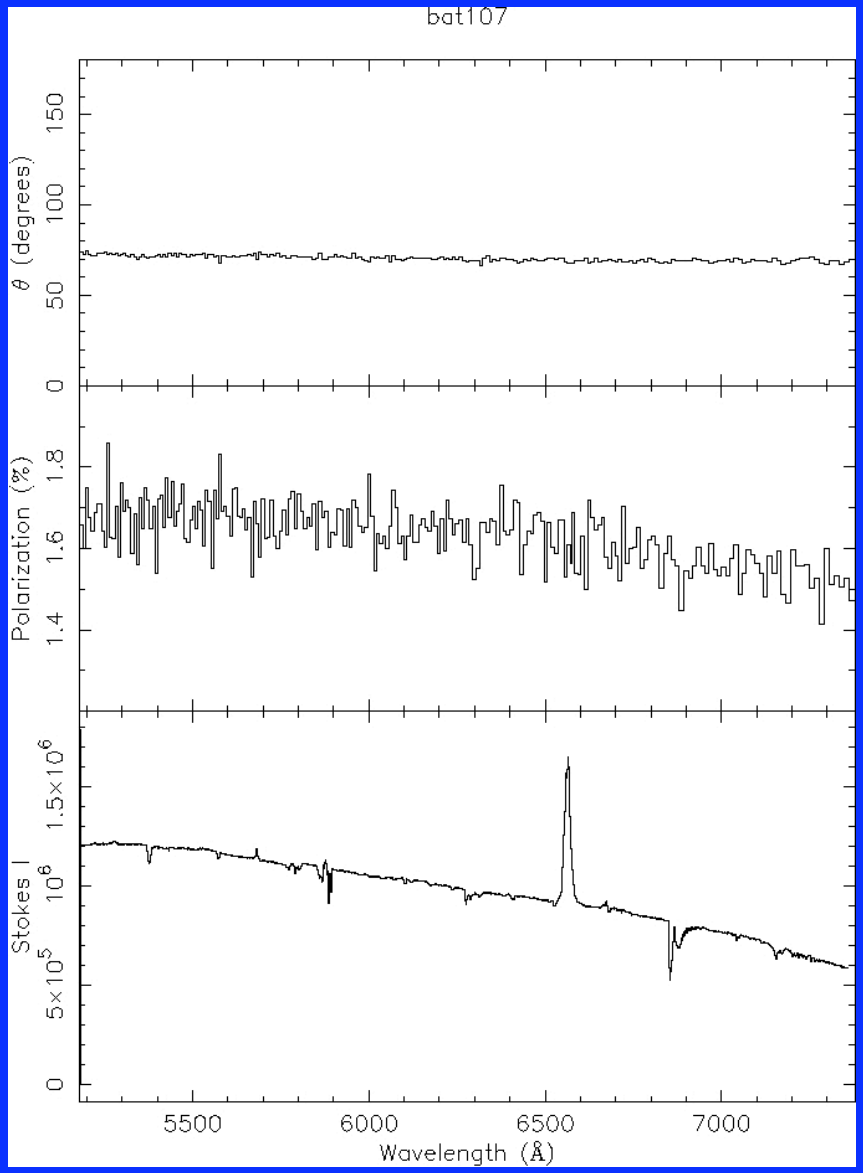
$$P = \sqrt{(U^2 + Q^2)}$$

$$\theta = \frac{1}{2}\arctan\left(\frac{U}{Q}\right)$$

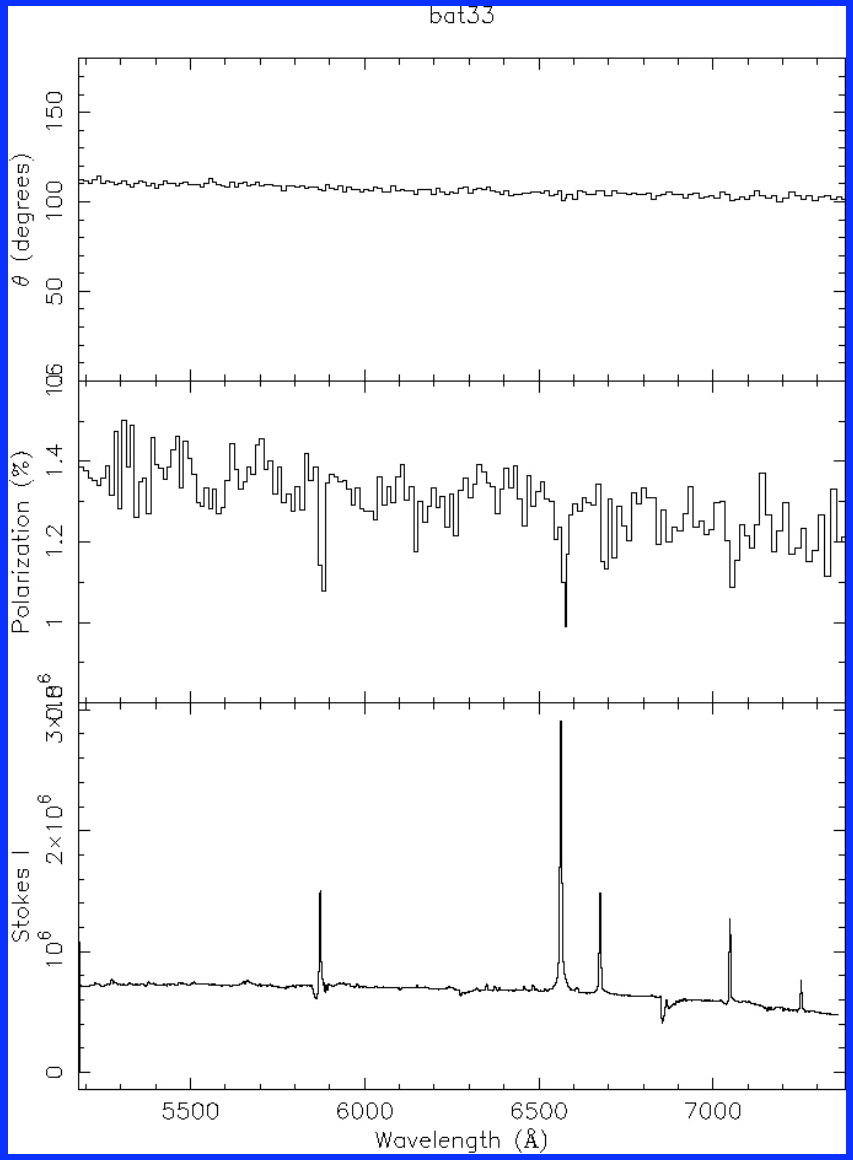




LMC WR spectropolarimetry



LMC WR spectropolarimetry



Statistics

- Be stars in galaxy: 60% line effects
- WR stars in galaxy 15-20%
- WR stars in LMC: 2/13 i.e. 15%

Conclusions

- LMC WR winds equally symmetric as in the Galaxy
- LMC winds strong enough to remove angular momentum

- GRB threshold Fe/H of 50% solar