Wolf-Rayet stars in the SMC

What's up with the binary formation channel?

Tomer Shenar
university of Potsdam, Germany

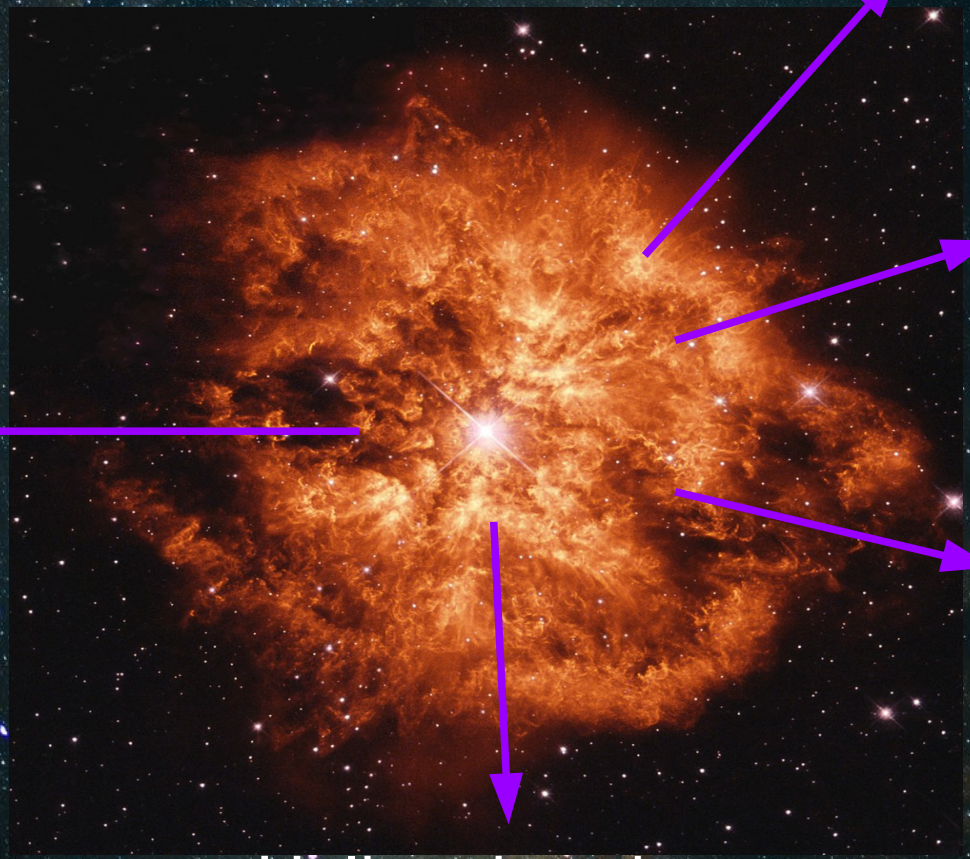
R. Hainich, A. F. J. Moffat, J. J. Eldridge, W.-R. Hamann, L. Oskinova, H. Todt, A. Sander

Wolf-Rayet (WR) stars: A recap

Strong mass-loss

Radiatively driven winds

Wolf-Rayet (WR) stars: A recap



Strong mass-loss

H-deficient/free

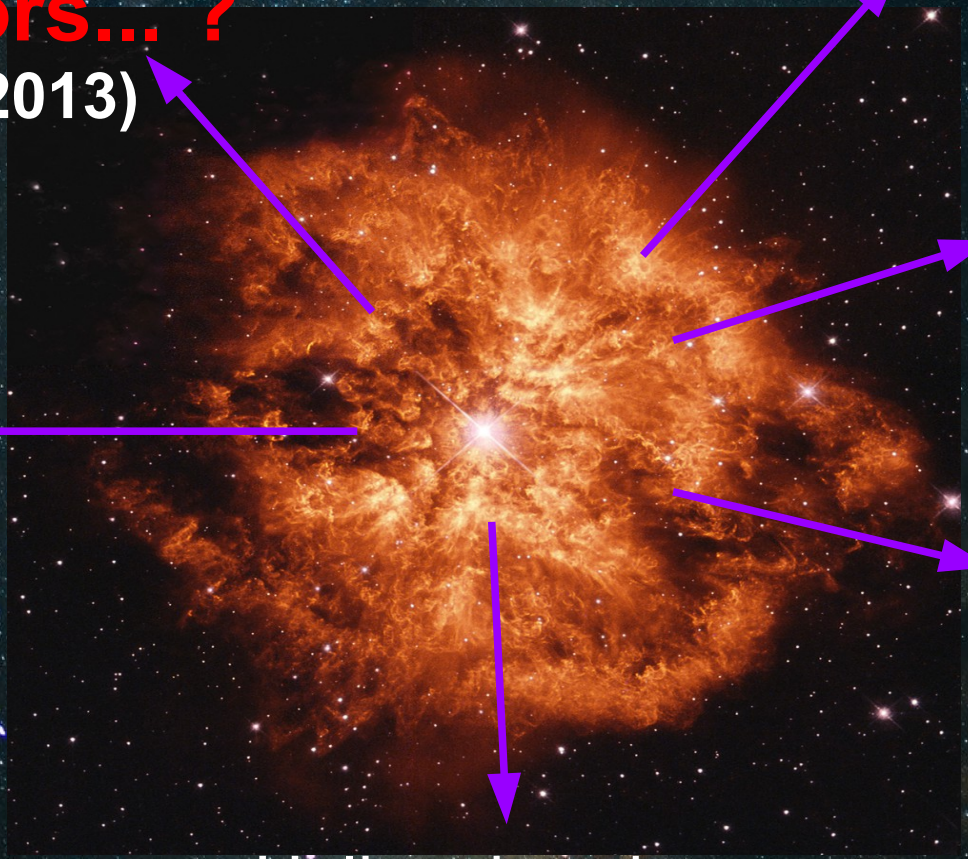
Radiatively driven winds

Evolved massive stars

Helium burning cores

Wolf-Rayet (WR) stars: A recap

Supernovea Ibc progenitors... ?
(e.g. Groh+ 2013)



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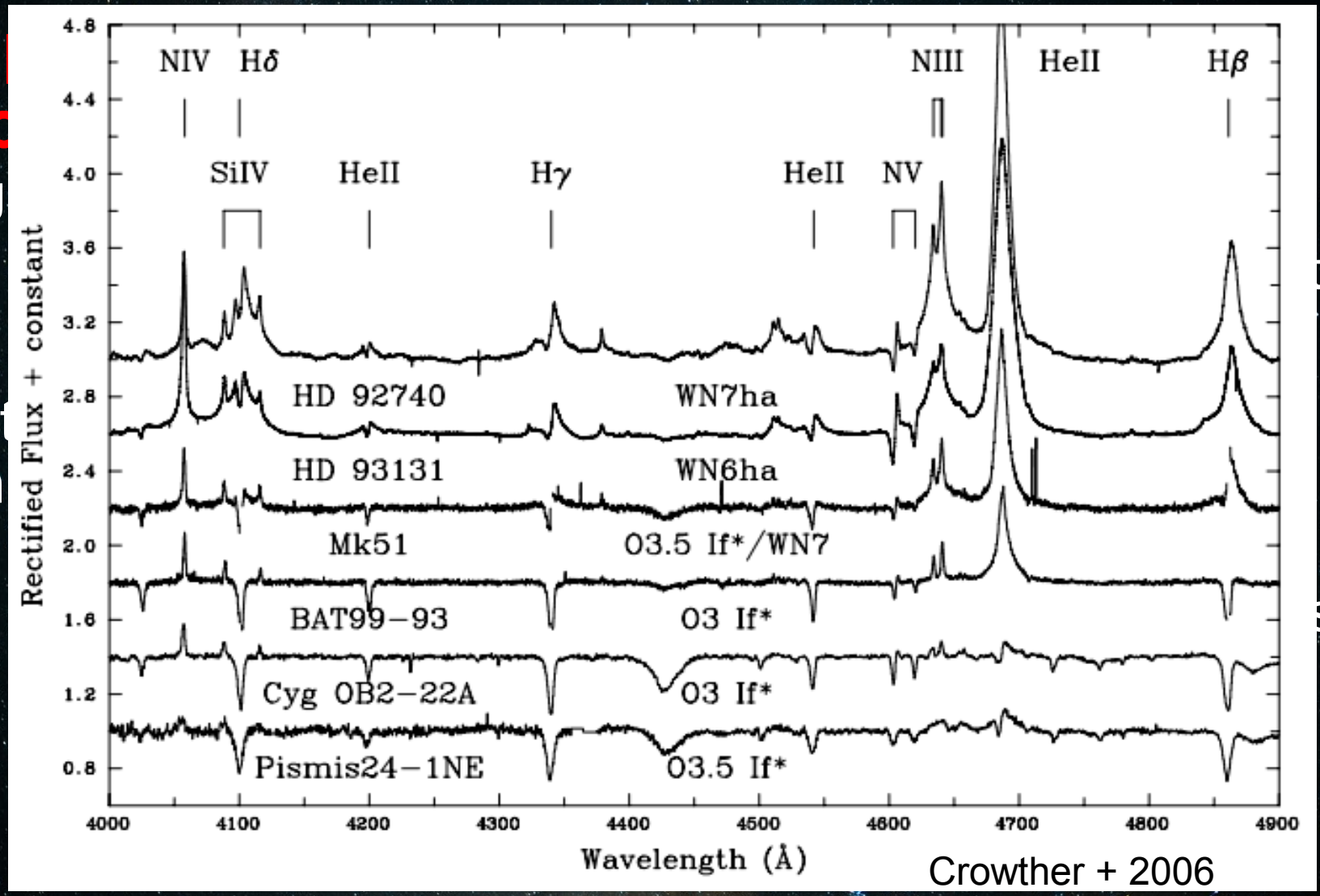

Crowther + 2006

Wolf-Rayet (WR) stars: A recap

Supernovea (Ibc) progenitors... (?)

Strong mass-loss

? H-deficient/free

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Helium burning cores

?

Formation of H-deficient WR stars

As single stars
(Conti + 1975...)

N ~ Mdot ~ Z...
Vink+ 2000,Crowther+ 2006,
Hainich+ 2015....

Mass-transfer in binaries
(e.g. Paczynski+ 73, Smith+ 2011)

~Z-independent...

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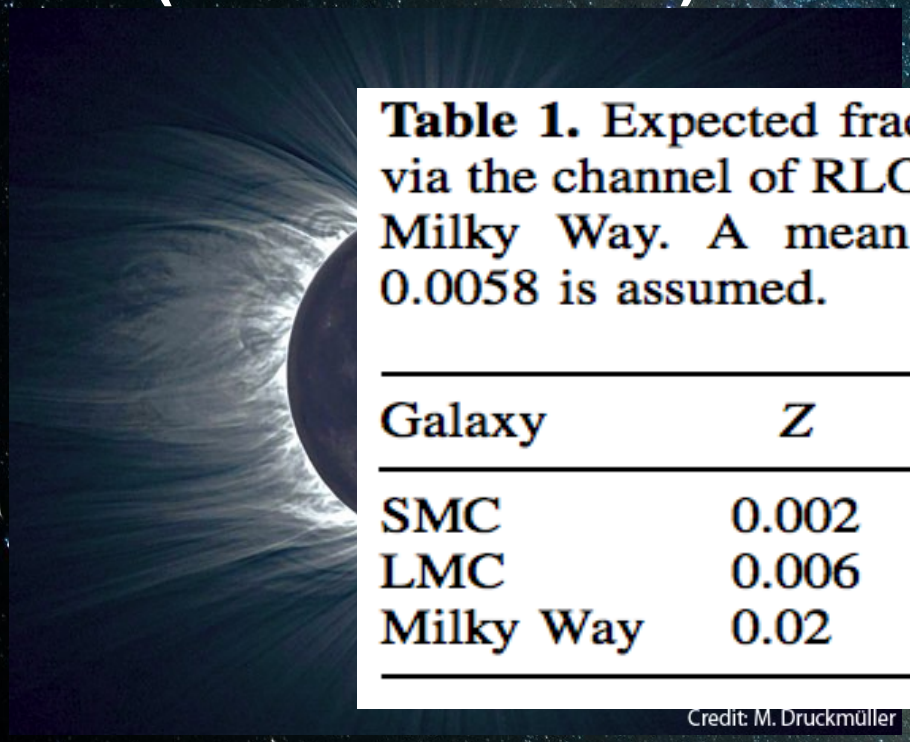


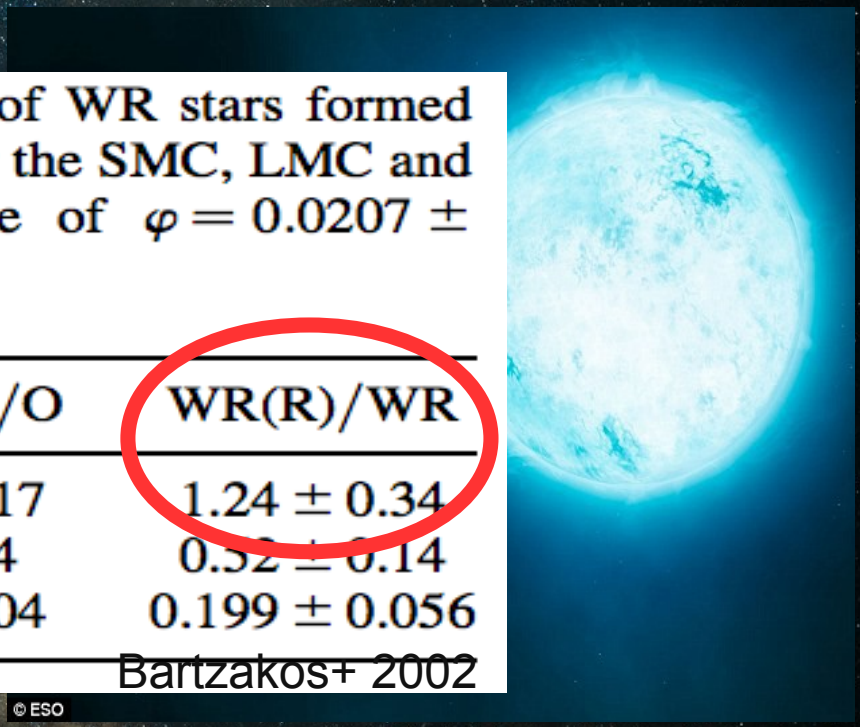


Table 1. Expected fraction of WR stars formed via the channel of RLOF for the SMC, LMC and Milky Way. A mean value of $\varphi = 0.0207 \pm 0.0058$ is assumed.

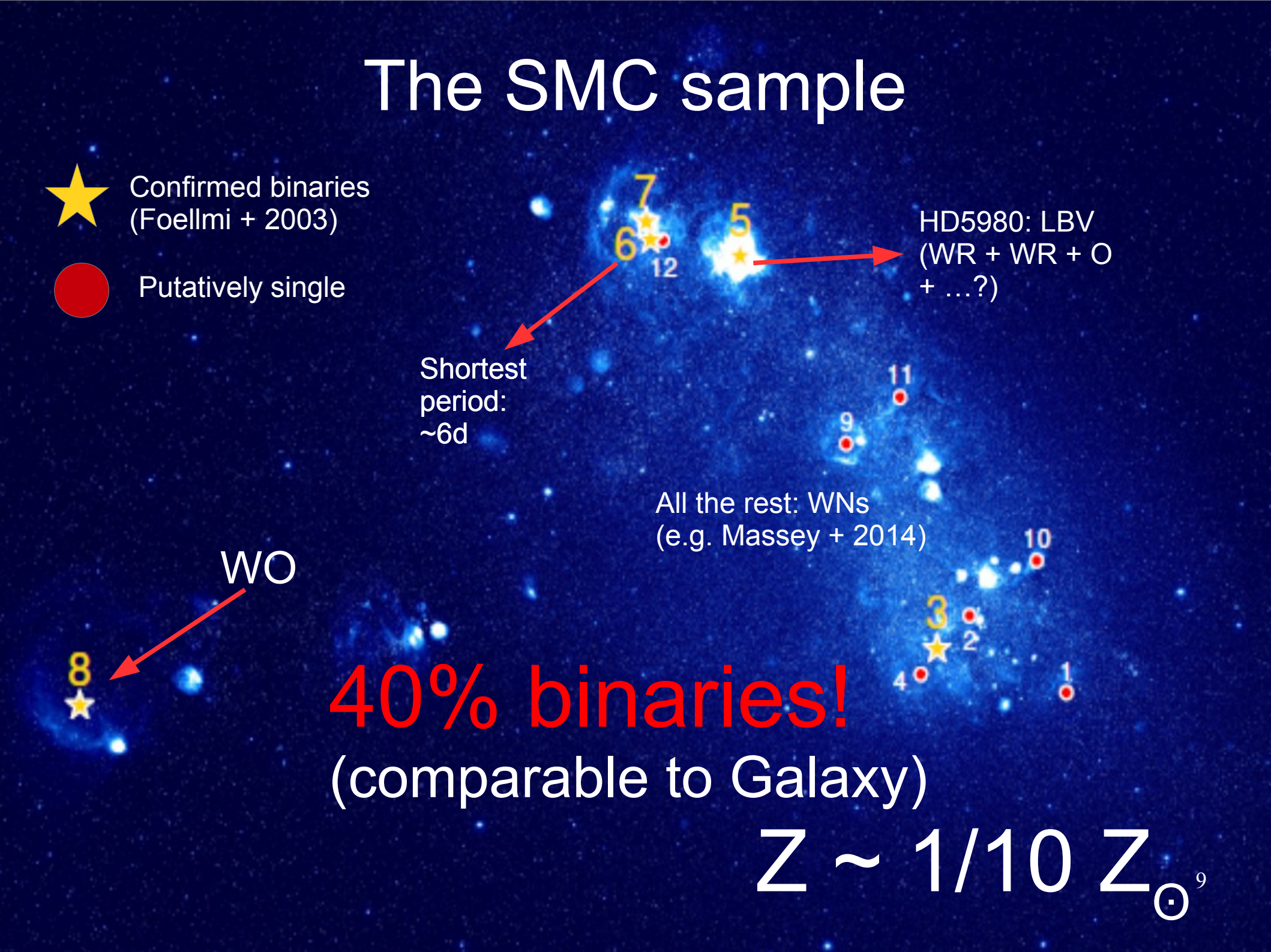
Galaxy	Z	WR/O	WR(R)/WR
SMC	0.002	0.017	1.24 ± 0.34
LMC	0.006	0.04	0.32 ± 0.14
Milky Way	0.02	0.104	0.199 ± 0.056

Bartzakos+ 2002

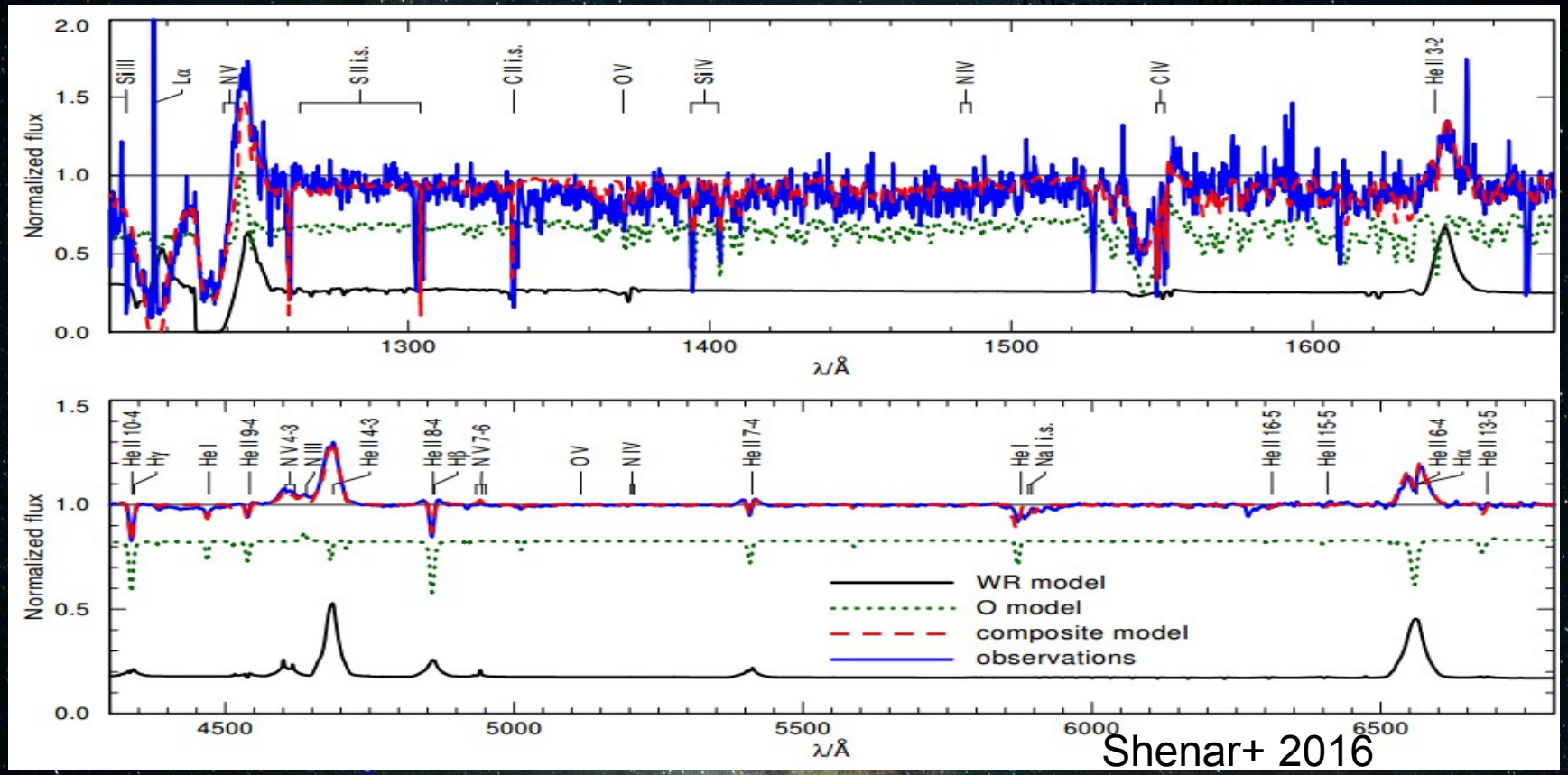
N ~ Mdot ~ Z...
Vink+ 2000, Crowther+ 2006, Hainich+ 2015....

~Z-independent...

The SMC sample



Spectral analysis (with PoWR)



L, T, Mdot, R, abundences….

Spectral analysis (with PoWR)

L, T, Mdot, R, abundences….

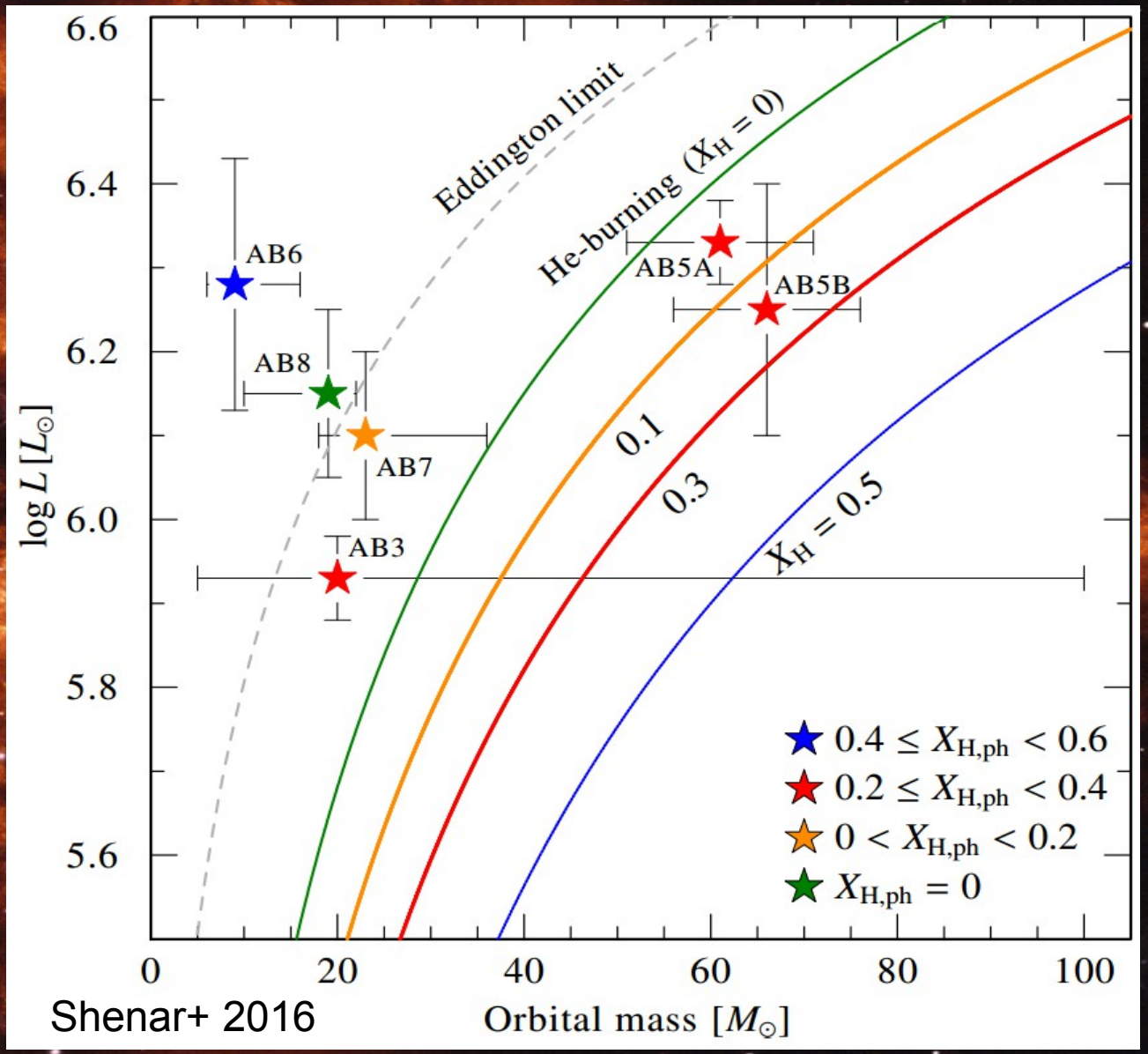
Results: comparison with M-L relations

Orbital masses

V.S.

Mass-Luminosity relations

(Langer+89, Graefener+2001)

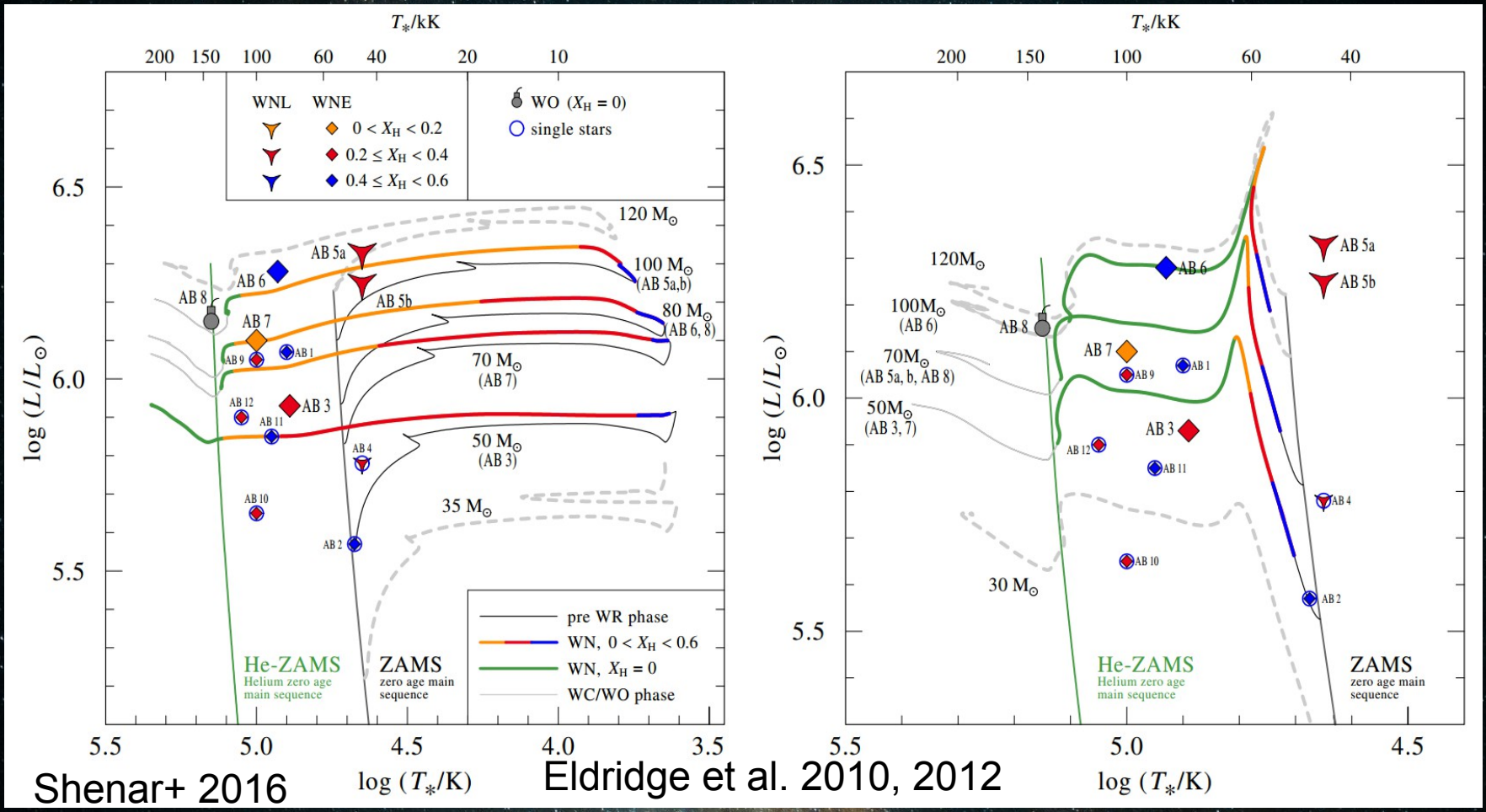


Shenar+ 2016

Results: single-star evolution tracks

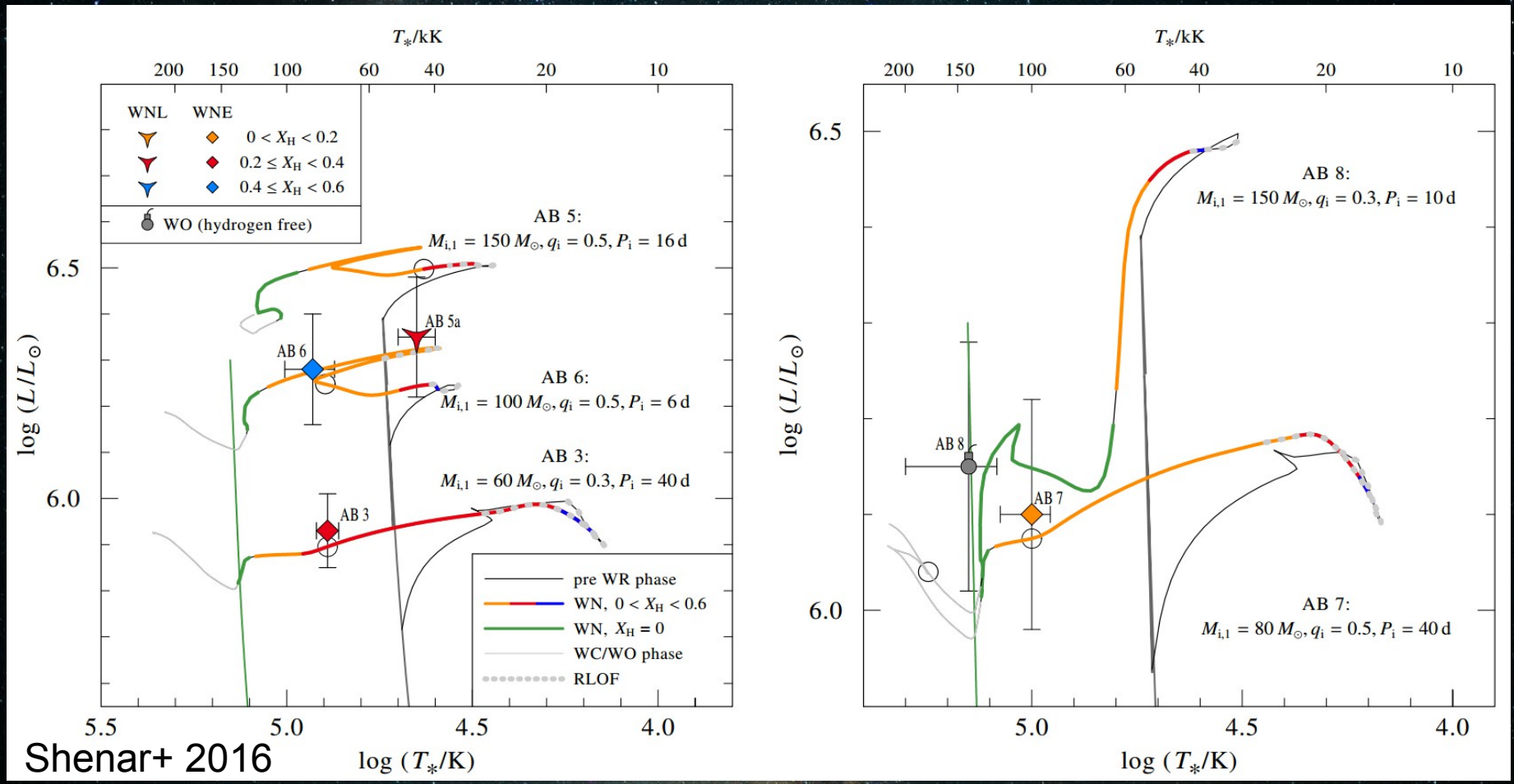
Non-homogeneous evolution

Homogeneous evolution



Homogeneous less consistent → Roche Lobe overflow occurs → Tracks not appropriate

Results: binary evolution tracks



Shenar+ 2016

Main conclusions:

- Chemically homogeneous tracks problematic
  -possible exceptions: AB5 (HD 5980) and AB8 (WO)
  -Due to tital interaction?

- Roche-lobe overflow occured in majority of systems

- YET: primaries would become WR stars anyway!

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- What's up with the binary formation channel?
  - Observational bias? (De Mink 2014)
  - Errors in evolutionary models?


Thank you!

Challenge: light ratios

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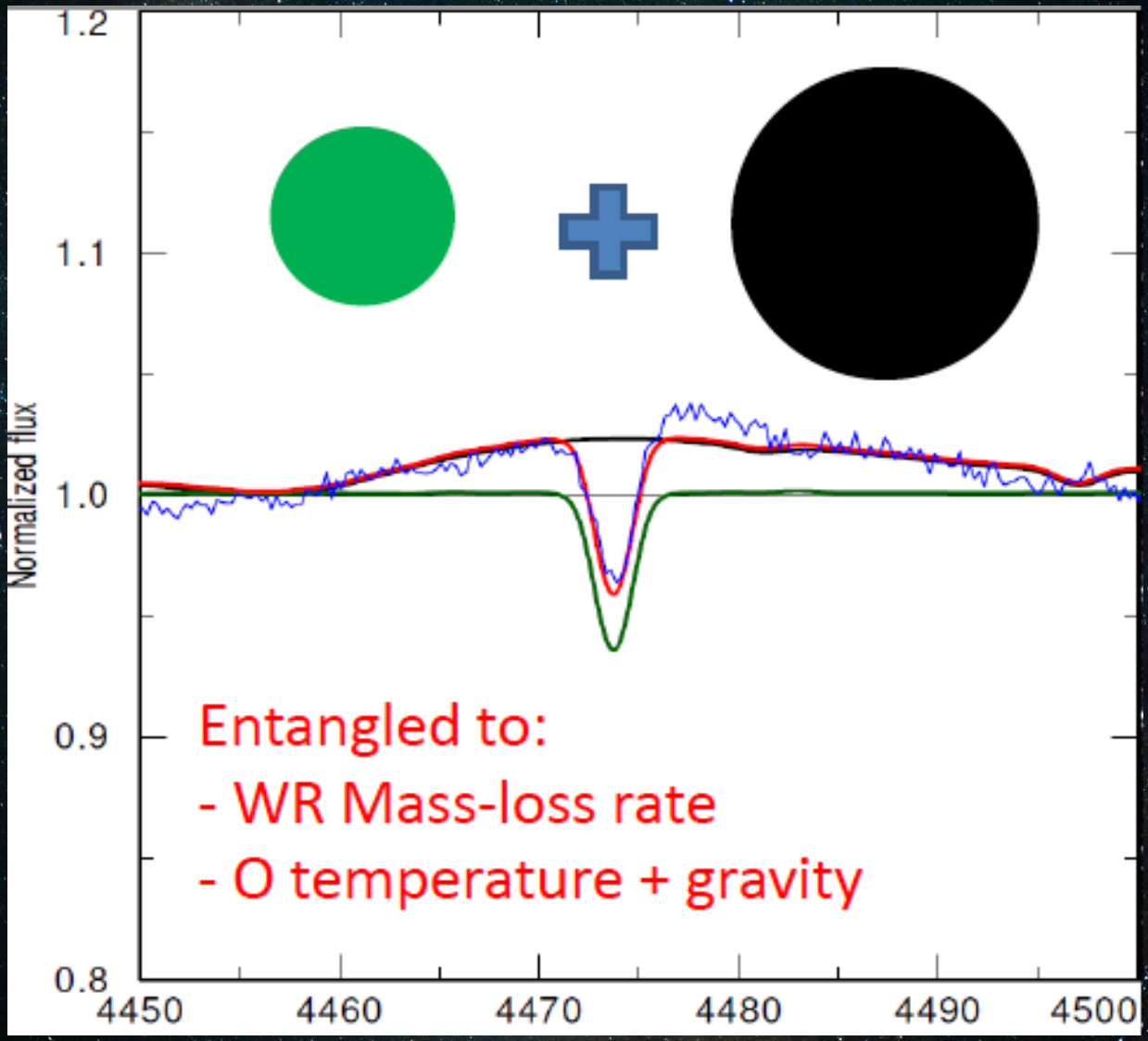
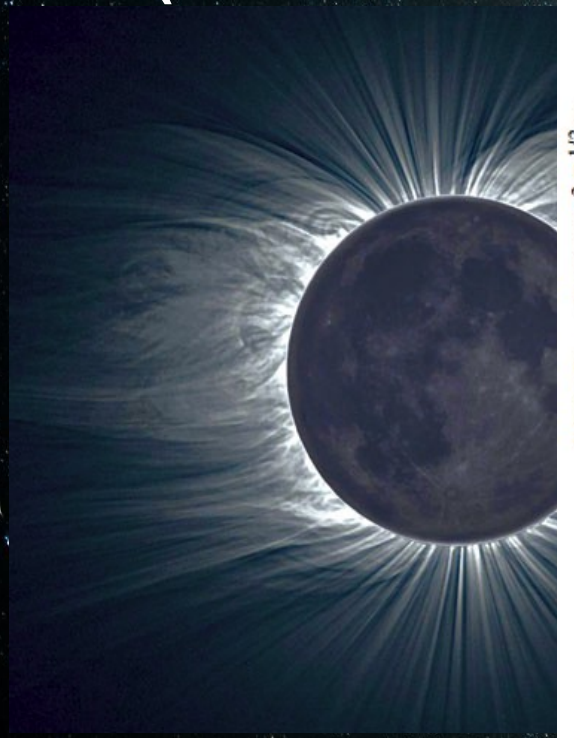
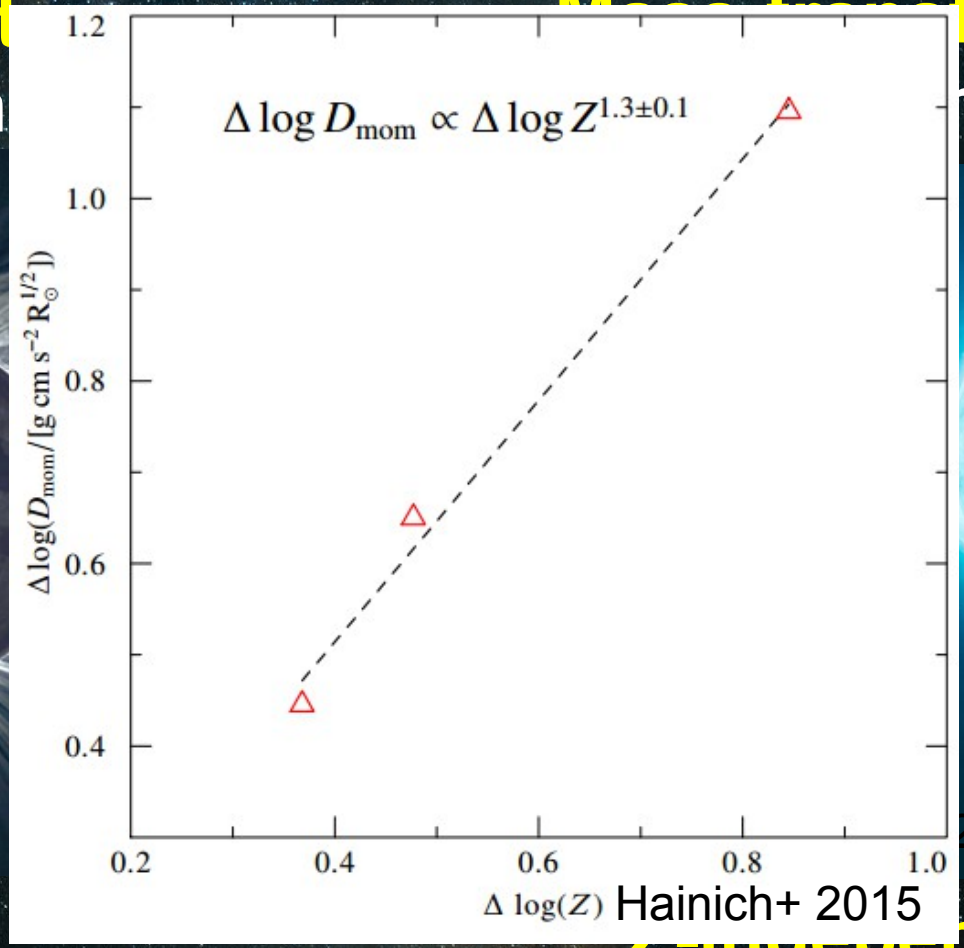


Formation of WR stars

As single st **fer in binaries**
(Conti scen **nski+ 73)**





Hainich+ 2015

N ~ Mdot ~ 1/Z...
Vink+ 2000,
Crowther+ 2006...

Z-independent...

Sources

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