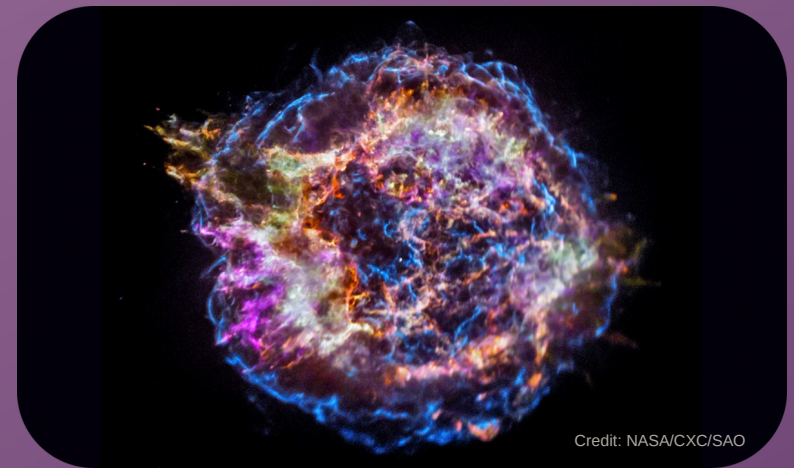


Exploding stripped stars



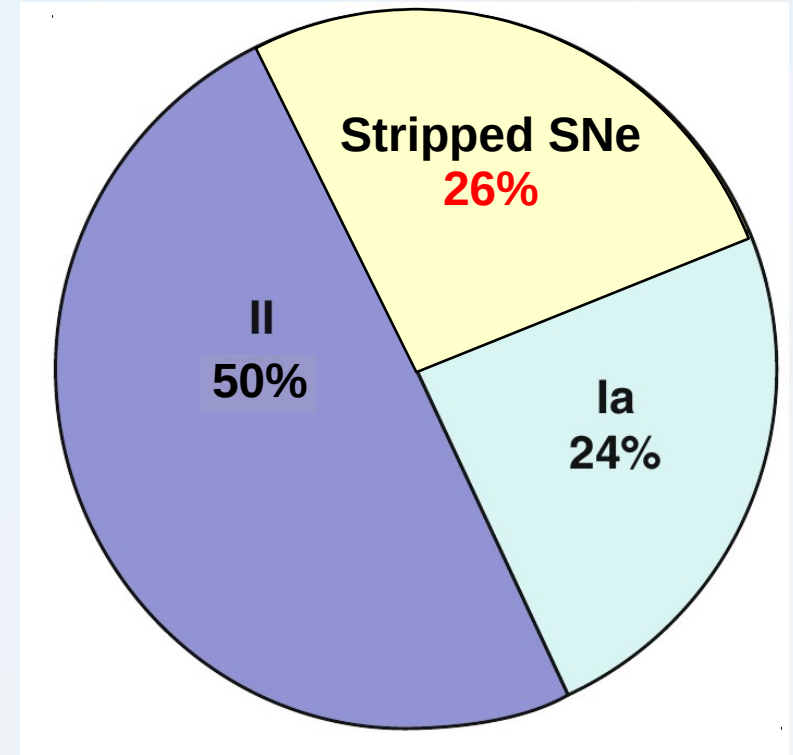
Eva Laplace

Selma de Mink,
Ylva Gotberg, Thomas Dodds
Rob Farmer, Manos Zapartas,
Mathieu Renzo, Stephen Justham
(API UvA, NL)

Massive stars and Supernovae conference
Bariloche, November 2018

Stripped SNe

- very common!

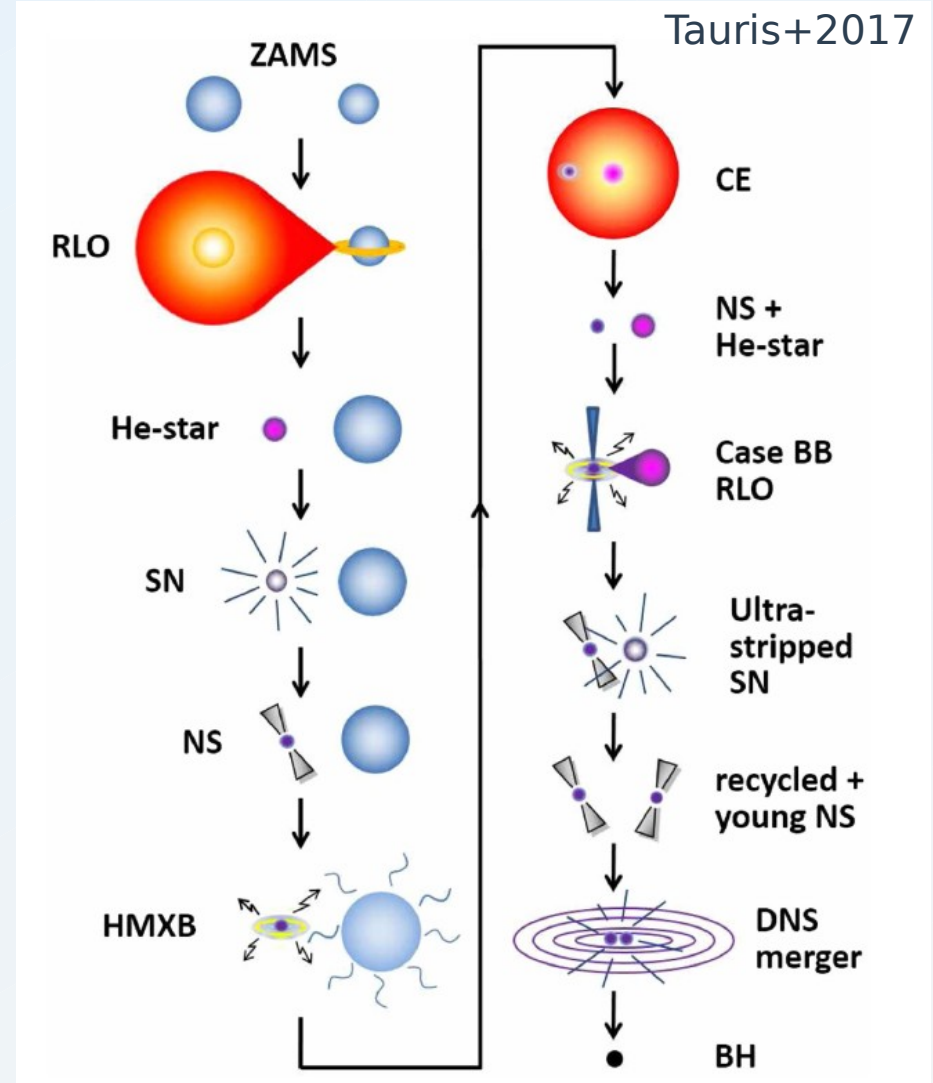


Intrinsic fractions of SNe
(Adapted from Arcavi 2017)

cf. Nomoto+1984; Dewi&Pols 2001, 2002; Yoon+2010; 2017; Bersten+2011; Li+2011; Schivvers+2017; Arcavi+2017; Zapartas+2017; Tauris +2017; Moriya+2014; Dessart+2018

Stripped SNe

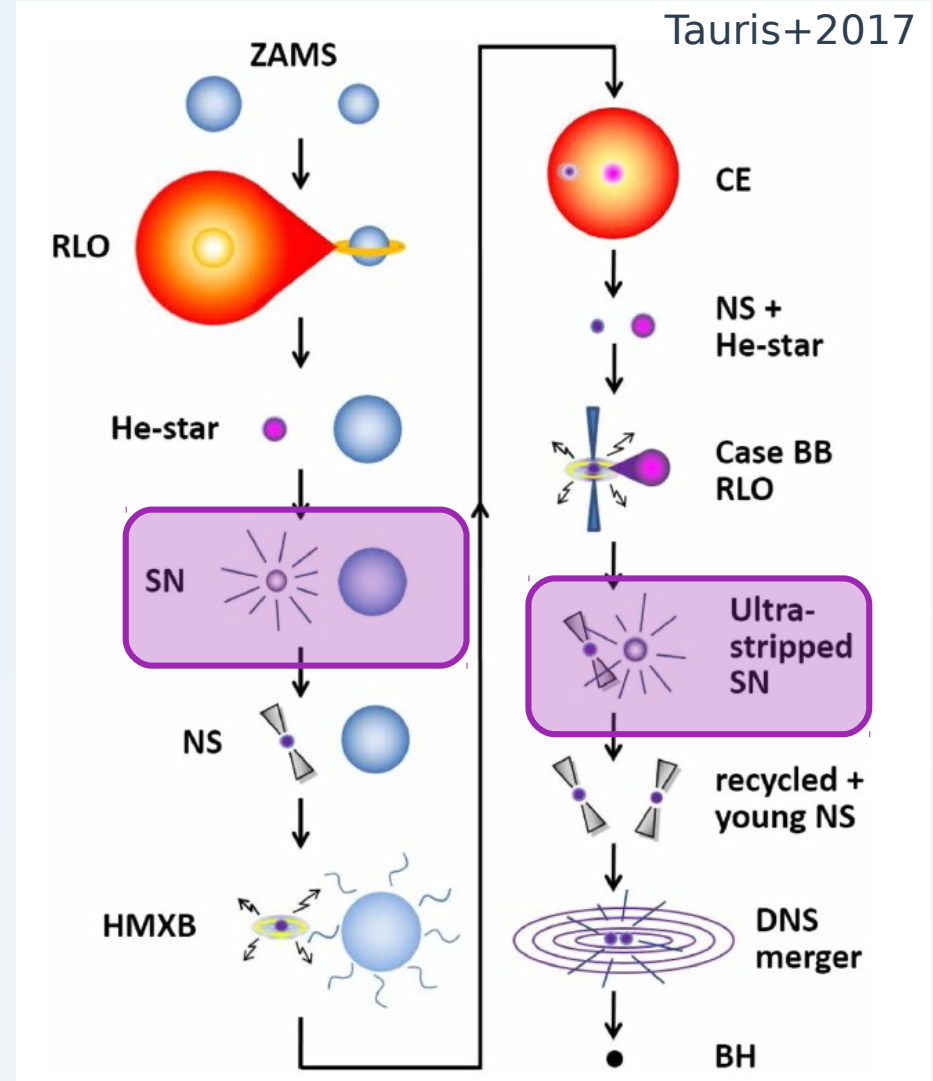
- very common!
- Natural progenitors of gravitational waves (GW) sources



cf. Nomoto+1984; Dewi&Pols 2001, 2002; Yoon+2010; 2017; Bersten+2011; Li+2011; Schivvers+2017; Arcavi+2017; Zapartas+2017; Tauris +2017; Moriya+2014; Dessart+2018

Stripped SNe

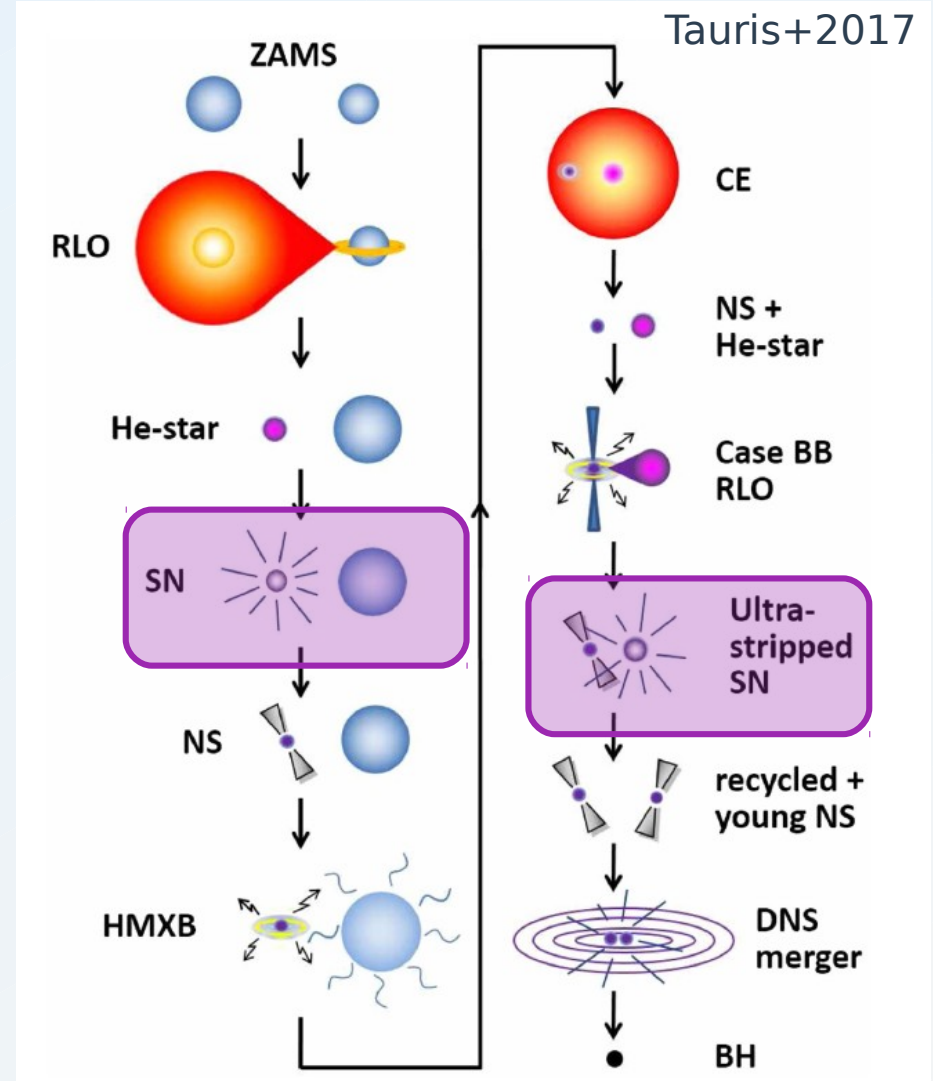
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Stripped SNe

- very common!
- Natural progenitors of gravitational waves (GW) sources
- Theoretical models are lacking



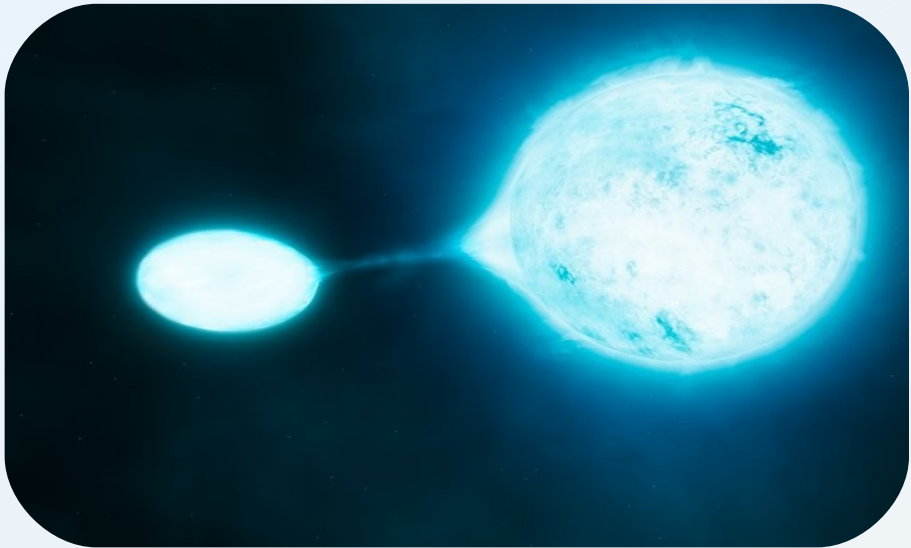
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Stripped stars



Winds

or



Binaries



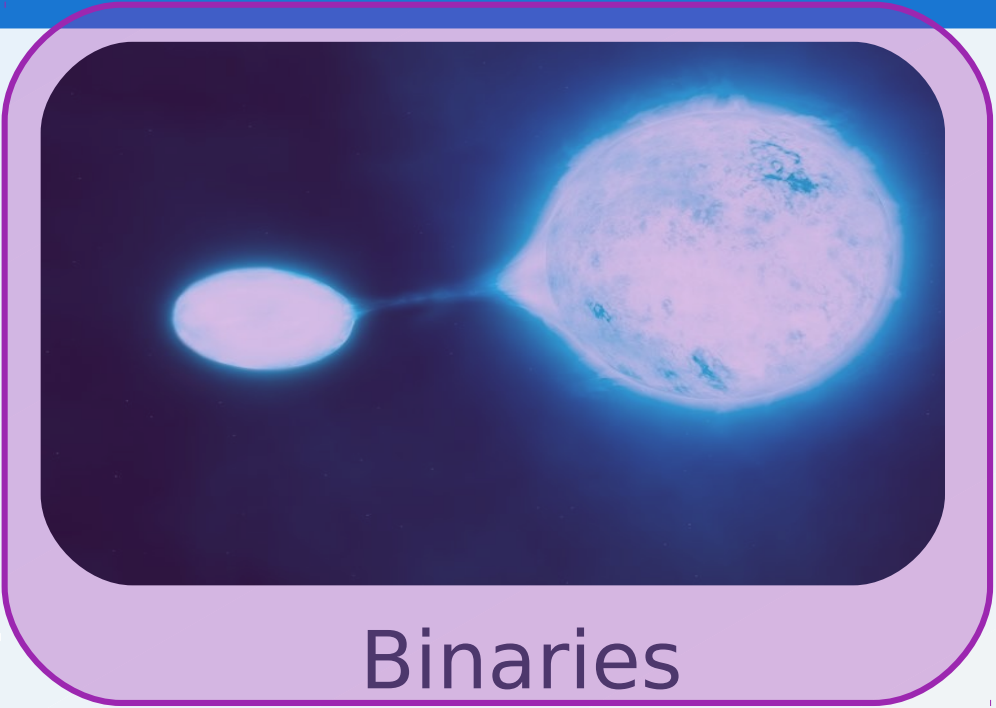
Helium or Carbon core

Stripped stars



Winds

or



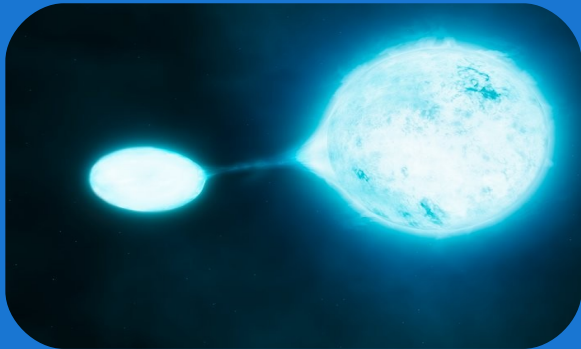
Binaries



Helium or Carbon core

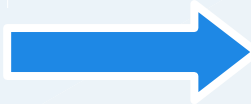
Project

**Stellar
evolution**

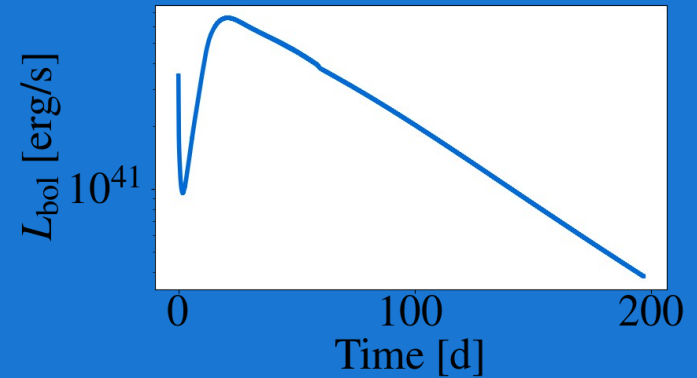


MESA

Modules for Experiments in Stellar Astrophysics



**Supernova
explosion**



SNEC

c.f. Paxton+2011,2013,2015

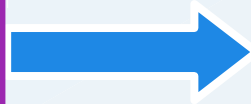
Morozova+2015

Project

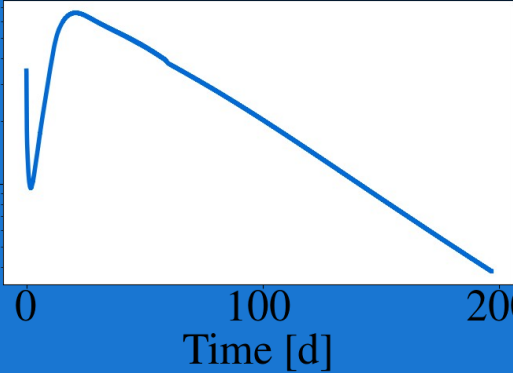
Stellar evolution



MESA
Modules for Experiments in Stellar Astrophysics



Supernova explosion



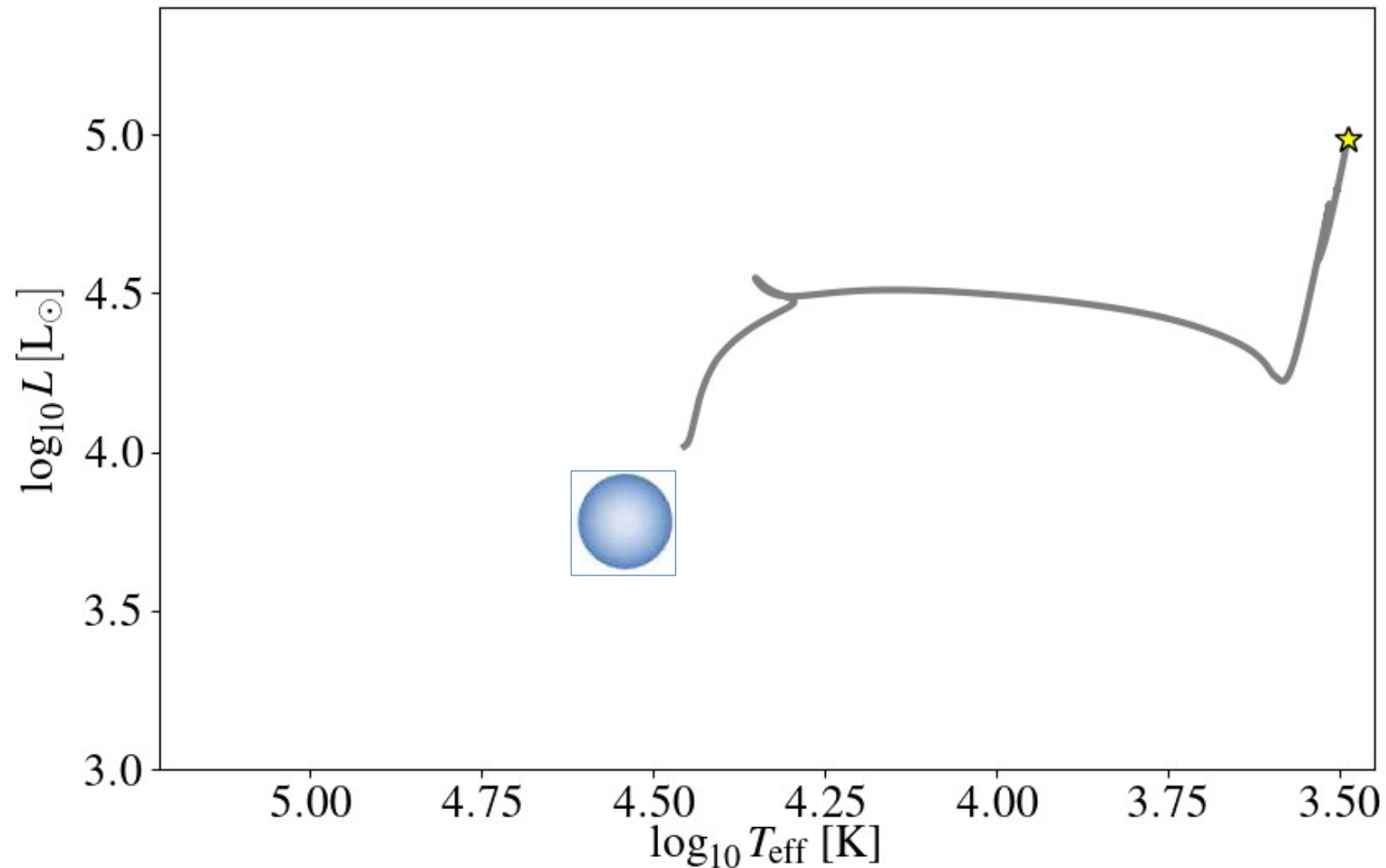
SNEC

c.f. Paxton+2011,2013,2015

Morozova+2015

Progenitor evolution

$M = 15 M_{\text{sun}}$



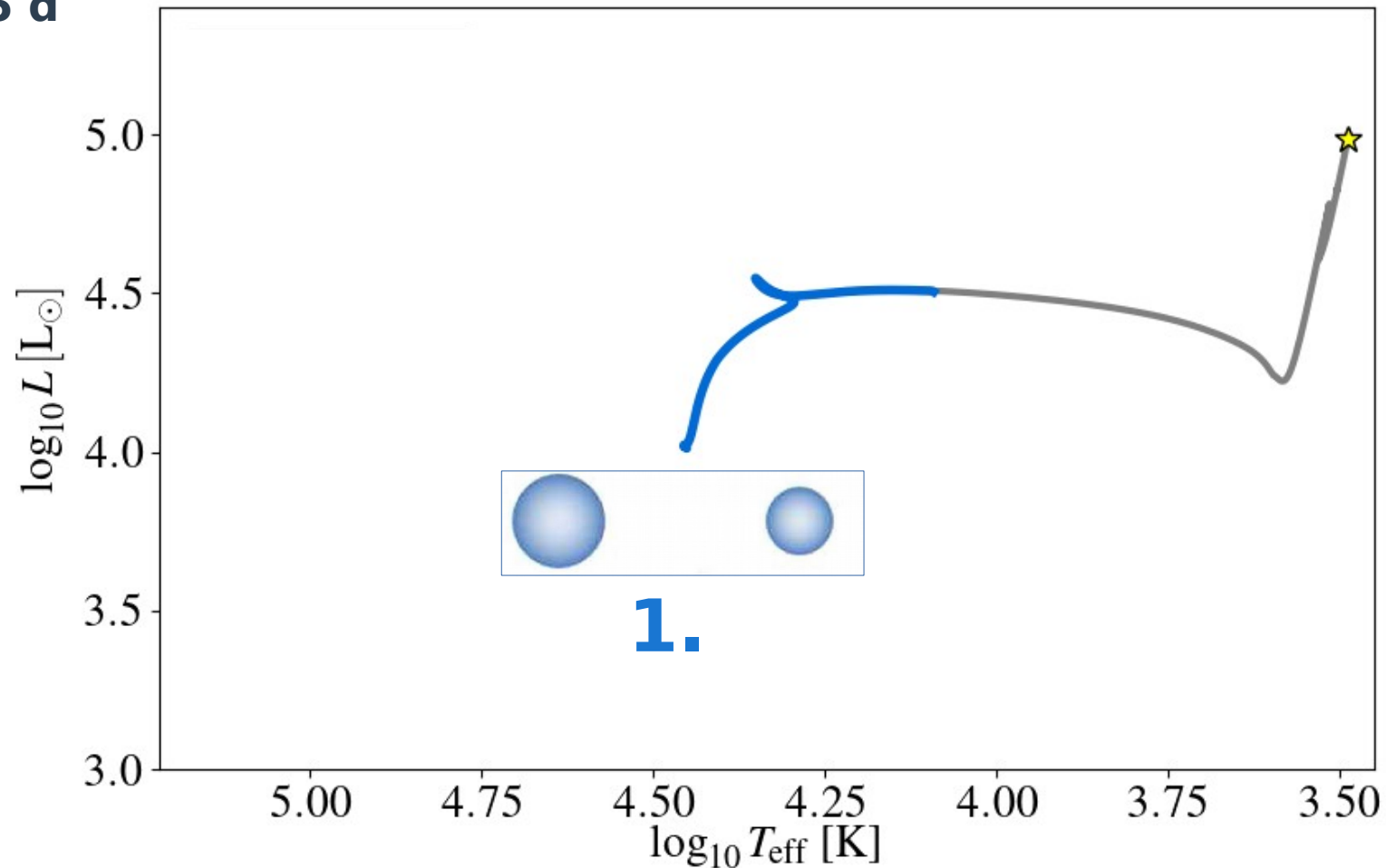
cf. Kippenhahn & Weigert 1967; Habets+1986; Dewi&Pols 2001, 2002; Yoon+2010, 2017; Bersten+2011; Gotberg+2017

Progenitor evolution

$$M_1 = 15 M_{\text{sun}}$$

$$P_{\text{orb}} = 25 \text{ d}$$

$$q = 0.8$$



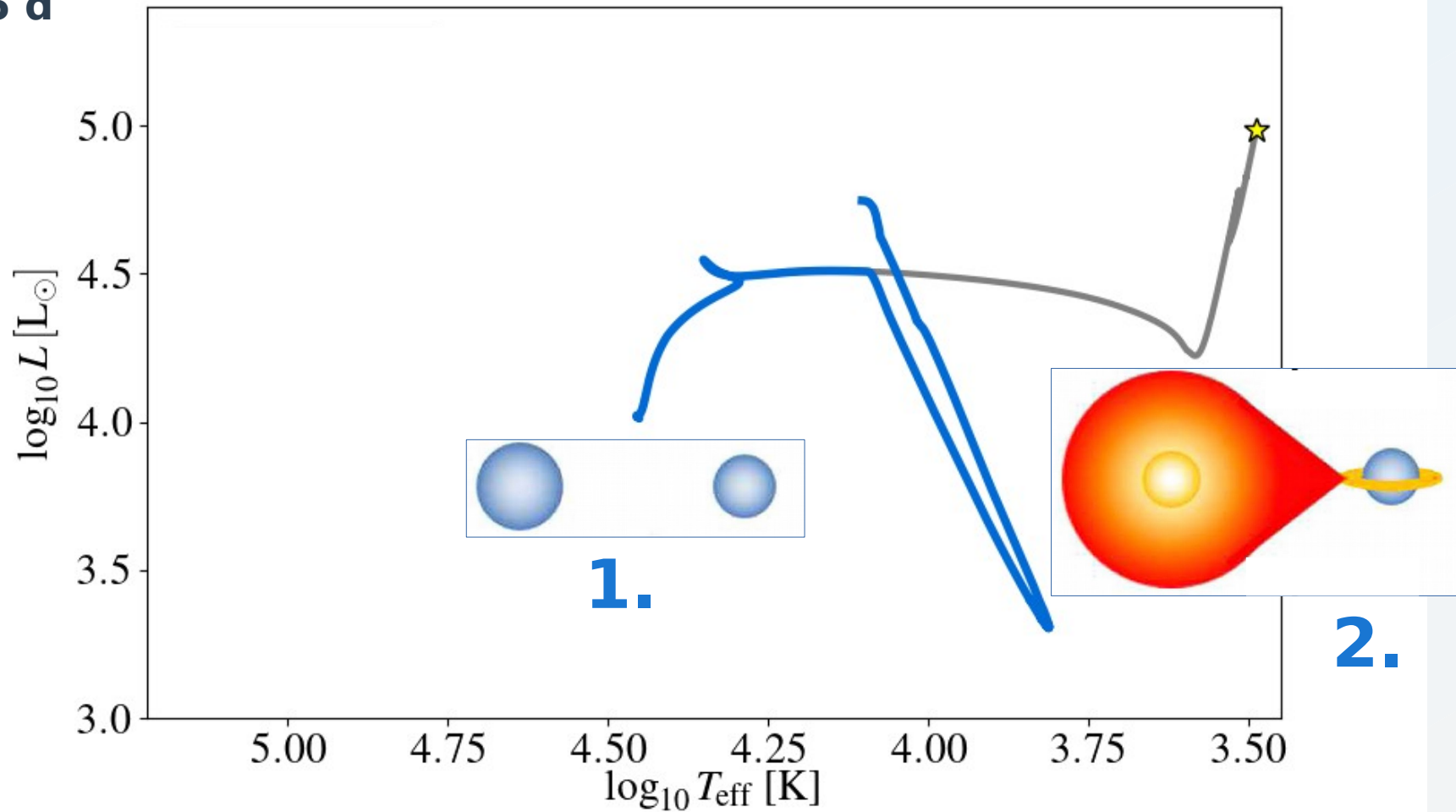
cf. Kippenhahn & Weigert 1967; Habets+1986; Dewi&Pols 2001, 2002; Yoon+2010, 2017; Bersten+2011; Gotberg+2017

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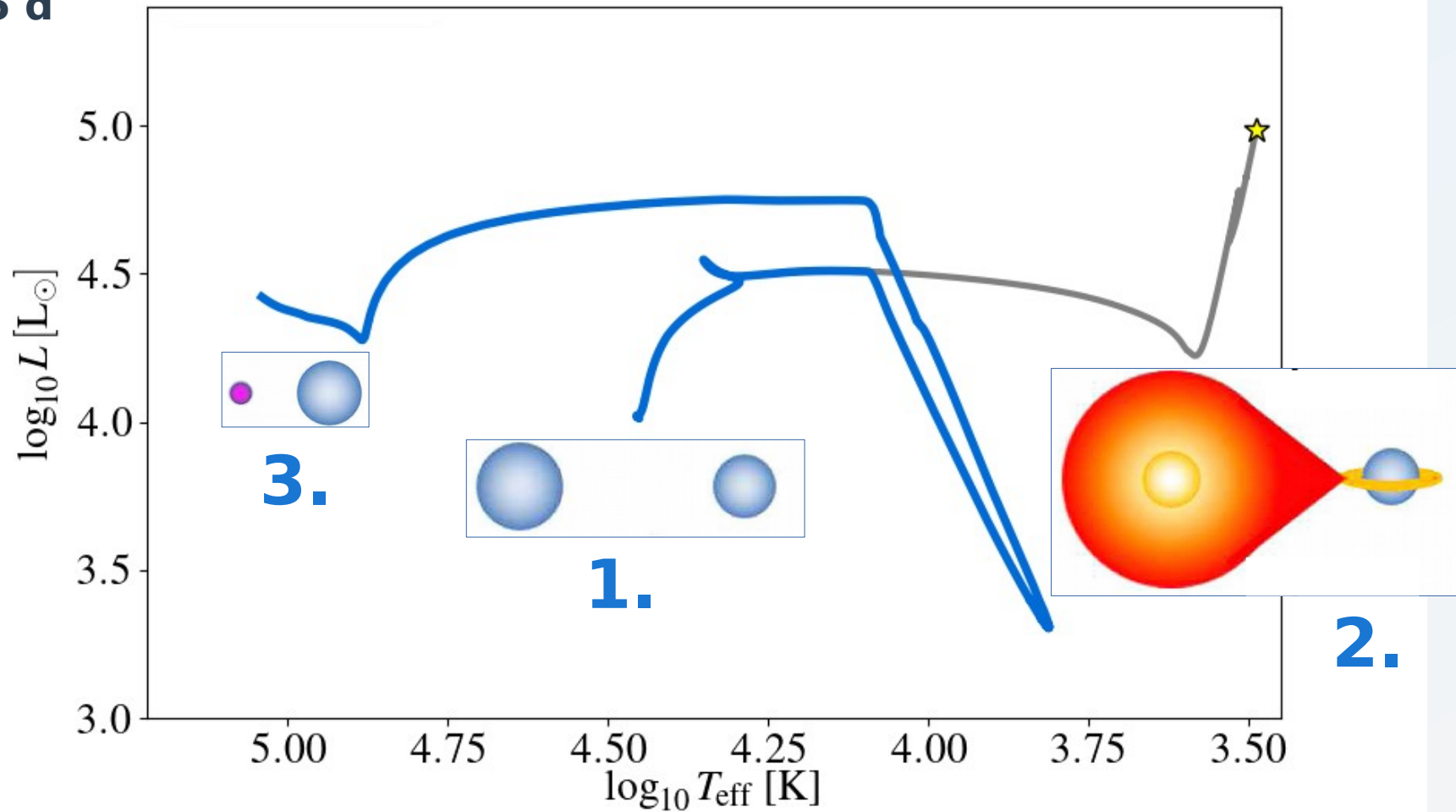
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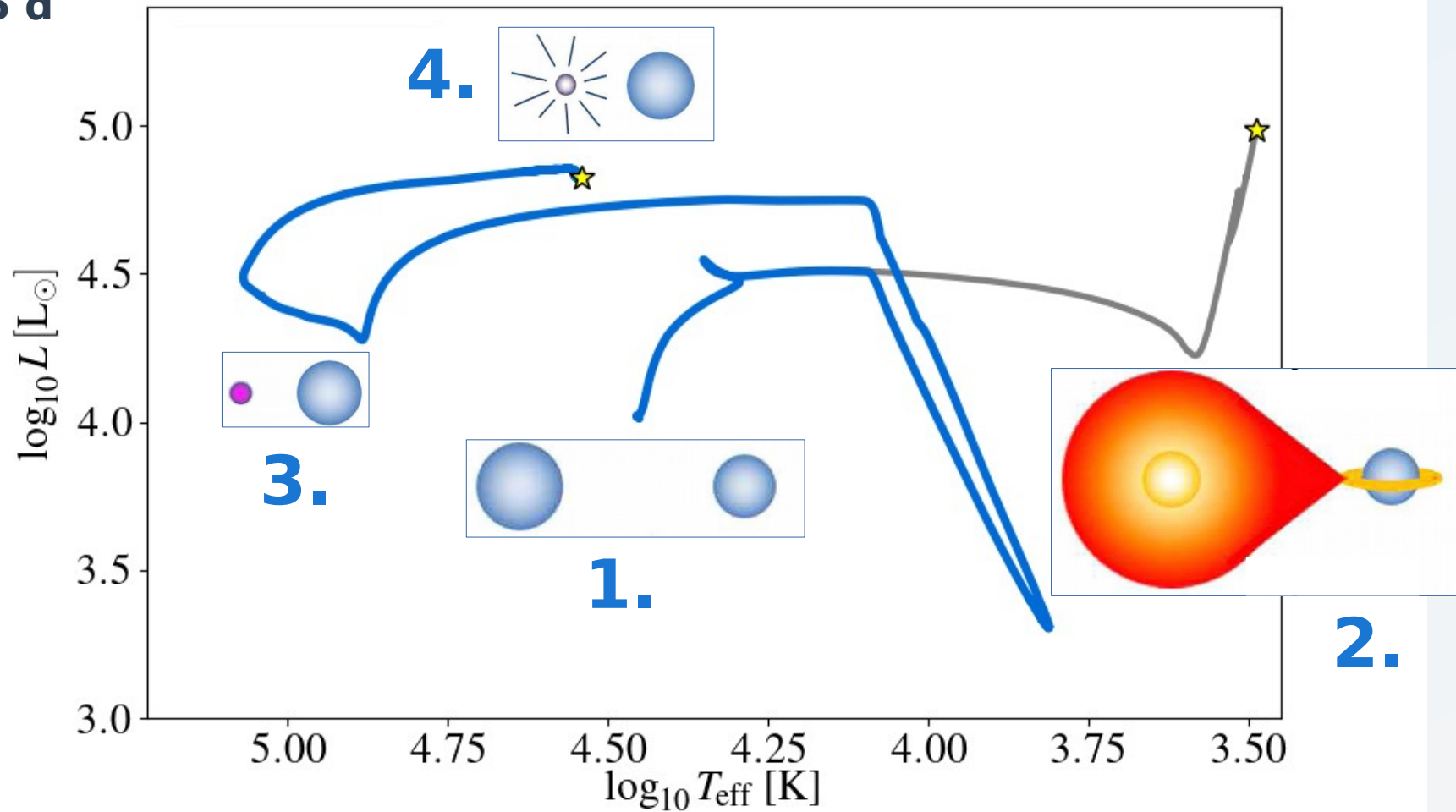
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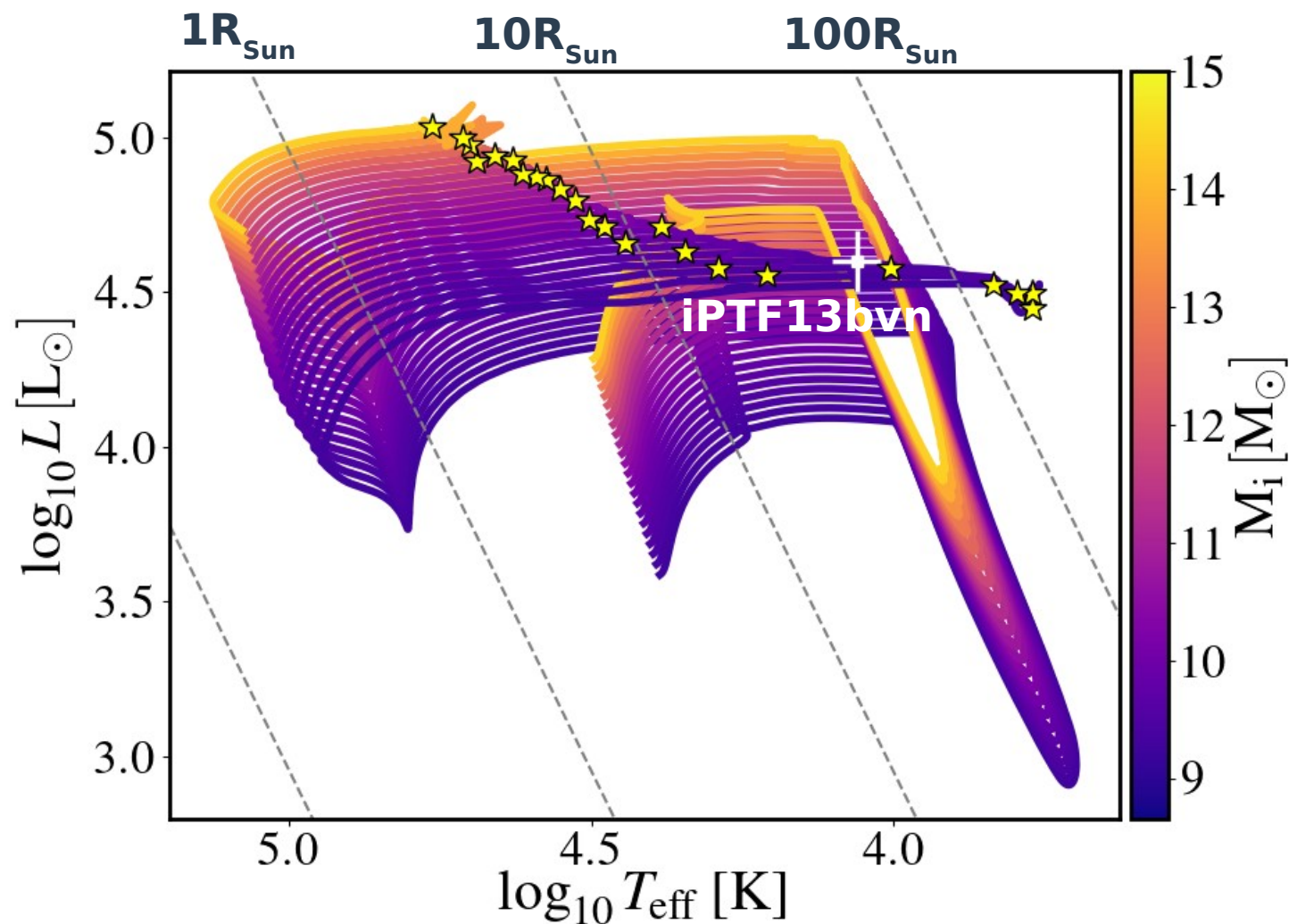
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cf. Kippenhahn & Weigert 1967; Habets+1986; Dewi&Pols 2001, 2002; Yoon+2010, 2017; Bersten+2011; Gotberg+2017

Grid of stripped stars

Laplace et al. in prep.



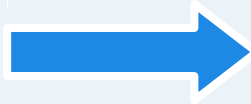
cf. Kippenhahn & Weigert 1967; Habets+1986; Dewi&Pols 2001, 2002; Yoon+2010, 2017; Bersten+2011; Eldridge+2016, 2017; Gotberg+2017

Project

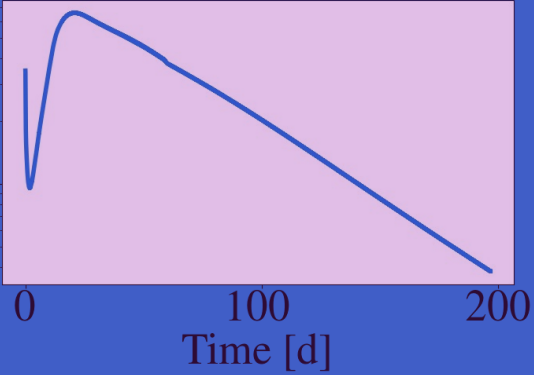
Stellar evolution



MESA
Modules for Experiments in Stellar Astrophysics



Supernova explosion



L_{bol} [erg/s]

Time [d]

SNEC

c.f. Paxton+2011,2013,2015

Morozova+2015

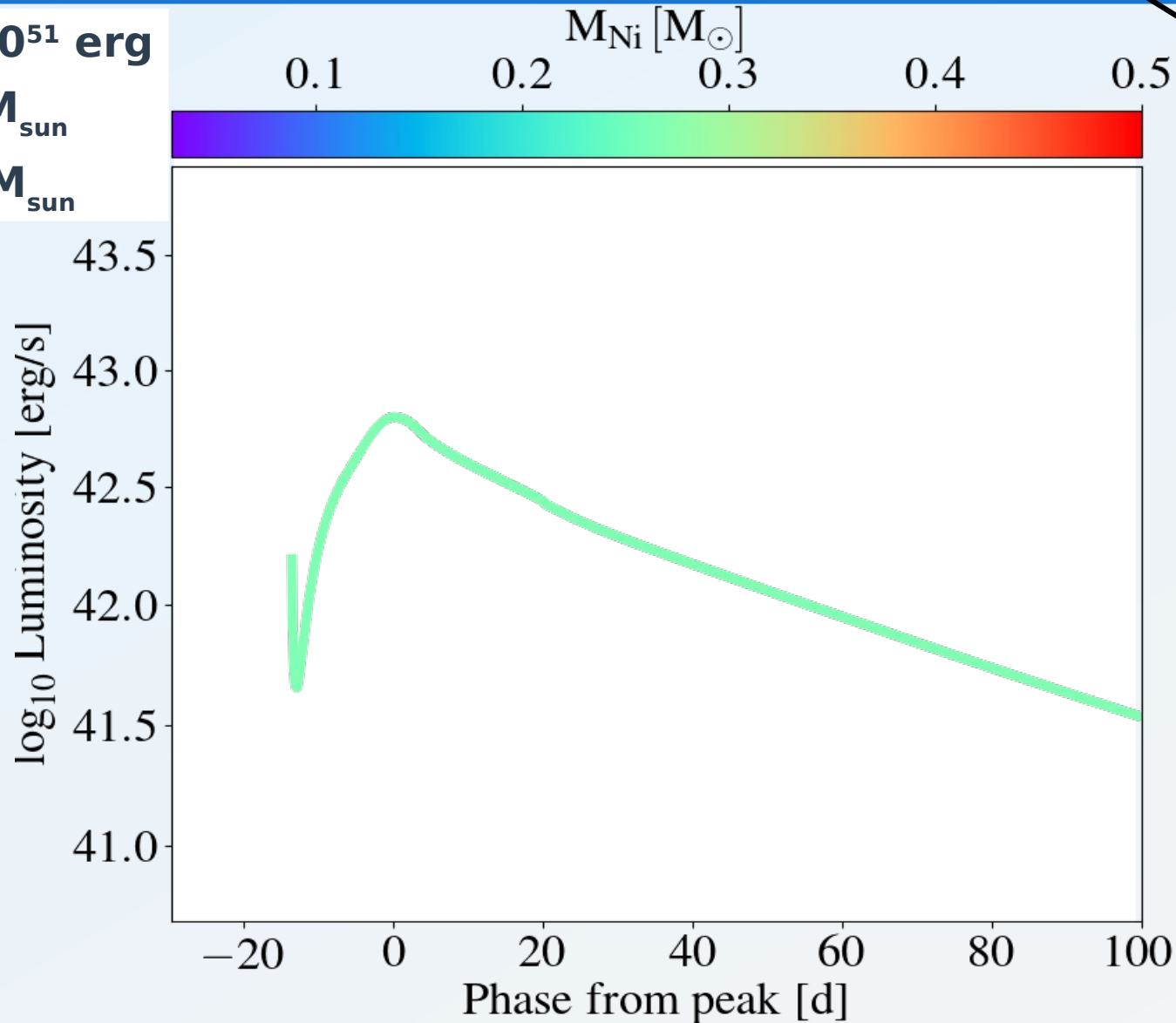
Light-curves of stripped SNe

Work in progress

$E = 1.6 \times 10^{51}$ erg

$M_{\text{NS}} = 1.4 M_{\text{sun}}$

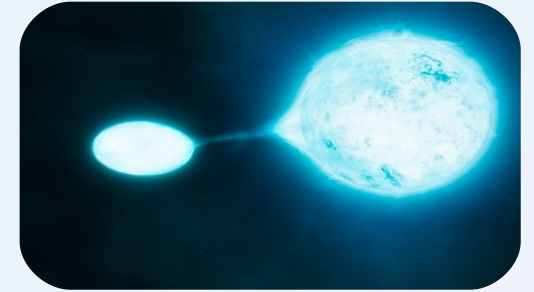
$M_{\text{Ni}} = 0.28 M_{\text{sun}}$



cf. Lyman+2016; Taddia+2018; Moriya+2014; Dessart+2018

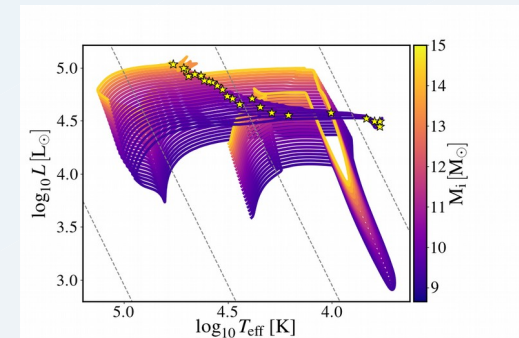
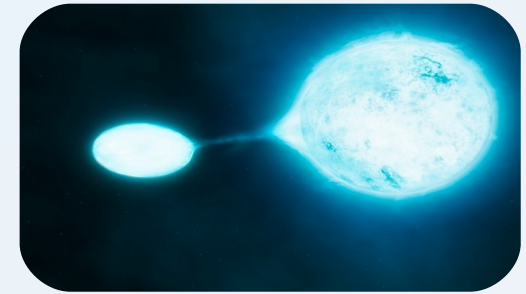
Conclusion

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- We computed a detailed grid of binary evolution models of stripped stars. Their final sizes are much larger than assumed in population synthesis models. This is expected to have an impact on the number of gravitational waves sources. **Laplace et al. in prep.**



Conclusion

- Binarity affects the lives and deaths of stars
- We computed a detailed grid of binary evolution models of stripped stars. Their final sizes are much larger than assumed in population synthesis models. This is expected to have an impact on the number of gravitational waves sources. **Laplace et al. in prep.**
- Light-curves computed with our models agree with observations and can be used to infer their physical properties.

