

Homogeneous evolution and binarity: the progenitor behind various cosmic explosions

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University of Birmingham
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AKADEMIE VĚD
ČESKÉ REPUBLIKY

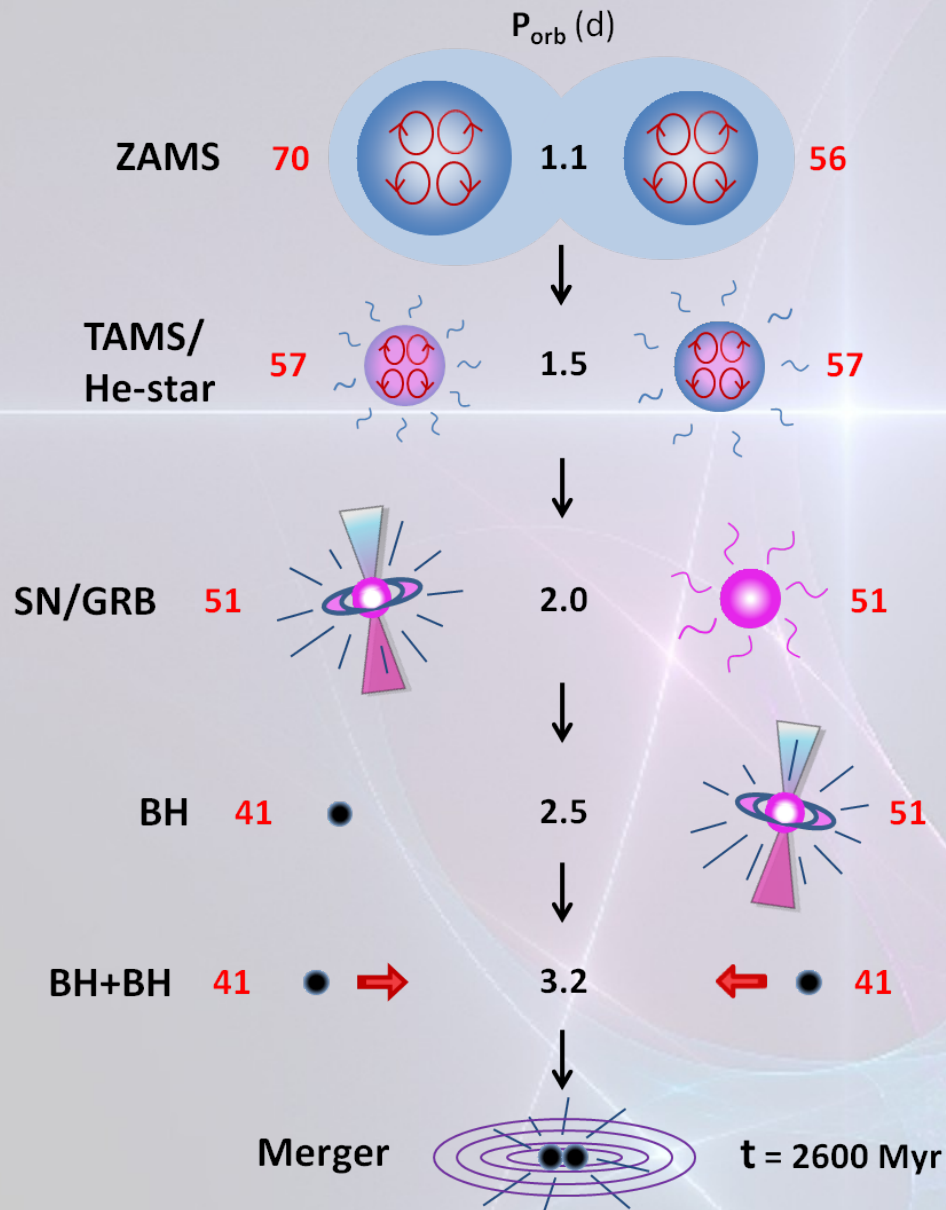


Astronomický
ústav
AV ČR

BH-BH merger \rightarrow Gravitational Wave detection + SGRB



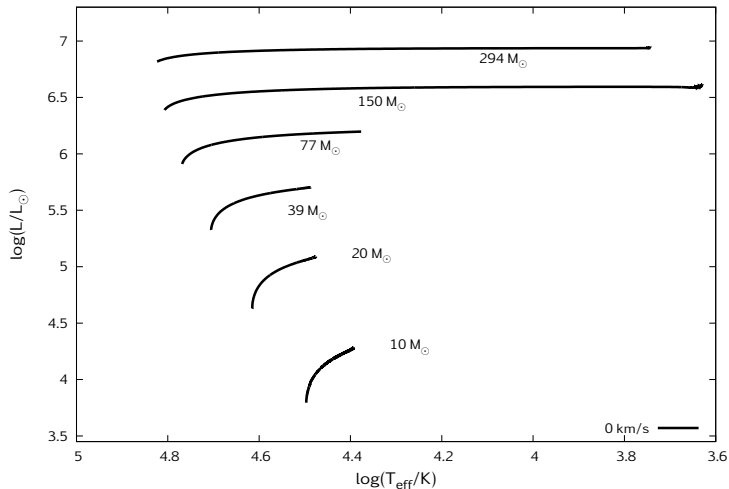
BH-BH merger → Gravitational Wave detection + SGRB



Credit: Marchant+2016

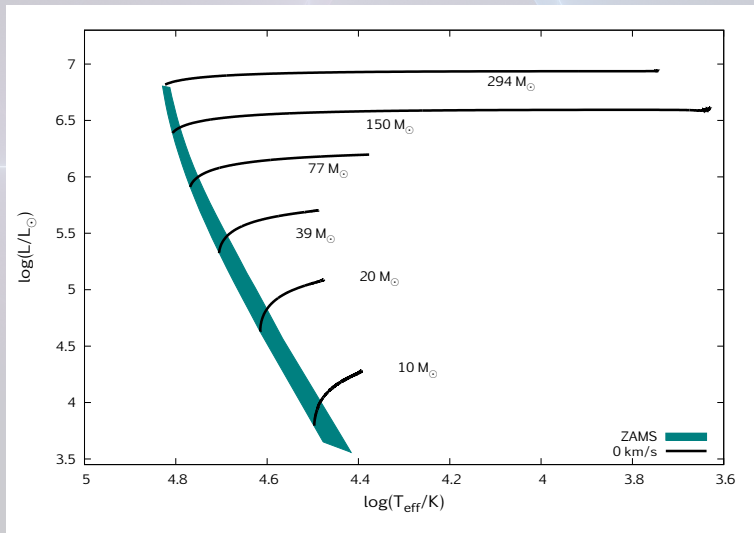
Low Metallicity Massive Stars

Szécsi et al. 2015 (*Astronomy & Astrophysics*, v.581, A15)



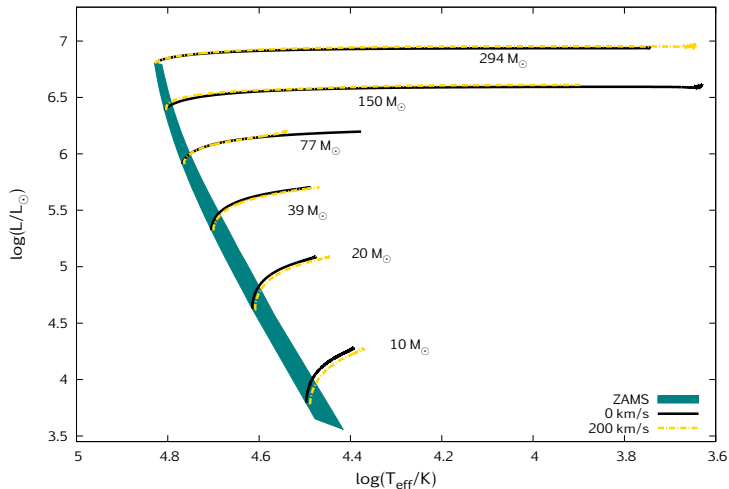
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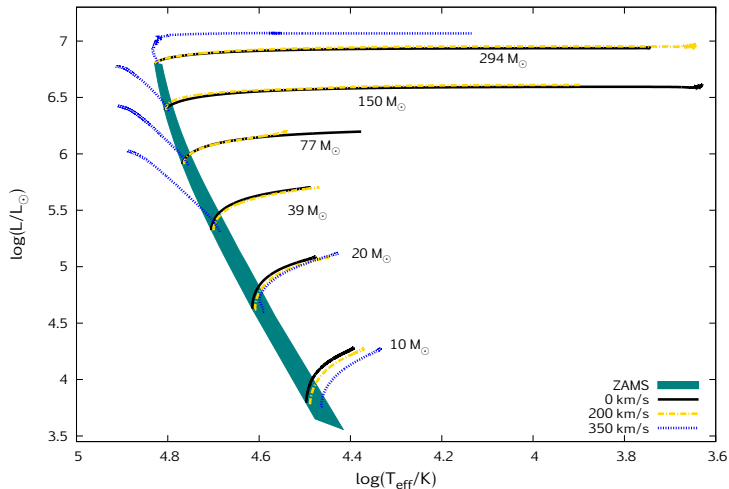
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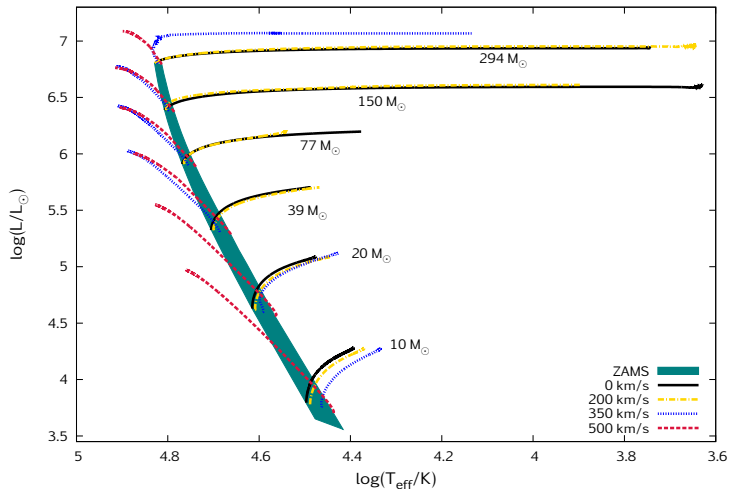
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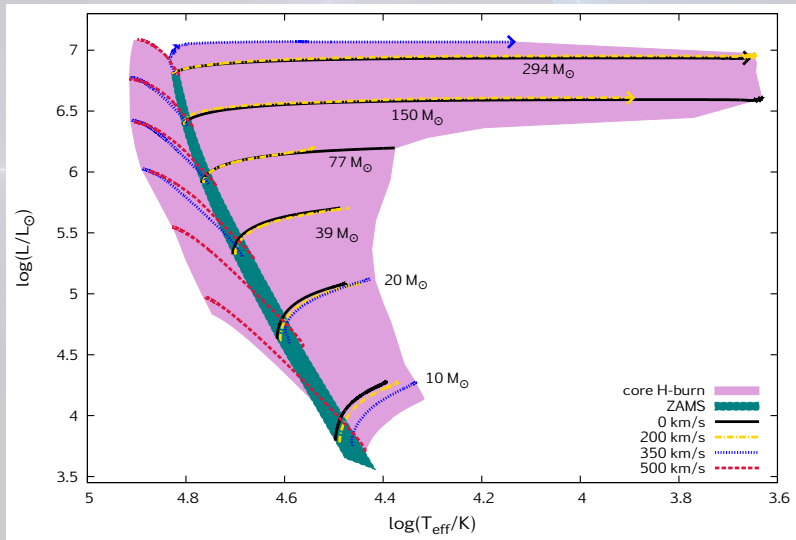
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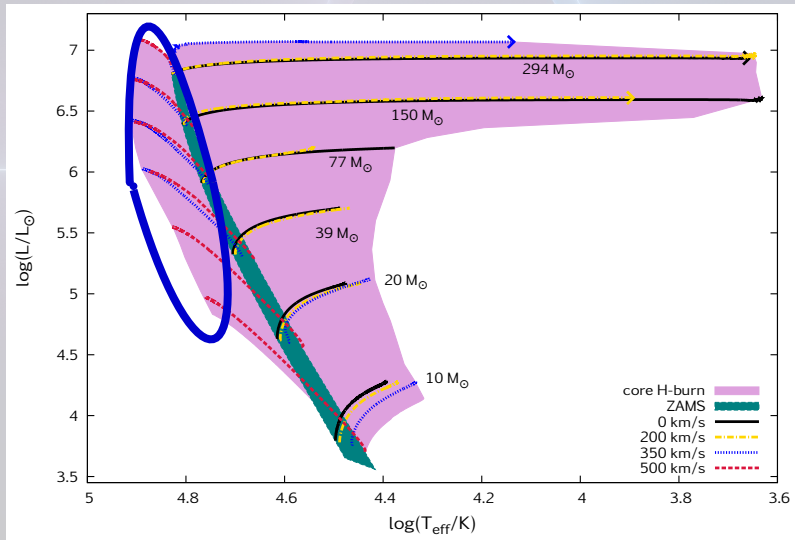
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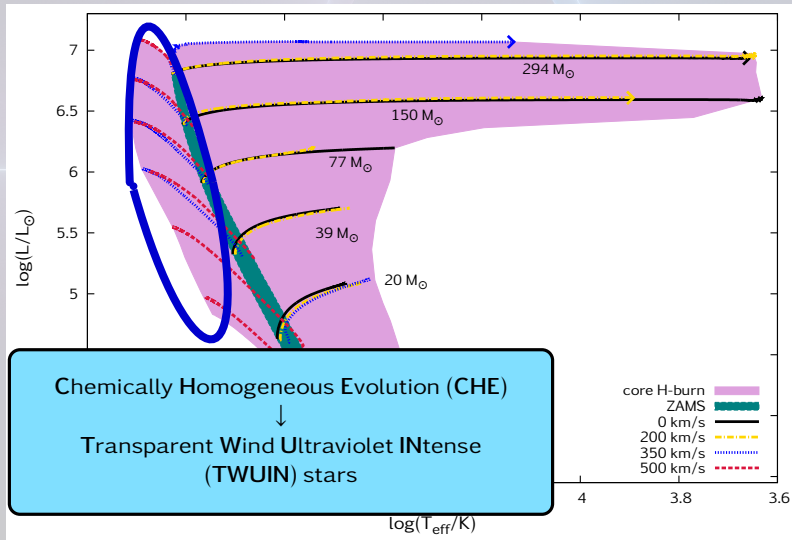
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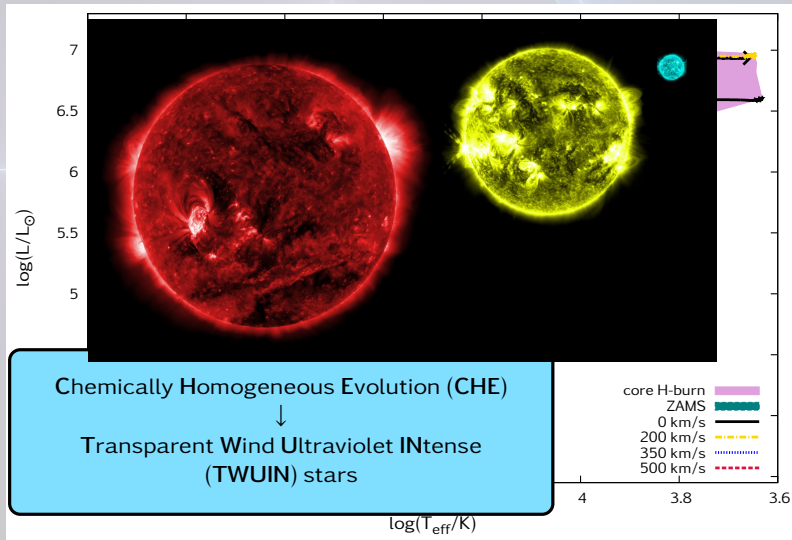
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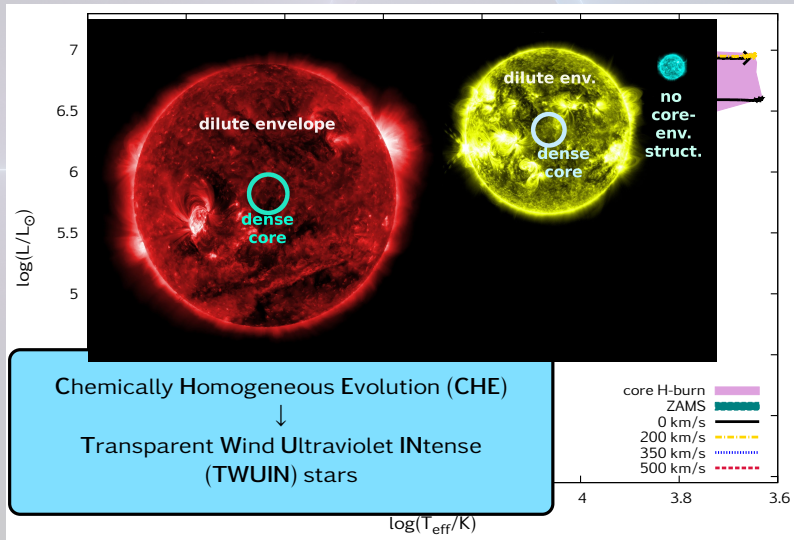
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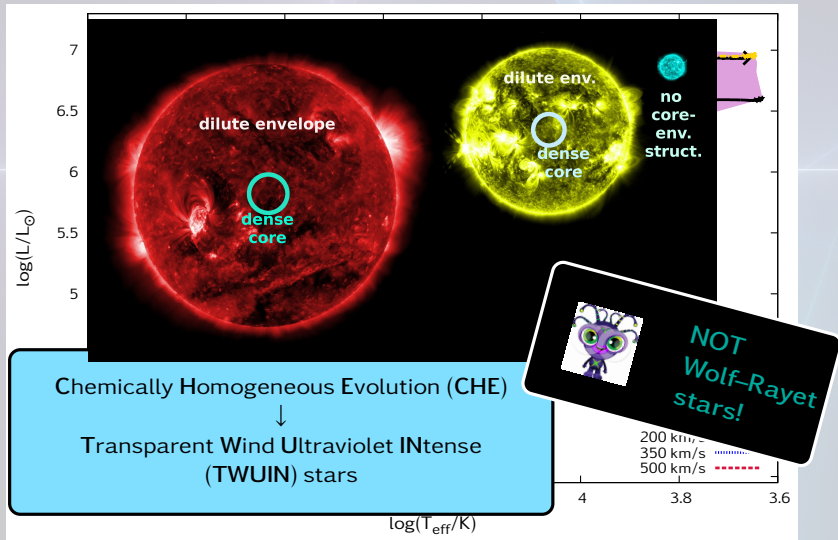
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Chemically Homogeneous Evolution
(low metallicity!)

no Pair Instab.
core < 40 M_⊙

Pair Instability
core > 40 M_⊙

*spins down
due to extreme*
mass loss*

*rotates fast
at collapse*

core collapse
SN Ic

puls. PISN
40 M_⊙ < core < 64 M_⊙
SLSN I

'failed' SN
(collapsar)
ξ high
IGRB

successful SN
(magnetar)
ξ low

PISN
64 M_⊙ < core < 133 M_⊙
SLSN R
SLSN Ic

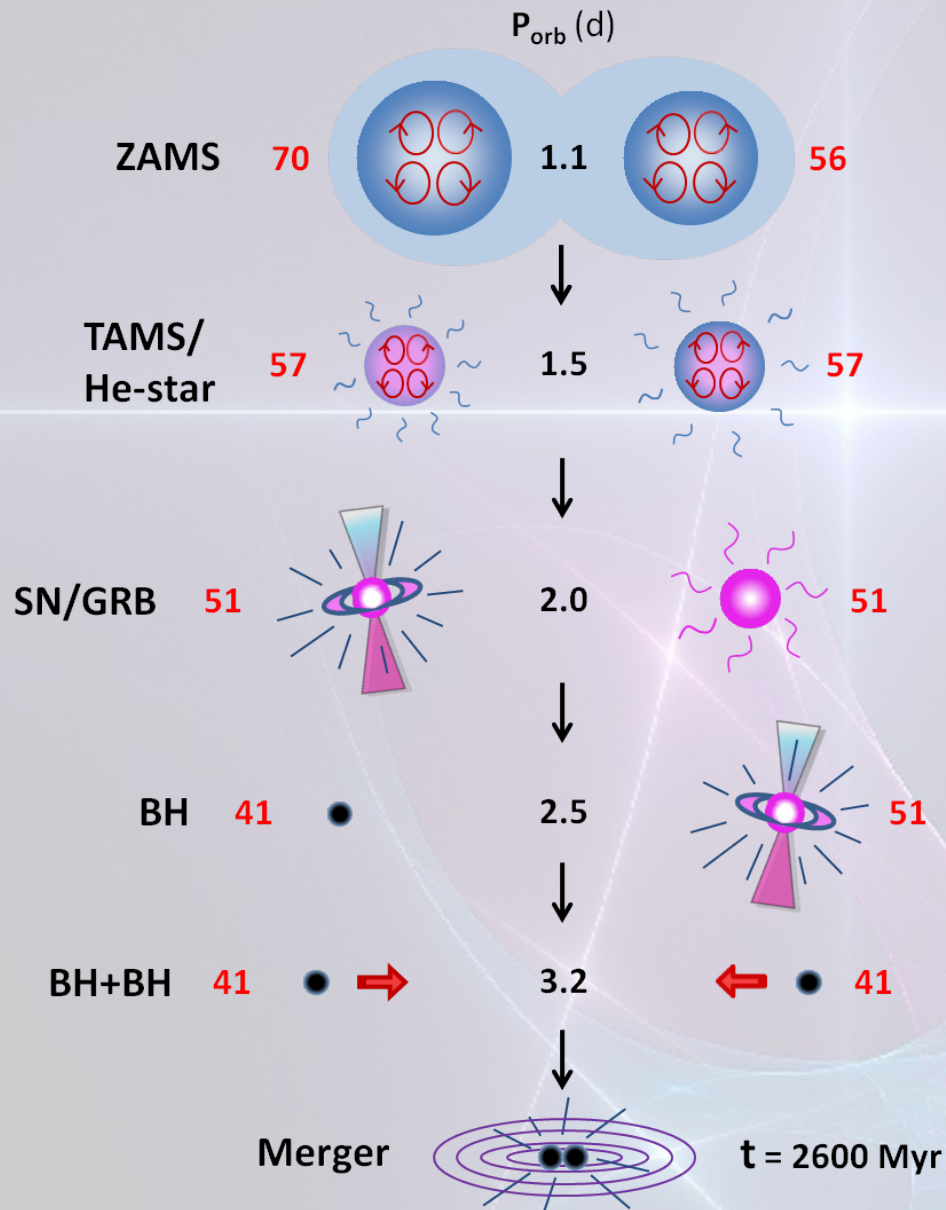
B ~ 10¹⁴ G
magn. powered
SLSN type I

B ~ 10¹⁵ G
IGRB
magnetar scen.

direct collapse to BH
133 M_⊙ < core
no explosion

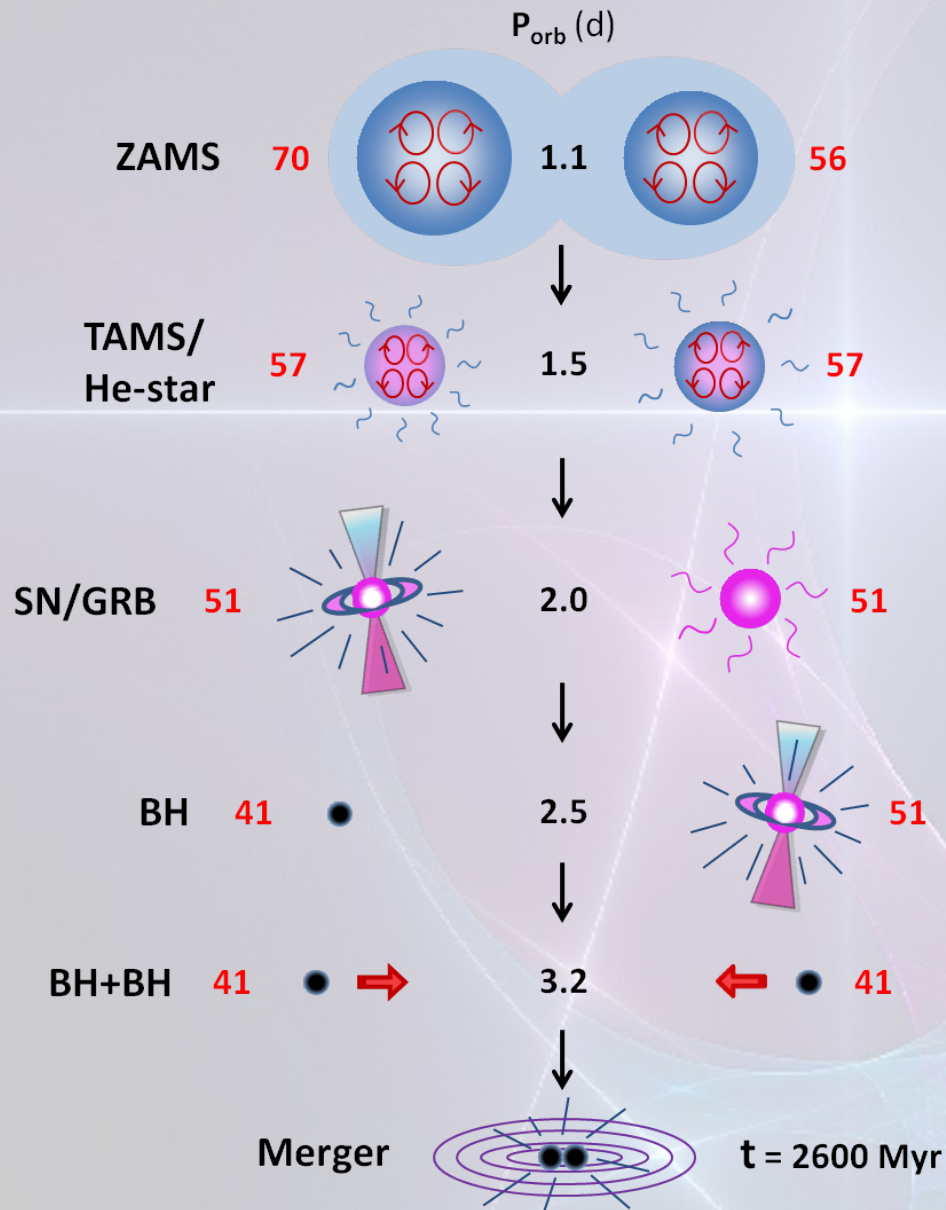
Credit: Szécsi et al. (in prep.)

BH-BH merger → Gravitational Wave detection + SGRB



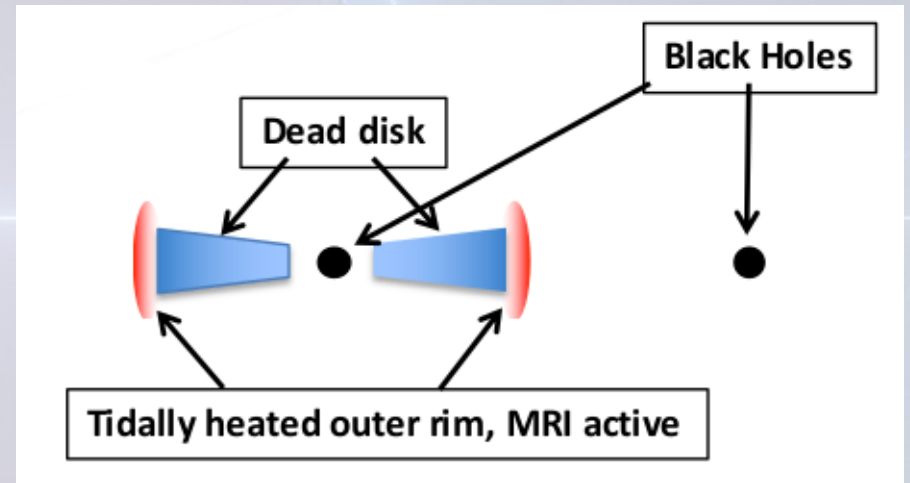
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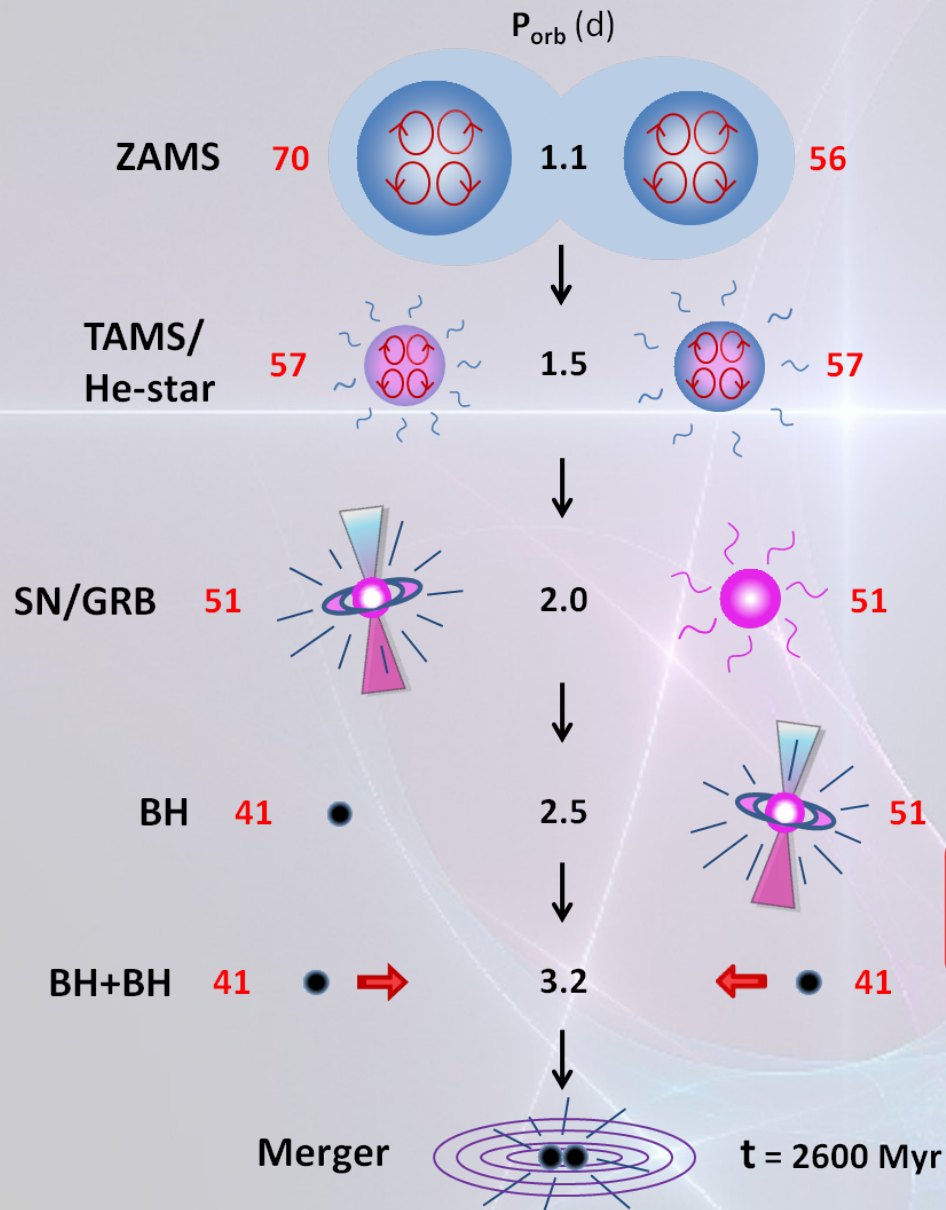
Perna+16:

second SN may be weak → long-lived disk from stellar envelope



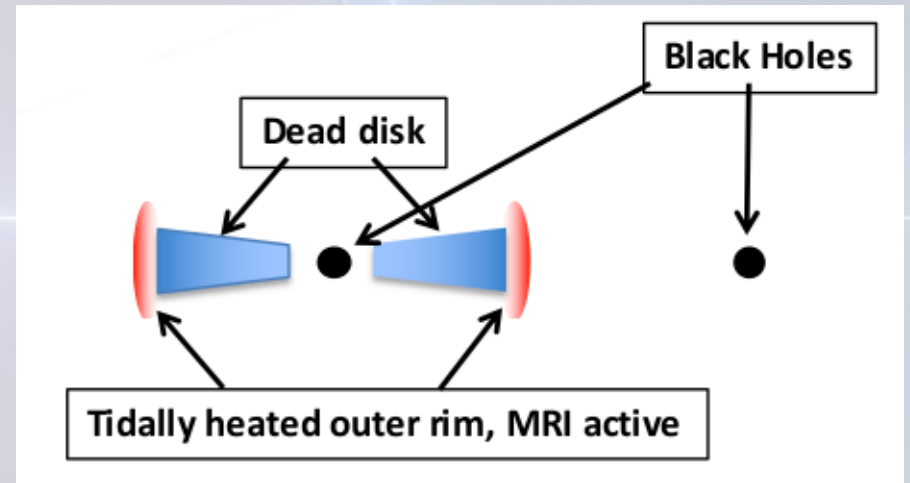
accretion re-vitalized by merger → SGRB+GW!

BH-BH merger → Gravitational Wave detection + SGRB



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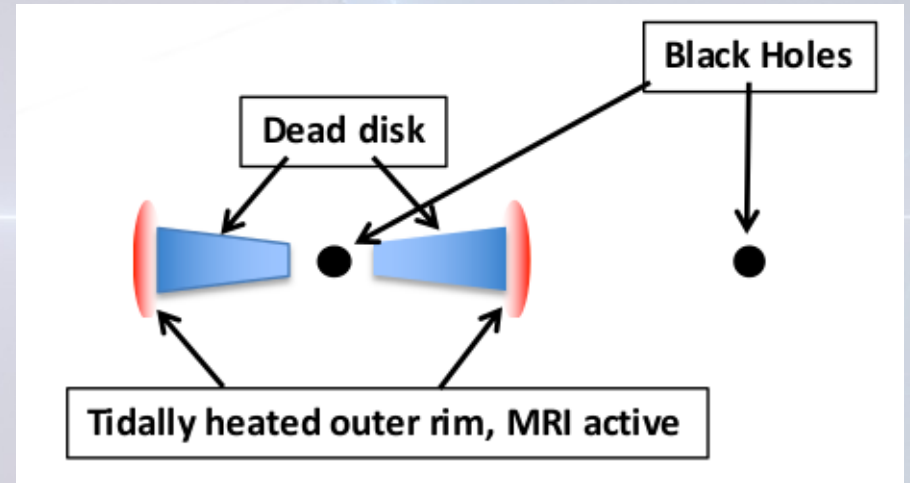
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Detection? Fermi! *Bagoly+16 (ADWO)*

BH-BH merger → Gravitational Wave detection + SGRB

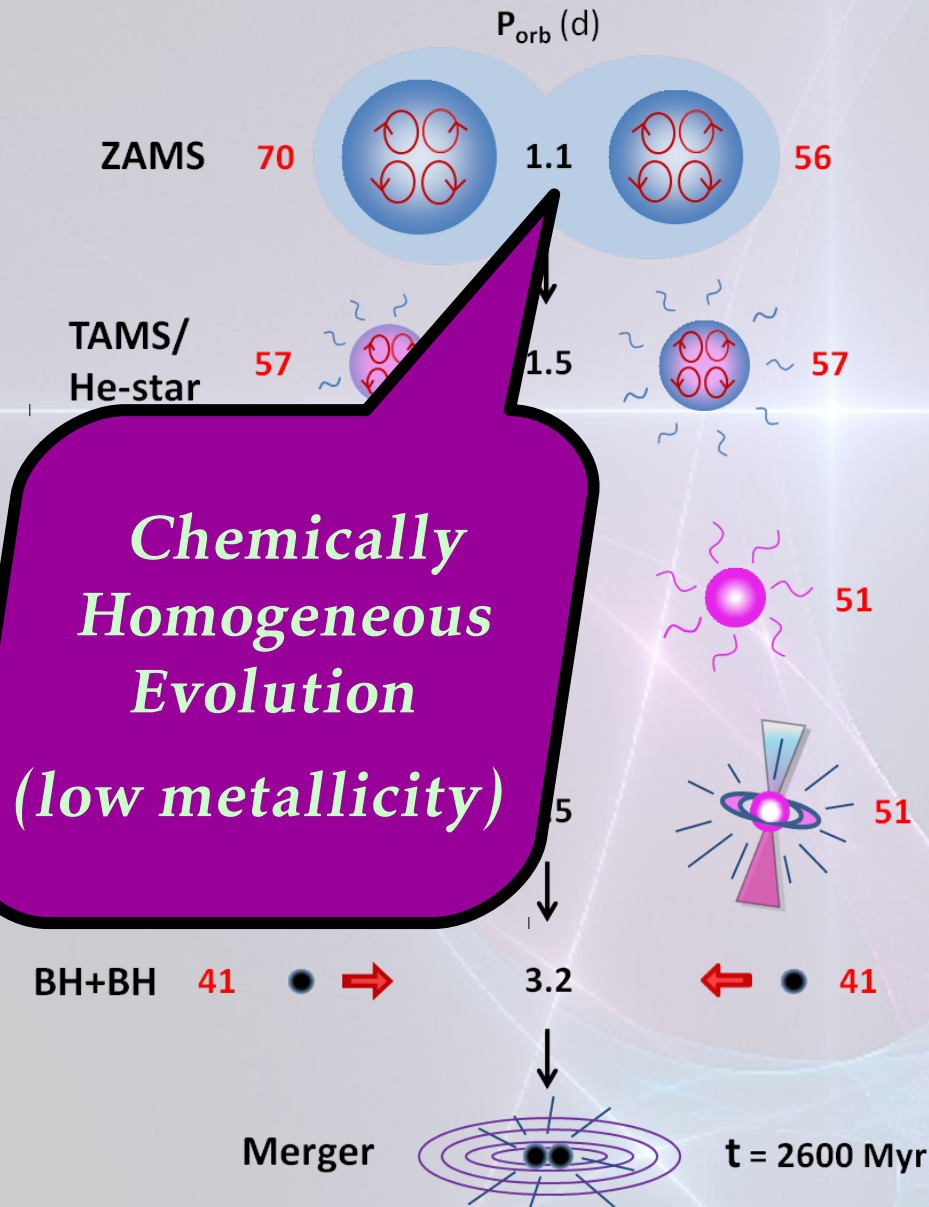
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