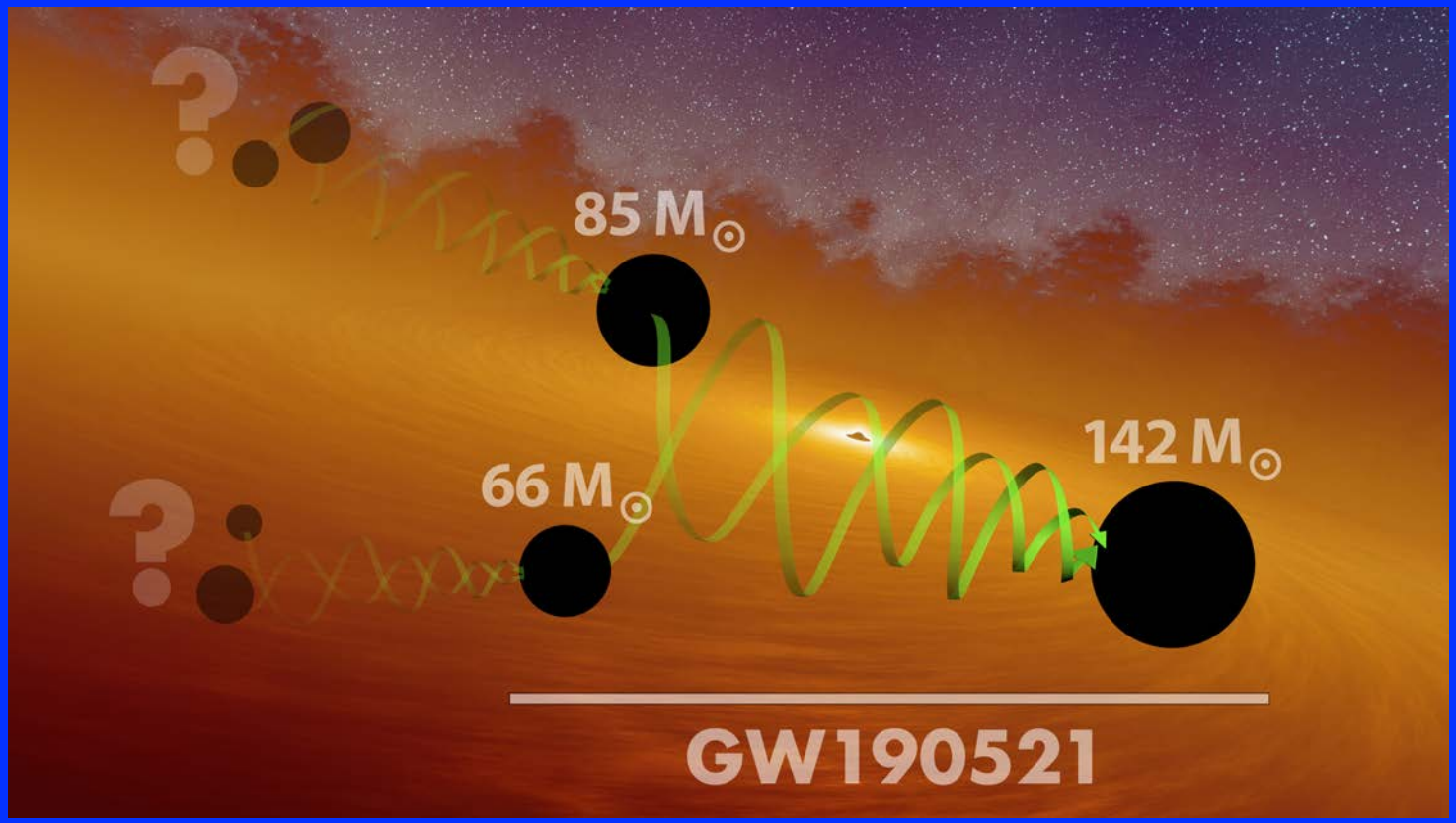
Forming an “Impossible” 85 Solar Mass Black Hole



Jorick S. Vink, E. Higgins, A. Sander & G. Sabhahit
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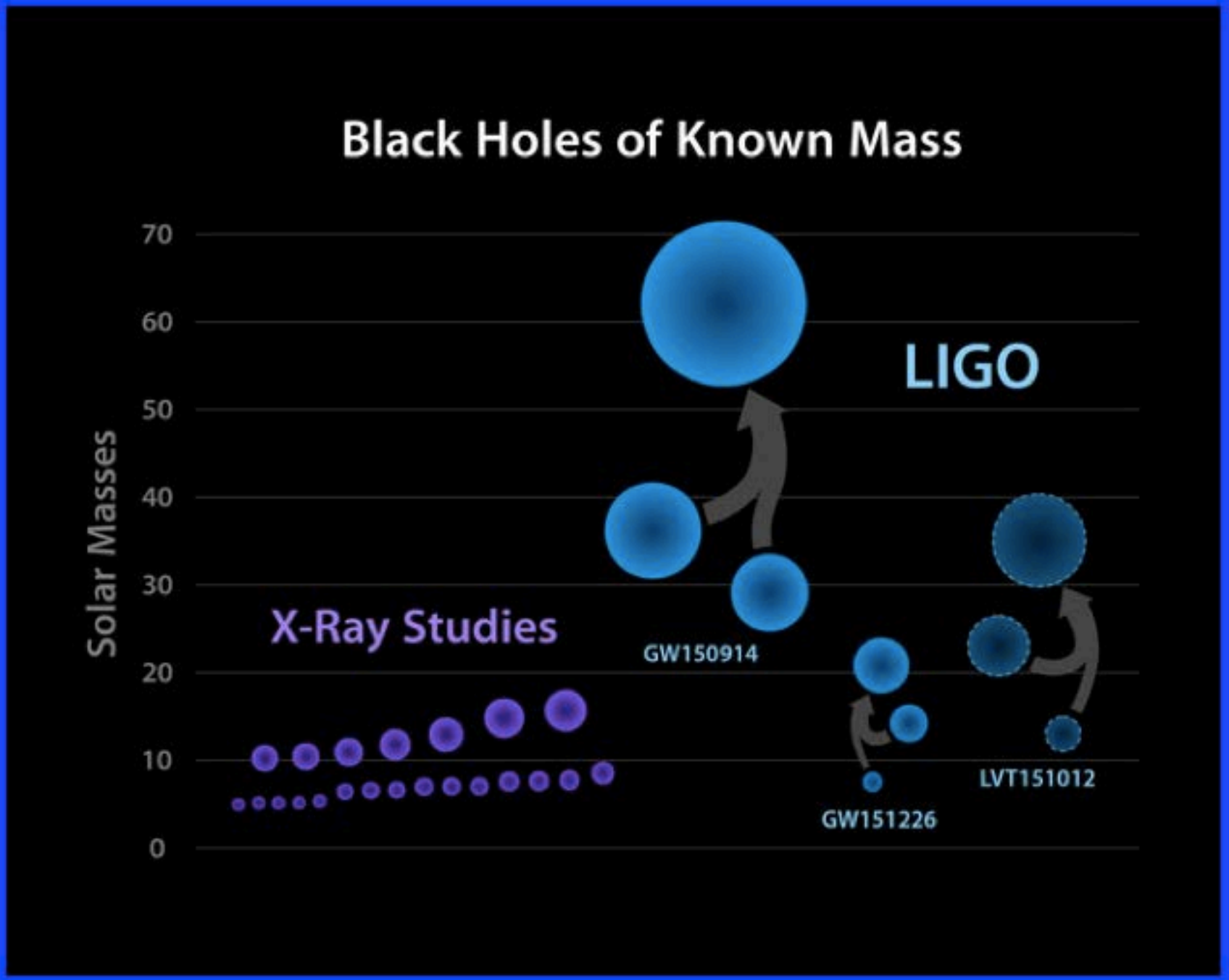
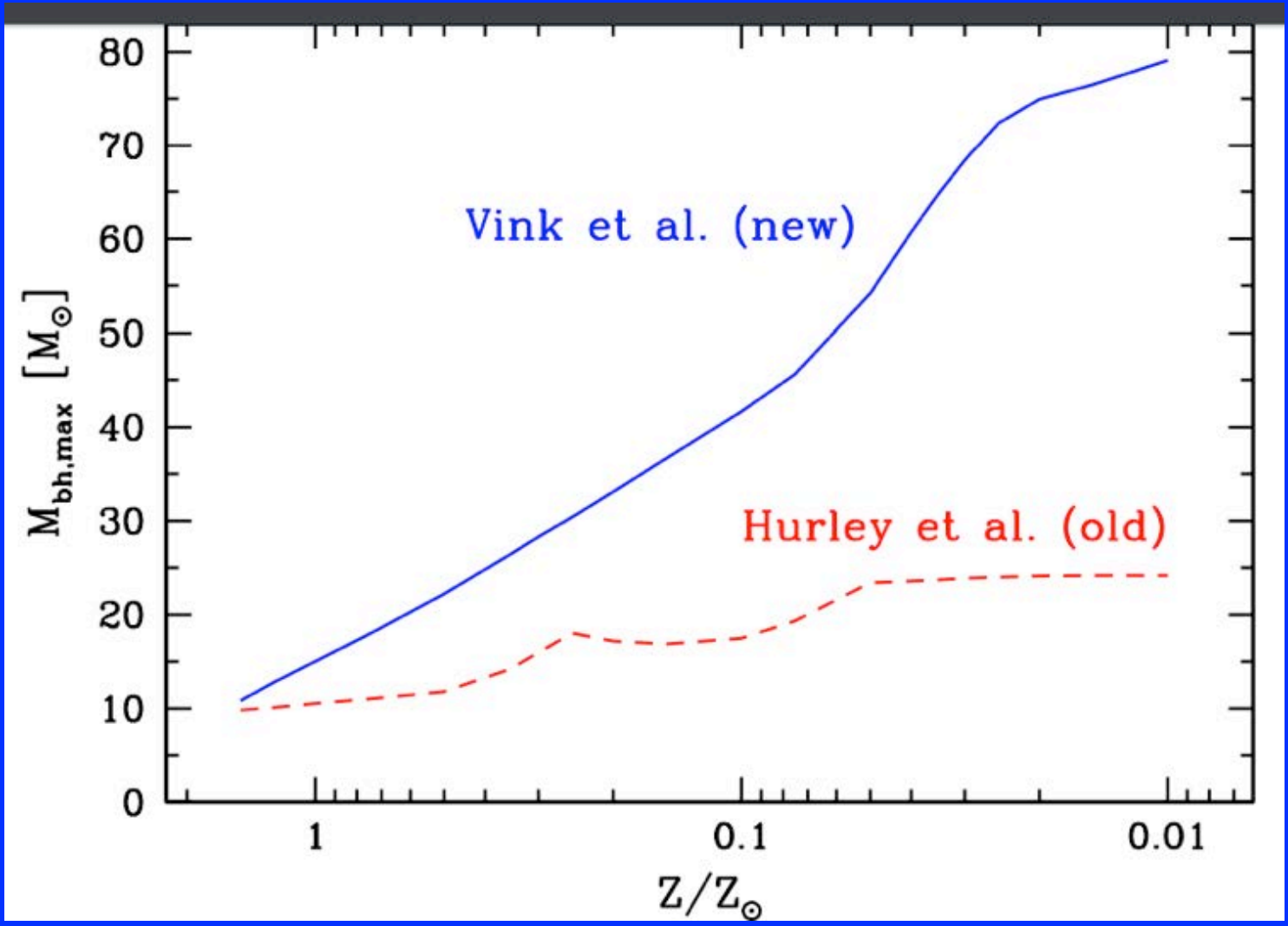
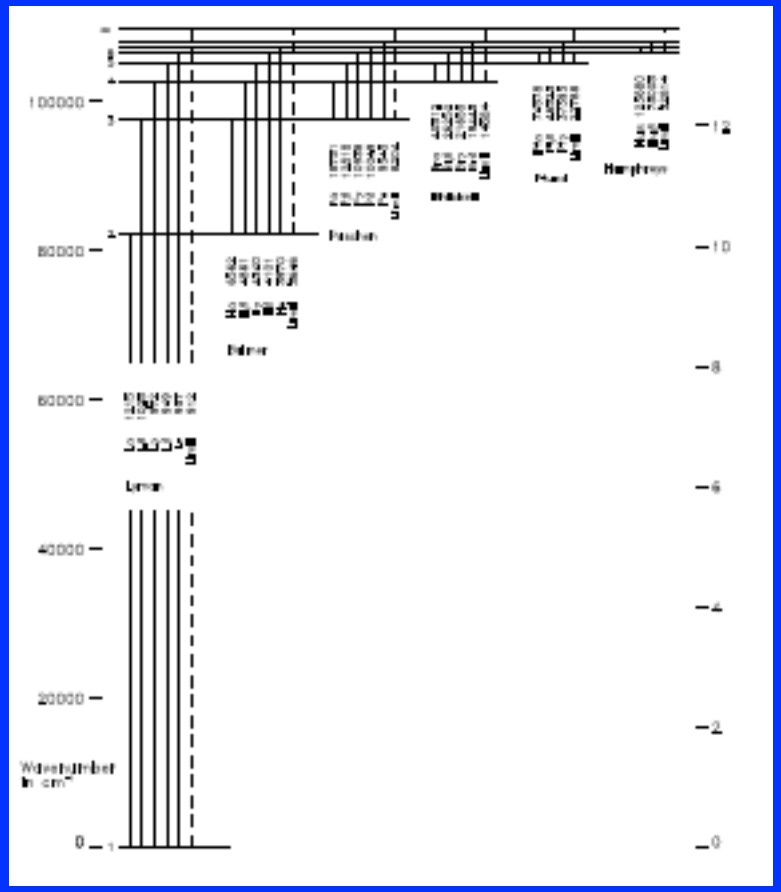

Black Holes of Known Mass
Solar Masses
70
60
50
40
30
20
10
0
LIGO
X-Ray Studies
GW150914
GW151226
LVT151012

“Heavy” black holes: How?

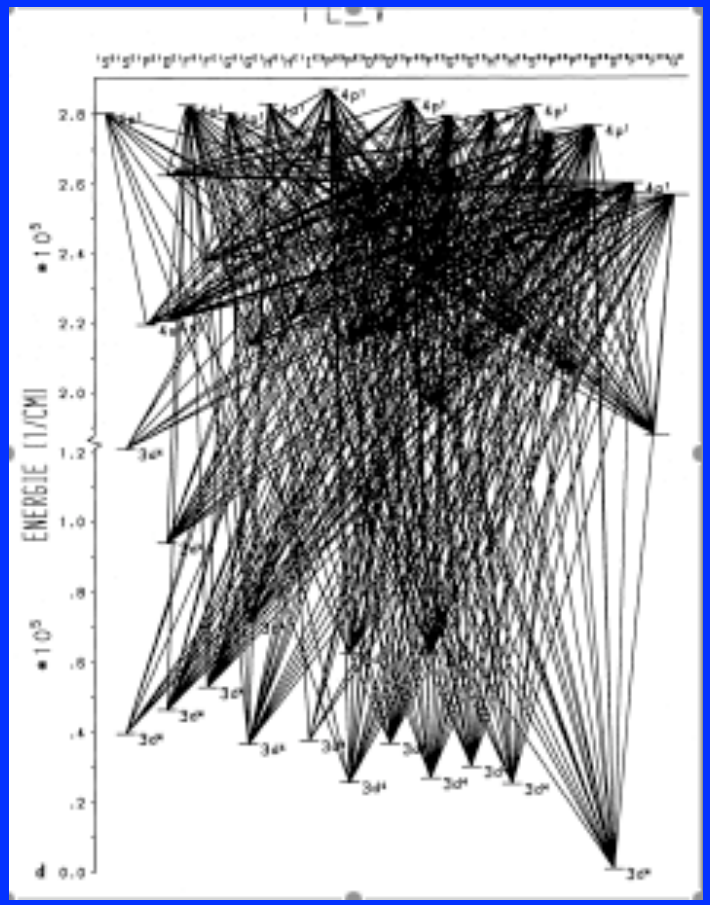


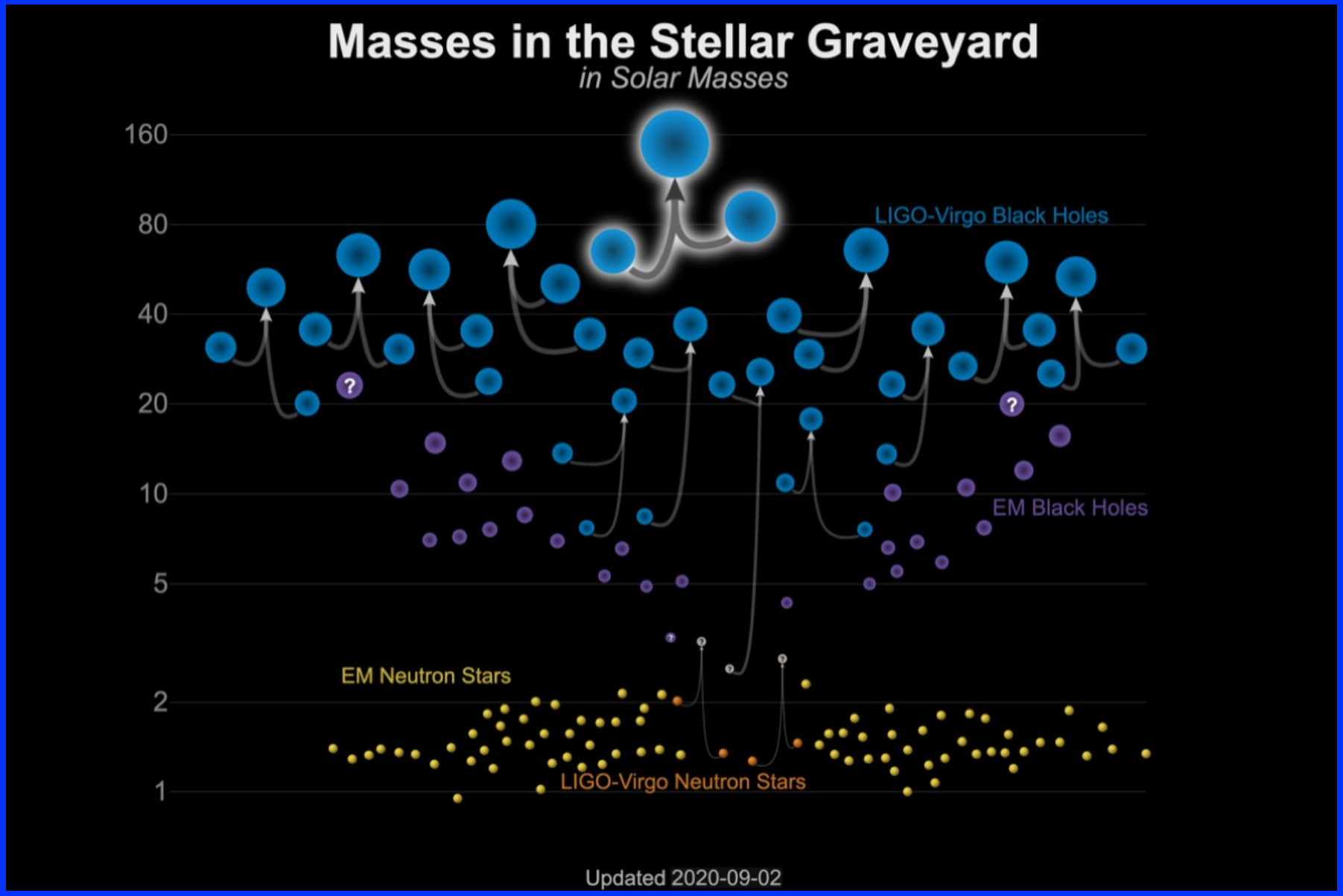
Belczynski..Vink..et al. (2010)

H atom

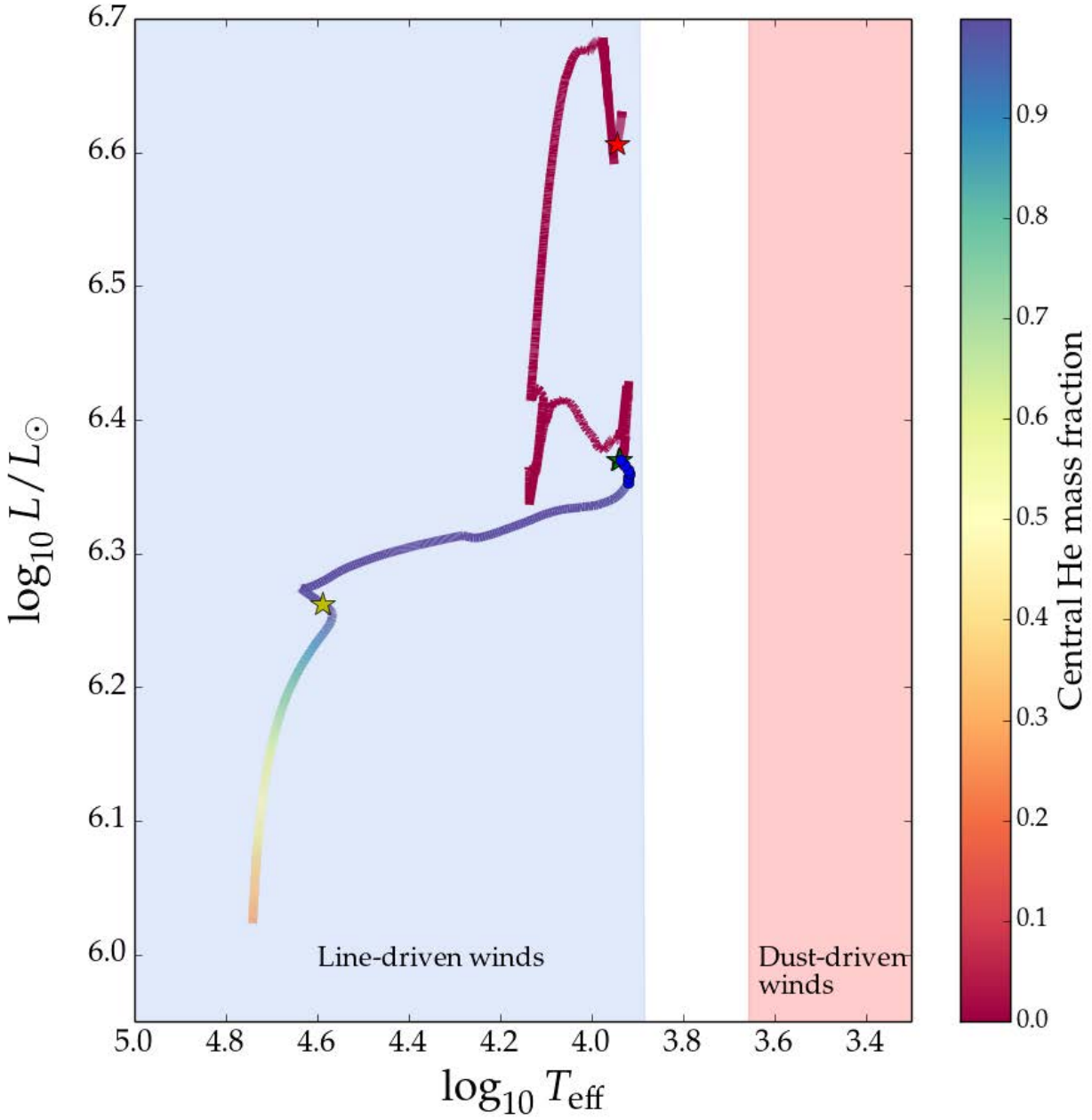


Fe V atom




Masses in the Stellar Graveyard
in Solar Masses
160
80
40
20
10
5
2
1
LIGO-Virgo Black Holes
EM Black Holes
EM Neutron Stars
LIGO-Virgo Neutron Stars
?
Updated 2020-09-02

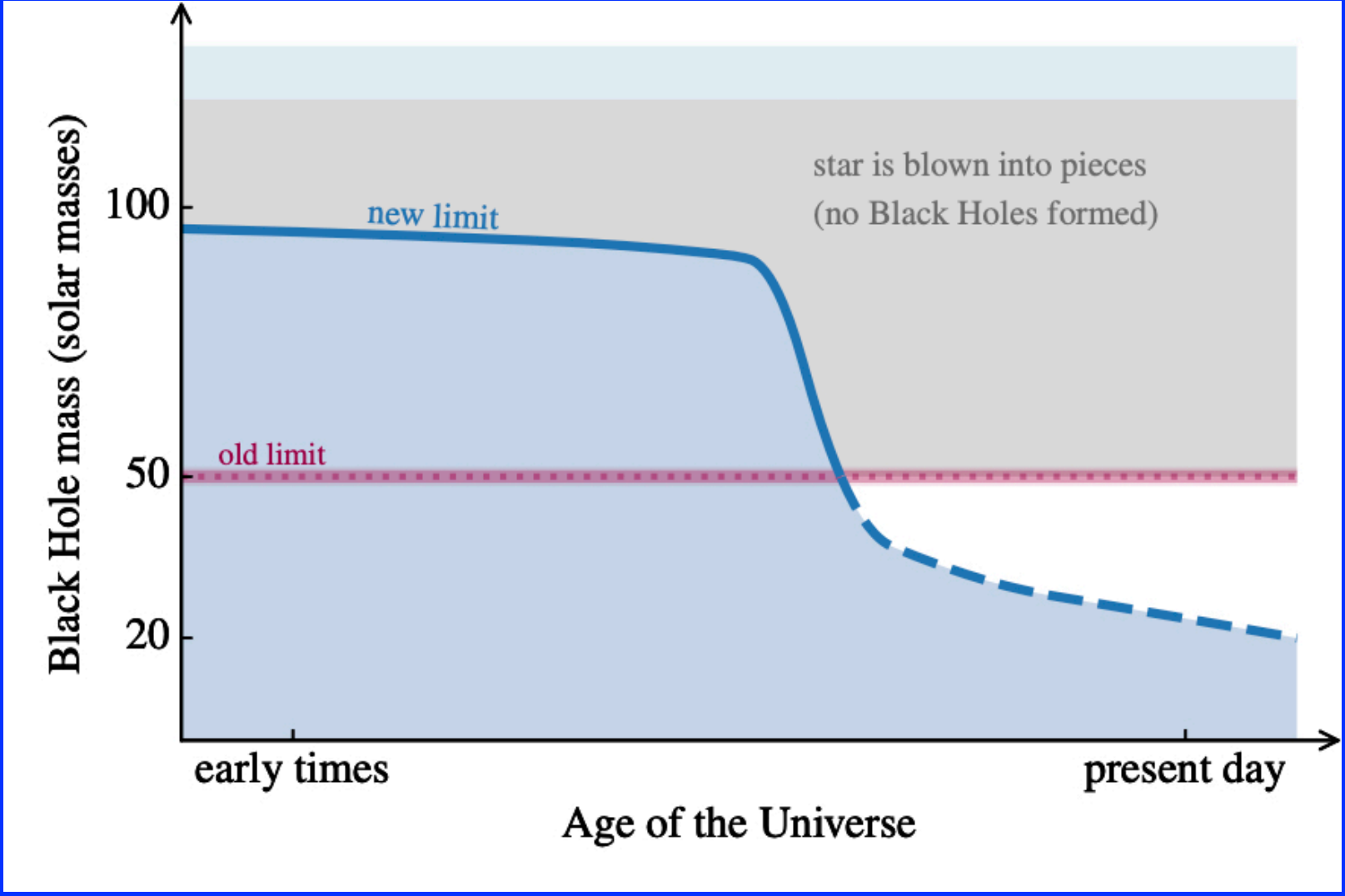
LIGO-Virgo



Vink et al. (2021, MNRAS 504, 146)

With MESA

Maximum Black Hole Mass across Cosmic Time



Vink et al. (2021, MNRAS 504, 146)

Summary

- Earlier in Universe lower metallicity
- Weaker Winds
- Heavier Black Holes

- 90-100 Solar Mass stars can keep Hydrogen envelope
- Collapse to 80-90 Solar mass Black Holes
- Maximum Black Hole mass as function of Cosmic Time

Vink et al. (2021, MNRAS 504, 146)
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