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Mind the gap: What can we learn about stellar astrophysics from gravitational wave detections of binary black holes?

Wednesday 28 July 2021 17:25 (20 minutes)

With the detection of binary black hole (BH) mergers from LIGO/Virgo we have opened up the field of gravitational wave astronomy and created a new window into the Universe. These discoveries bring new and independent information about how very massive stars end their life, and the final remnants they leave behind. In this talk I will discuss the stellar physics that goes into the formation of the most massive stellar mass black holes and how the detection of most massive merging pair of black holes to date, GW190521, with both BHs being in the “PISN mass gap” challenges this picture. I will show what physics goes into the location of this mass gap, and how robust we believe the estimate of the location of the mass gap is. I will then discuss what GW190521 informs us about the location of the mass gap, and the implications for finding both black holes in the mass gap. Finally, I will also discuss how measuring the location of the mass gap allows us to place constraints on uncertain stellar physics, namely the $C12(\alpha,\gamma)O16$ nuclear reaction rate and what GW190521 can tell us about this nuclear reaction rate.

Collaboration / Activity

N/A

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