A Blue Lurker Emerges from a Triple-System Merger

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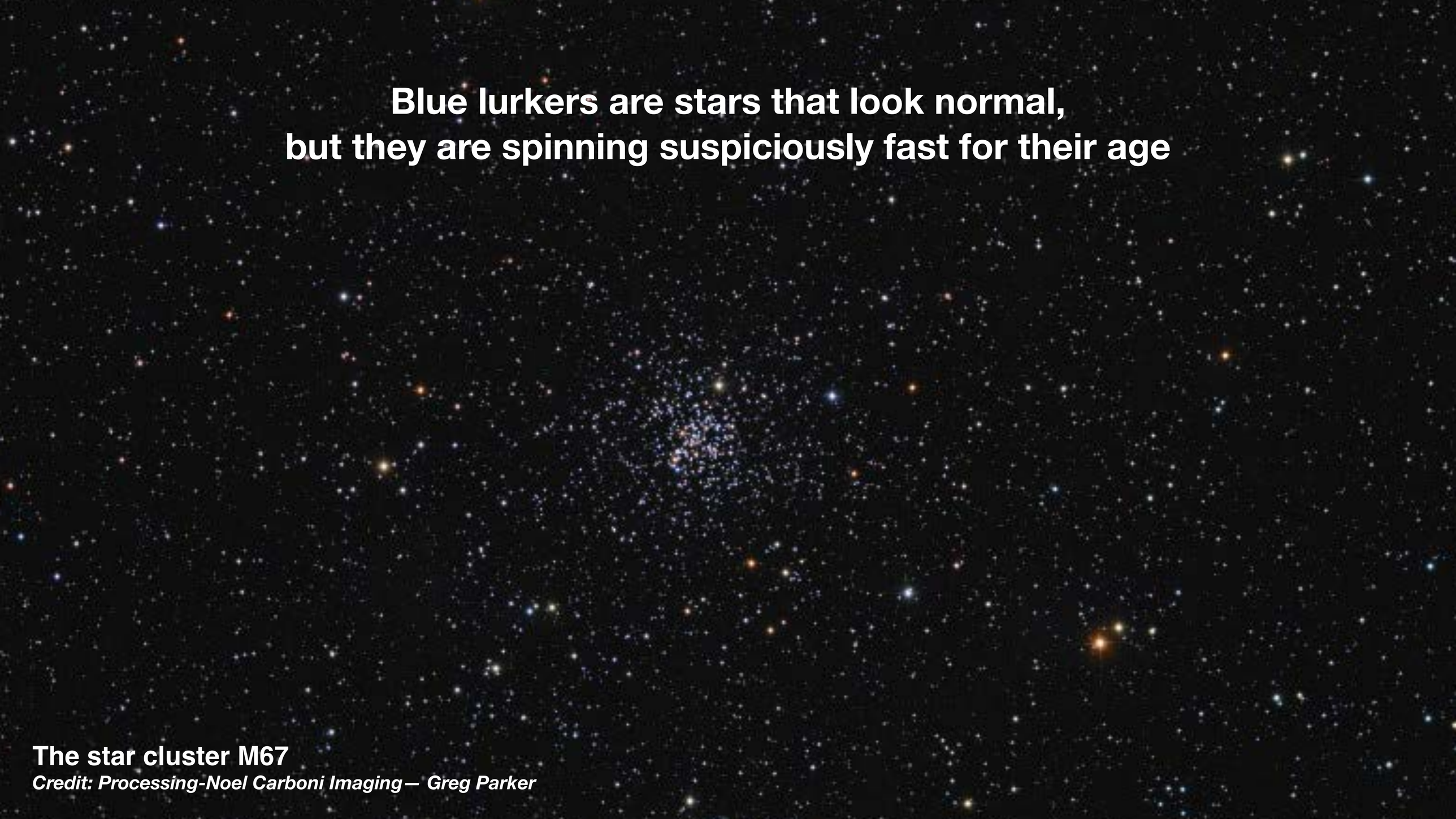
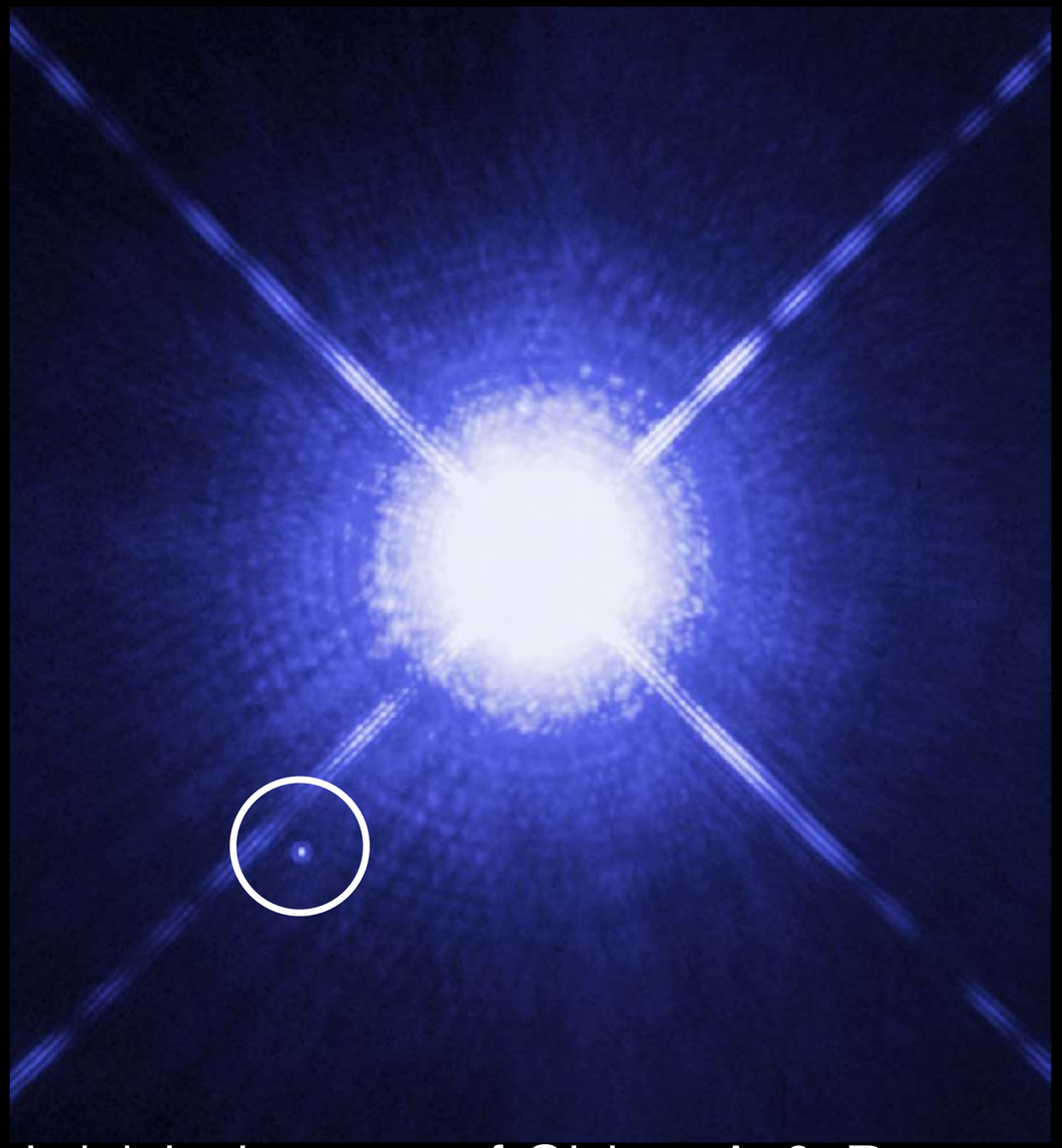


The star cluster M67

Credit: Processing-Noel Carboni Imaging— Greg Parker



Hubble image of Sirius A & B

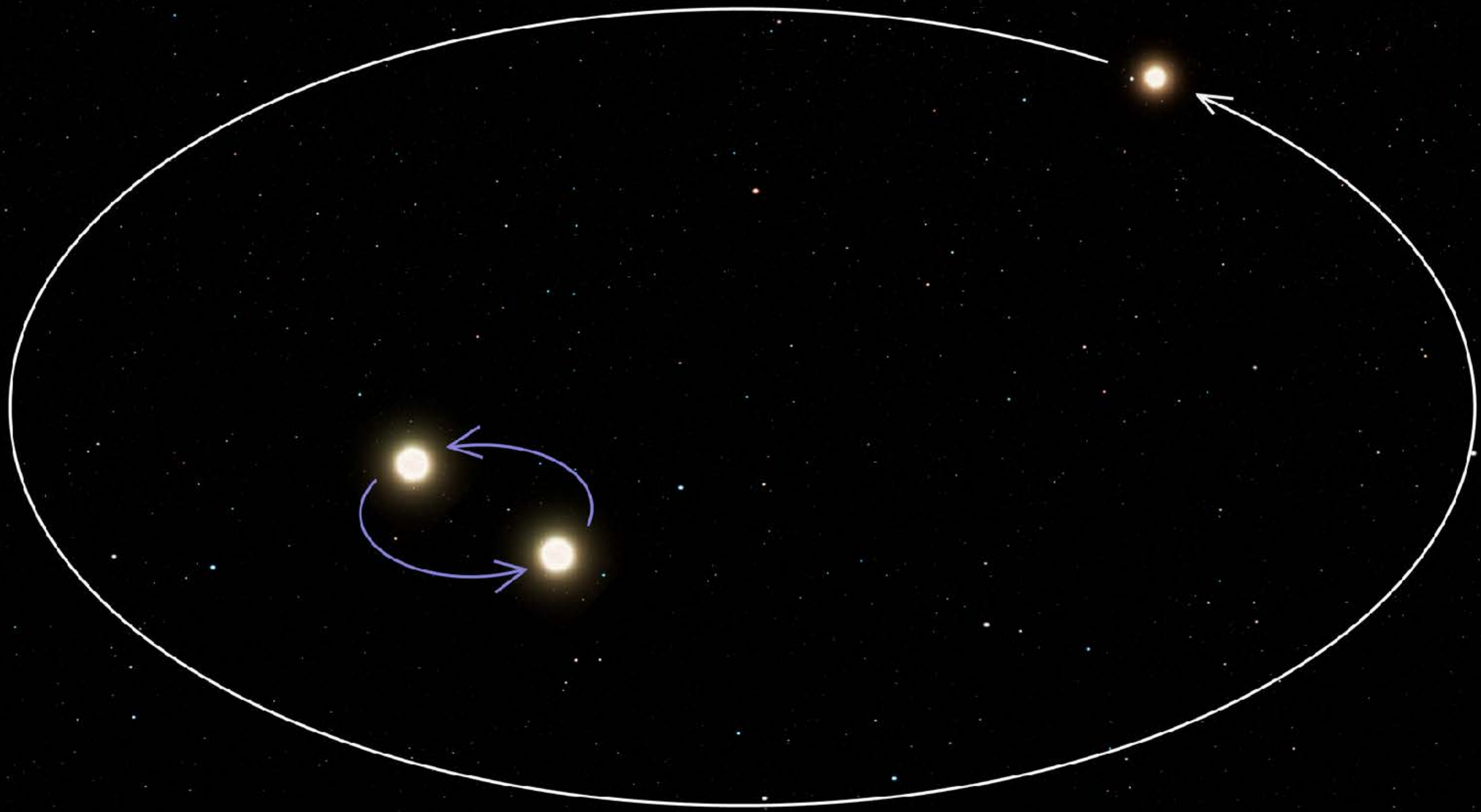
NASA, ESA, H. Bond (STScI), and M. Barstow (University of Leicester)

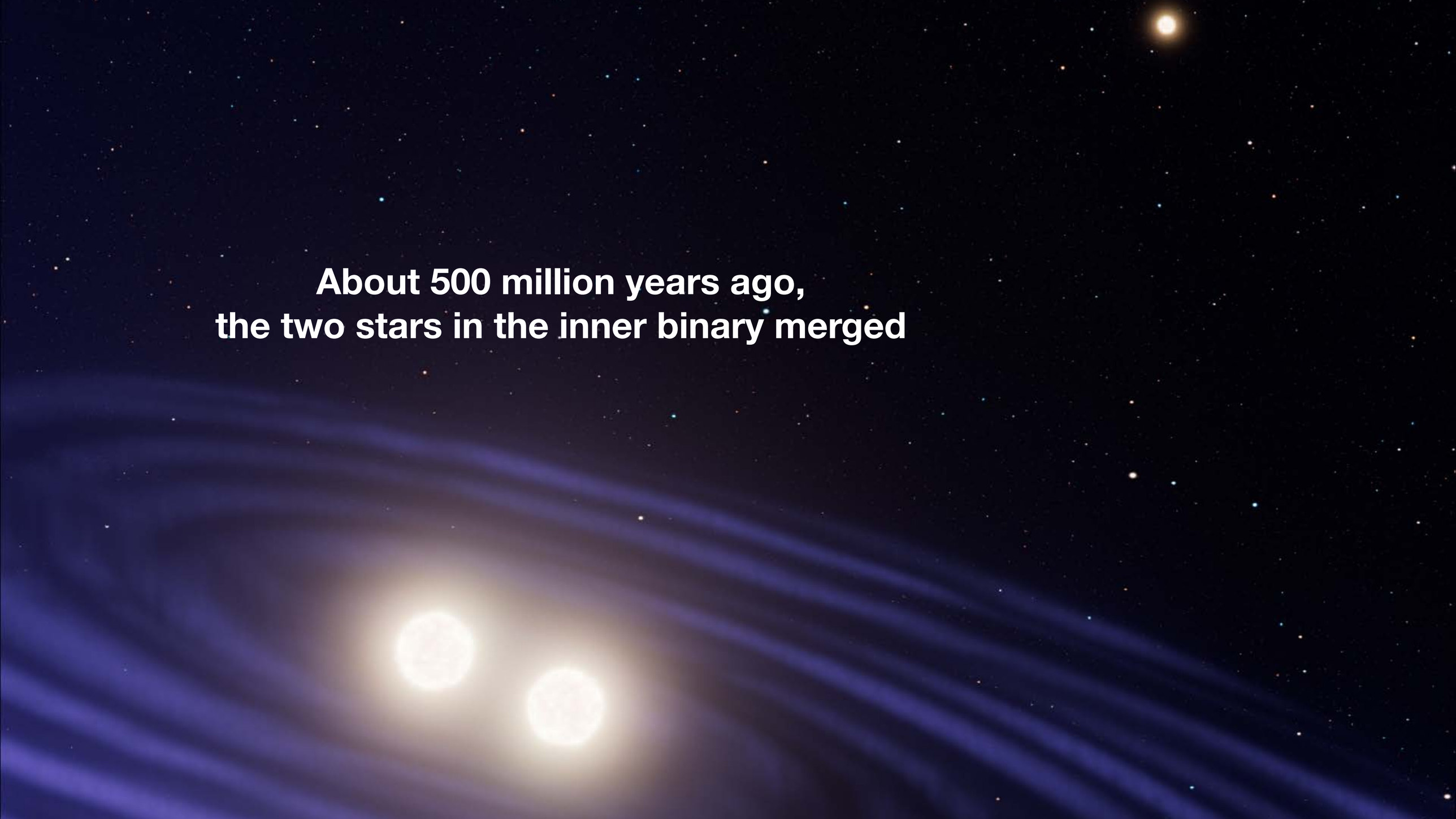
We pointed the *Hubble Space Telescope* at a blue lurker star in M67, and found that the blue lurker was not alone. It has a white dwarf companion

Only *Hubble* is sensitive enough it could have found this tiny white dwarf next to a bright blue lurker star

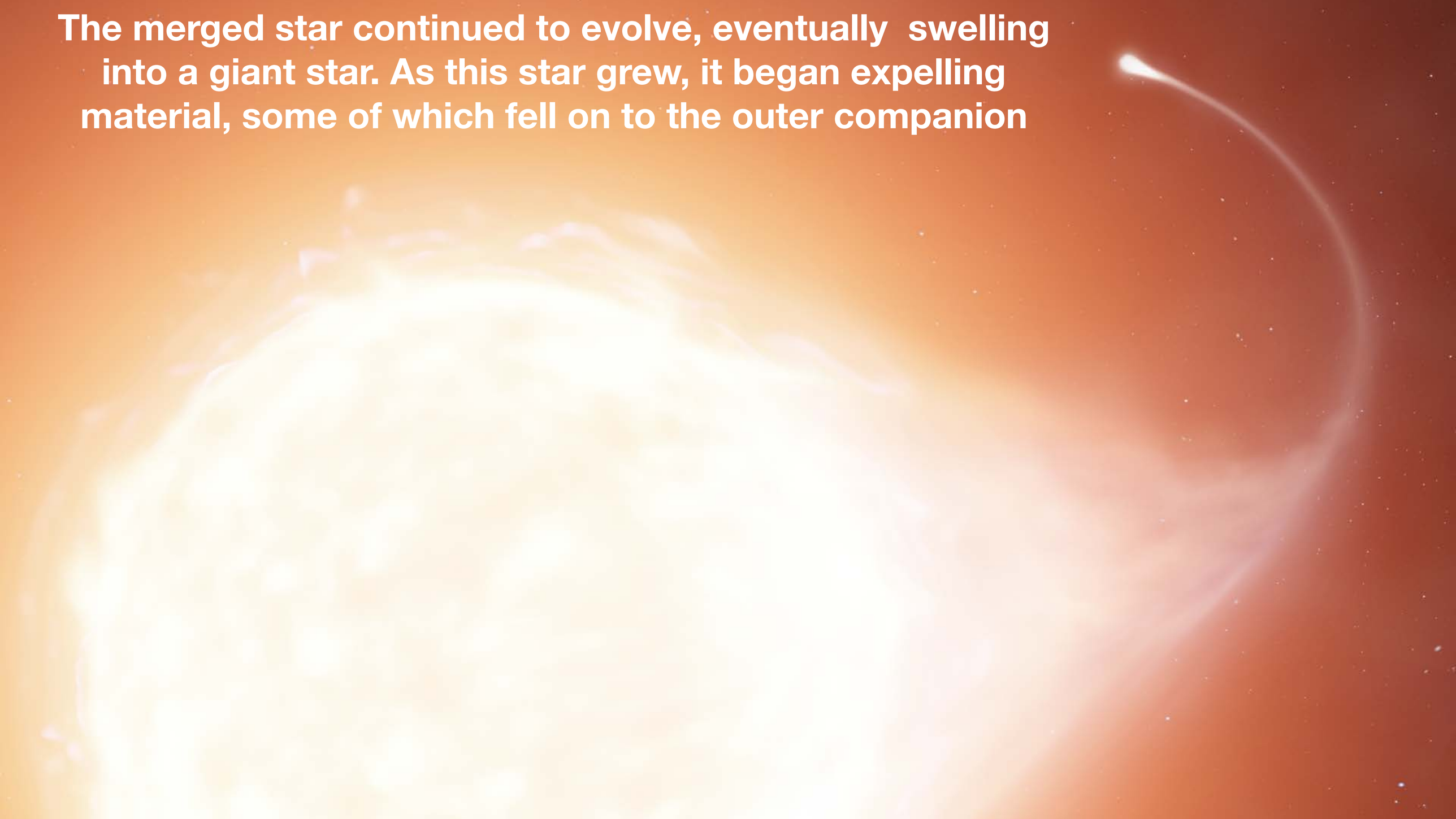
And there was an even bigger surprise… the white dwarf was far more massive than we expected. So massive it could not have descended from any normal star in M67

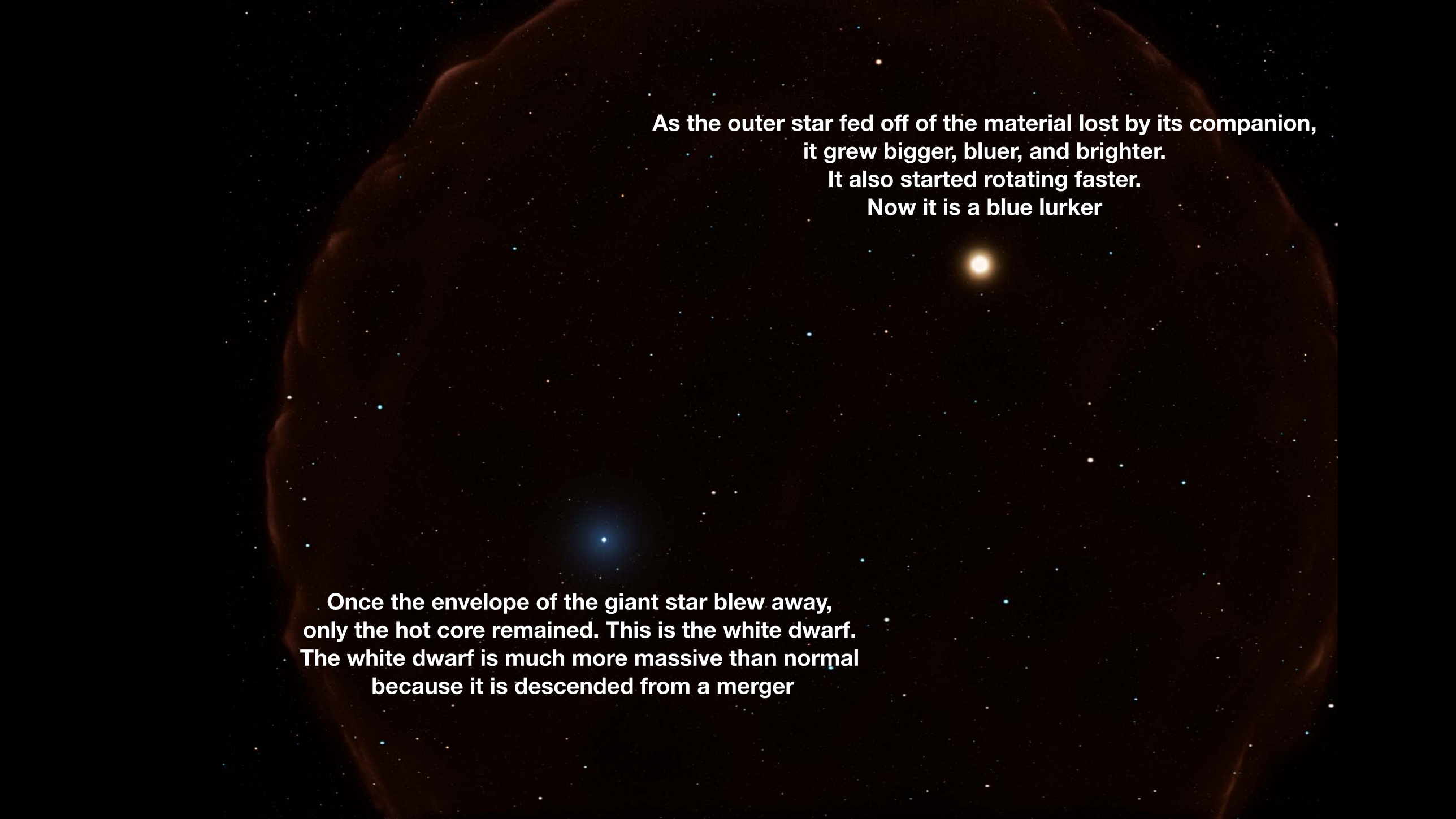
The system started as three Sun-like stars in a triple system!




About 500 million years ago,
the two stars in the inner binary merged

The merged star continued to evolve, eventually swelling into a giant star. As this star grew, it began expelling material, some of which fell on to the outer companion




As the outer star fed off of the material lost by its companion,
it grew bigger, bluer, and brighter.
It also started rotating faster.
Now it is a blue lurker
Once the envelope of the giant star blew away,
only the hot core remained. This is the white dwarf.
The white dwarf is much more massive than normal
because it is descended from a merger

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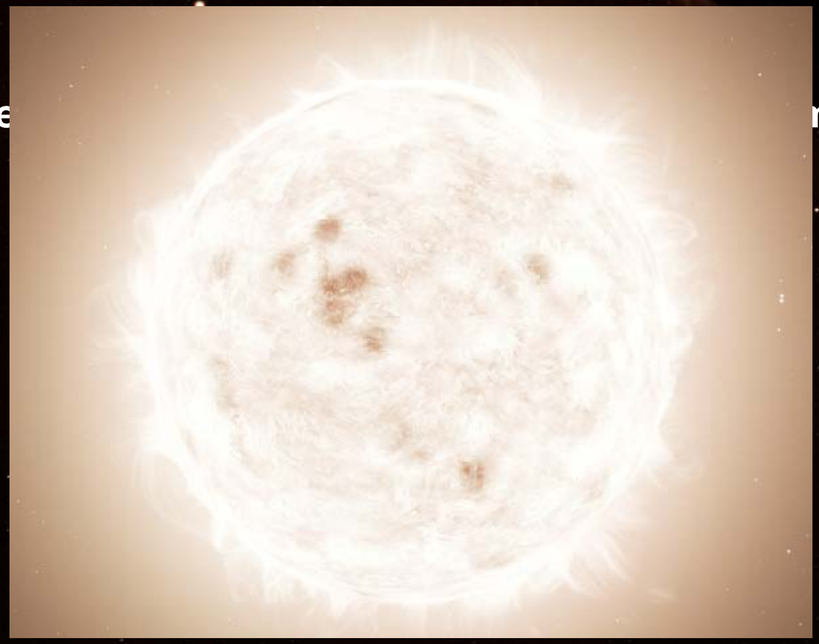

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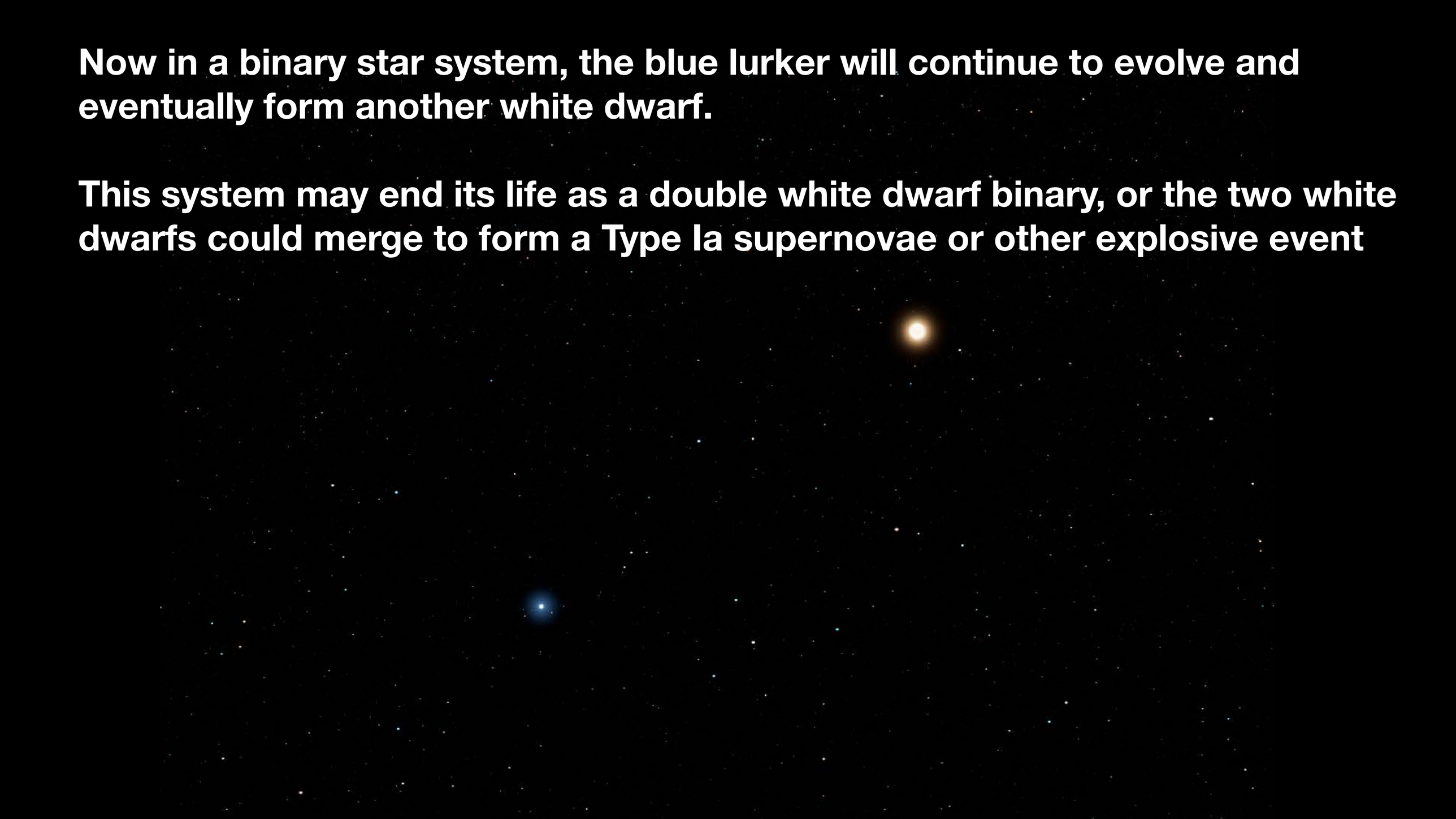
Once the envelope of the giant star blew away, only the hot core remained. This is the white dwarf. The white dwarf is much more massive than normal because it is descended from a merger

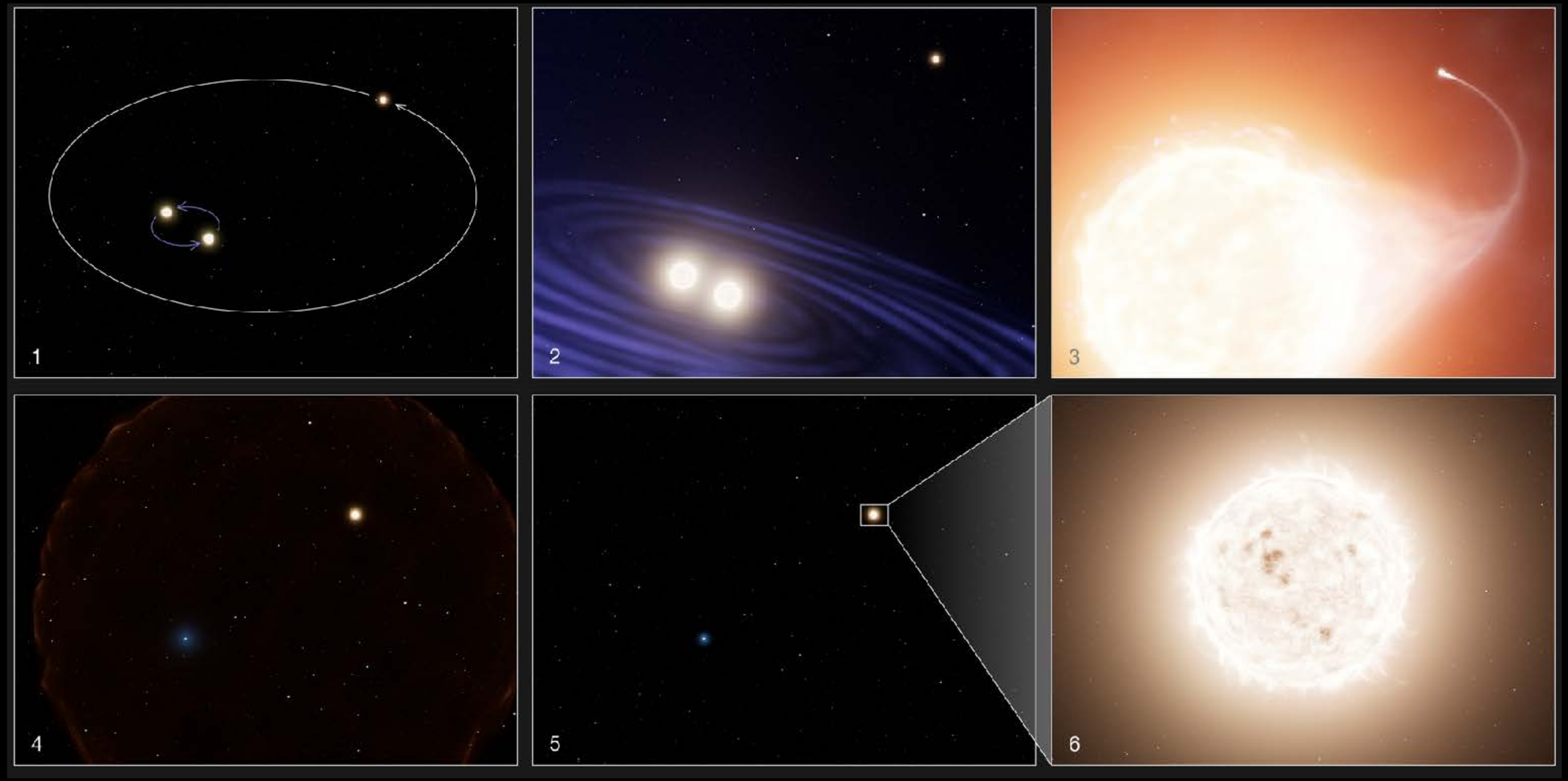
Now in a binary star system, the blue lurker will continue to evolve and eventually form another white dwarf.

This system may end its life as a double white dwarf binary, or the two white dwarfs could merge to form a Type Ia supernovae or other explosive event



Blue lurkers are rotating fast because they have gobbled up material from a companion!

Triple systems are fairly common, but we are just starting to understand how they evolve. The story of this blue lurker is an exciting glimpse of the interesting objects that can form when three stars interact.



Questions? Email me at eleiner@iit.edu