BLUE STRAGGLER STARS

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YOUNG MASSIVE & BLUE?

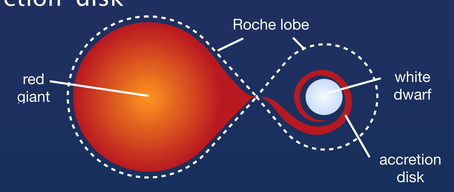
Blue Straggler Stars are main-sequence stars that are **higher in luminosity** and **bluer** than the average main sequence turn-off star in their associated clusters. A higher luminosity indicates that they have a **greater mass** than expected.

MERGERS

There are several theories that aim to explain how blue straggler stars form:

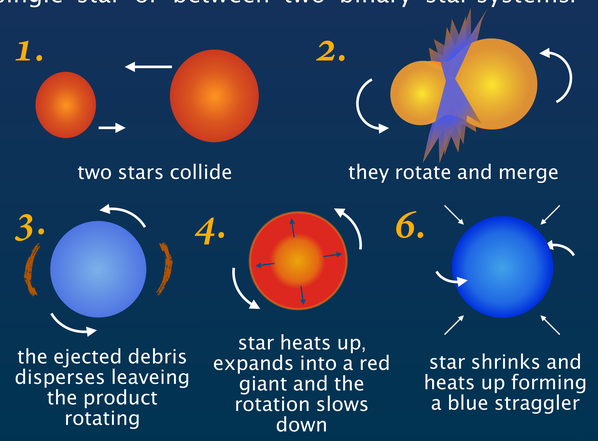
Mass Transfer

In a binary system, giant star loses material via Roche lobe overflow through an accretion disk

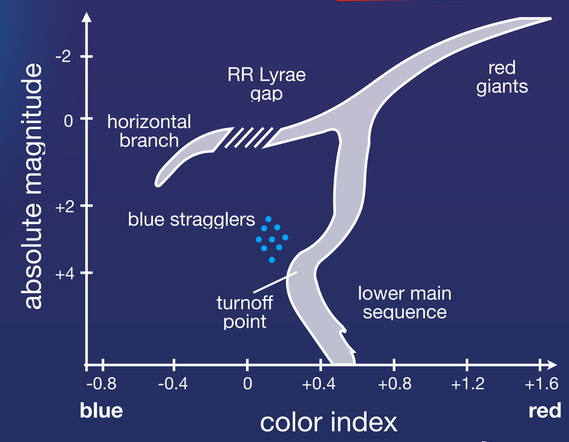


Collisions

between two single stars or a binary system and a single star or between two binary star systems.

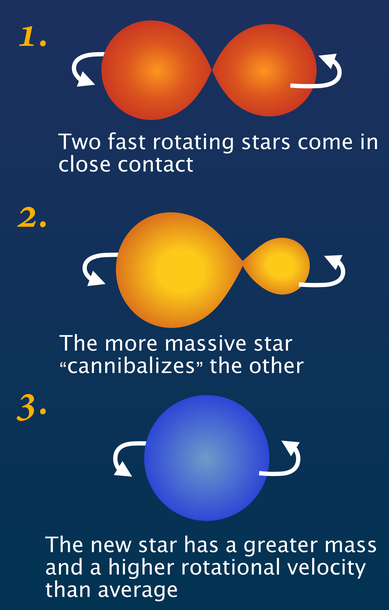


BEYOND the MAIN SEQUENCE TURN OFF



Coalescence

process by which two or more stars in a primordial binary merge during contact to form one star.



FINDING BLUE STRAGGLERS

The goal is to identify Blue Straggler Star candidates that are more than twice as massive as a main-sequence turn off (MSTO) star

Method

1. Confirm the membership of the stars in the cluster by plotting proper motion diagrams
2. Identifying the blue stragglers based on their location on the color-magnitude diagram of the cluster
3. Overlaying theoretical isochrones on the color-magnitude diagram
4. Using the best-fitting isochrone to determine the mass of the blue straggler star
5. Comparing the mass of the blue straggler to the mass of the main sequence turn off star

WHY STUDY THEM?

Because blue stragglers occupy a region on the Hertzsprung-Russell diagram that astronomers expect to be void:

- ★ they challenge the preexisting stellar evolutionary models
- ★ They are young stars in old clusters which should not exist
- ★ Stars with a high luminosity and a high mass should have died a long time ago
- ★ knowing how they formed could alter, add or completely change the theory of stellar evolution

RESULTS

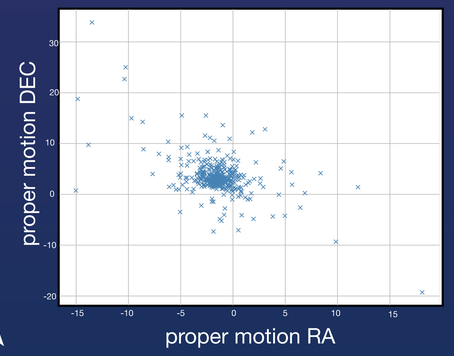
Several blue straggler stars were identified in the chosen **clusters**.

One star from Melotte 66 was identified to be twice as massive as a main-sequence turn off (MSTO) star.

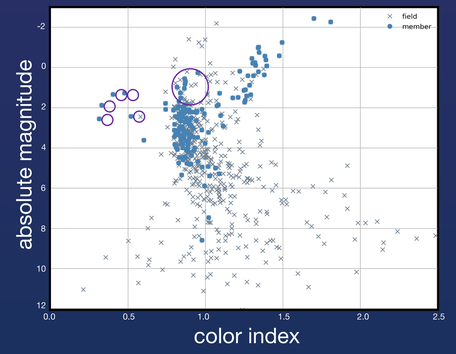
Clusters

- ★ Berkeley 39
- ★ Melotte 66
- ★ Messier 67
- ★ NGC 188
- ★ NGC 6791
- ★ NGC 7789

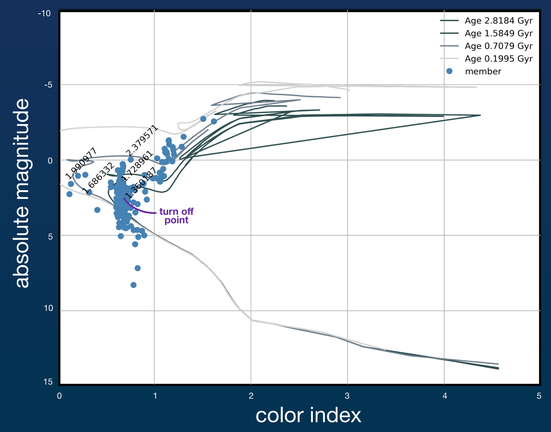
Graphs (for Melotte 66)



members of the same cluster approximately share the same proper motion.



The color-magntude diagram shows a few possible blue straggler candidates located beyond the MSTO



The isochrones show that the blue stragglers appear to be younger than the rest of the stars in the cluster.

Members of the cluster were adjusted for interstellar reddening.

Reddening was a major limitation in the study.

The MTSO mass is shown on the color magnitude diagram.

Mass of the blue straggler candidates is also shown.