Stellar Metamorphosis: Transformation Curves on the Wolynski-Taylor Diagram

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May 26, 2019
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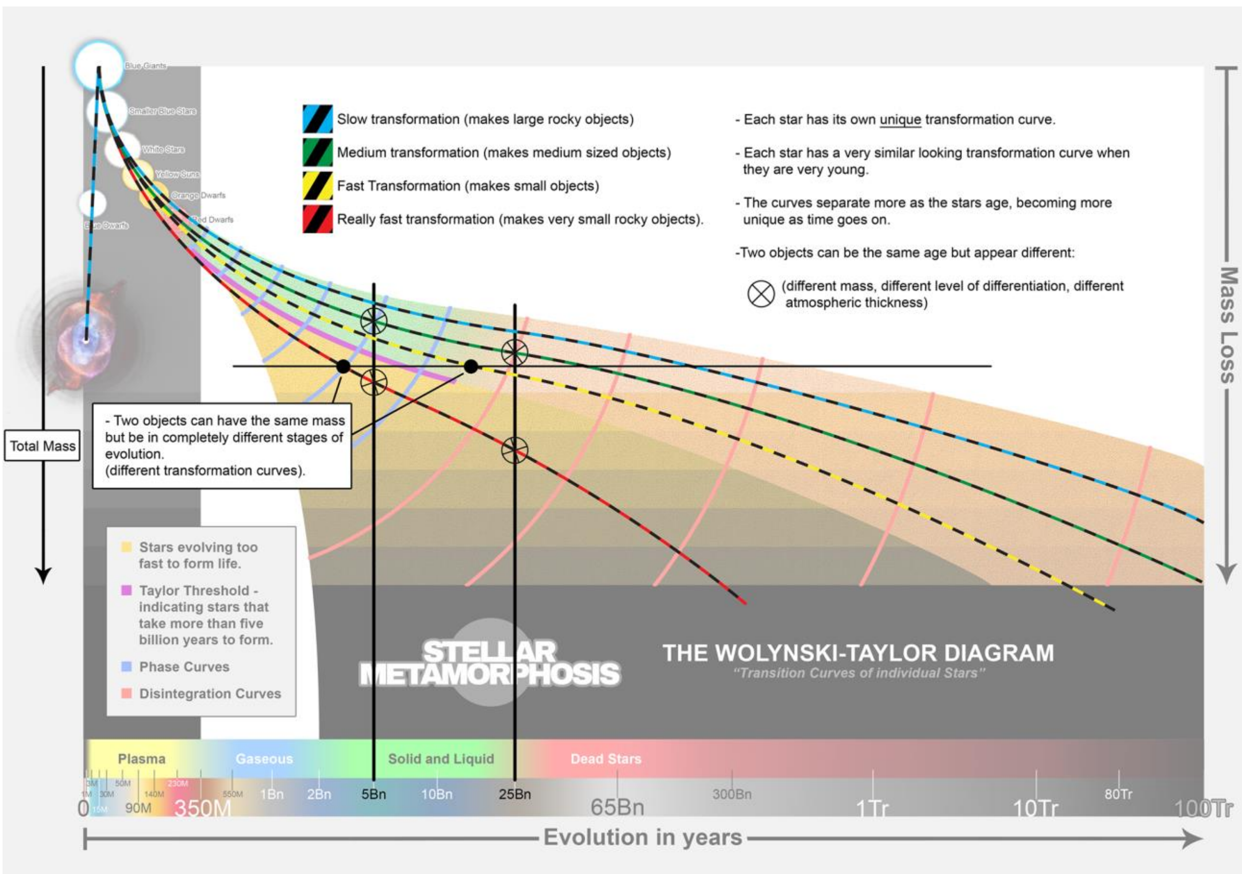
Abstract: In the general theory stars evolve into what are called "planets/exoplanets". Some aspects to transformation curves are explained on the Wolynski-Taylor diagram.



There is quite a lot of information that can be gathered using the WT diagram. Outlined in the graph above:

1. Each star has its own unique transformation curve. Think of stars as being individual people. Sure, they may be quite the same, and appear the same, but there are small differences that distinguish

all stars from all other stars. Even stars that have extremely similar masses, diameters, elemental abundances, ages, etc. probably did not orbit similar stars in their past. Think of a transformation curve as the DNA of a star, it is what "codes the proteins" for the star's next stage of metamorphosis. Though, variables can change the star and rip it from a slow steady transformation curve and make it move lower, such as being adopted and ripped away from a more docile distant red dwarf host to a much bigger, hotter blue giant host (which can take it close in and rip it's atmosphere away much quicker.

2. There are no stepped transformation curves though, they are continuous. The differences between transformation curves are not discrete and static, but continuous and dynamic.

3. Transformation curves are not the entire history of the star, but can be used to make a guess of their future and infer their past, depending on their mass. More work will need to be done to further elaborate that fact.

4. You cannot have a star on a transformation curve and move that star to the next higher transformation curve. If anything, the star can either remain on its curve, or drop down. It cannot go back up. Think about it like a check valve used in plumbing. Fluid can go in one direction, but if it tries to flow backwards the ball or valve disk will stop it. The fact that the star cannot gain any significant mass to move up to a higher transformation curve is outlined in the principle of mass loss, which takes part after the extreme blue giant phase of stellar evolution. It can gain mass though, just not more than it loses. This is outlined in the principle of mass conservation, something that has a net mass loss becomes less massive.

5. The similarities of transformation curves is closer the younger the star, and the similarities can decrease statistically as they grow older and evolve. The Red, Yellow, Green and Blue curves on the graph all were lead from much larger, hotter stages of evolution, but they all lost mass in different amounts as they aged for various reasons. This means that as they age, they become more unique, thus will give rise to various characteristics even though they could all be the same age. They can be the same ages, but have different masses, different levels of differentiation, different atmospheric thicknesses, etc.

6. Stars can be the same mass, but this does not necessarily mean they have the same levels of differentiation, atmospheric compositions and thicknesses, D/H ratios, etc. What is really great about this graph is that just because they have the same mass, does not make them the same age, as they could have been travelling down different transformation curves. The graph outlines the fact that you could have two stars the same mass, but one be ~4.8 times older than the other, ~3.5 billion to ~17 billion.

7. The cross symbols $\otimes$, are used to show that two stars can be on a very similar transformation curve as another, but have different masses, ages, and a host of other different properties. The idea is to show that just because two stars appear different and have huge measureable differences, does not mean they have different pasts, when their pasts might be quite similar. This is important because it can be used to predict the future of Jupiter, or any star for that matter, if the variables are honed to very exacting levels, and orbital adoption/ejection and stellar movements in galaxies can be computated much more accurately.

8. The term "hot Jupiter" would be a star that is getting ripped apart by a hotter host. That would be a good example of a star that is moving on a faster transformation curve.

9. The term "ice giant" would be a star (Neptune, Uranus) that orbits so far away from a host, that it has more time to build up an inner core (the future Earth), and has more material to work with before the atmosphere is completely lost. So those would be on slower transformation curves.

10. The transformation curves are ideal at the moment, and have more refining to do. What has happened though is that a new paradigm of stellar evolution is being made, counter to the dogma. This new paradigm is shared with Anthony J. Abruzzo, whom I think the word "transformation" is best suited to define the curves, to account for the idea that gas giants transform into rocky worlds, in his paper here: https://www.gsjournal.net/Science-Journals/Research%20Papers-Astrophysics/Download/1164

11. As is noted, stars cannot have their ages set to host stars, because they are highly evolved stars themselves as noted in the General Theory and in the graph above. A companion star can be vastly older than its host, this is evidenced by all the highly evolved stars in our system that are vastly older than the Sun, and some even older than others. It is impossible for them all to have formed in the same disk, they are just too different now, and all have past histories that are also different, as evidenced by their physical and orbital characteristics.