

# The Cooling Principle of Stellar Metamorphosis

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Abstract: According to the 1<sup>st</sup> Law of Thermodynamics stars will cool indefinitely. Explanation is provided below.

According to stellar metamorphosis theory we can see stars that are very, very cold, only in the tens of Kelvin in their high atmospheres. Since they were really hot in the many tens of thousands of Kelvin when they were born, it is clear they have cooled down significantly. Fortunately there is a simple mathematical/physical relationship that can explain how this occurred. It is the 1<sup>st</sup> Law of Thermodynamics. Since stars produce heat, and have no mechanism for replacing the heat lost, they will cool. Therefore heat loss will continue indefinitely on all stars that shine and are not heated on their exteriors similar to Hot Jupiters. Heat loss will also continue on stars that do not shine strongly, as they are gravitationally collapsing, producing heat via chemical reactions, tugging on other objects gravitationally, their magmas are cooling, etc.

The change in internal energy of a system is equal to the heat added to the system minus the work done by the system.

$$\Delta U = Q - W$$

Change in internal energy      Heat added to the system      Work done by the system

The above equation is easy to understand. The change in internal energy of a system will equal the heat added to the system subtracting the work done by the system. The work done by young stars is

1. It is gravitationally collapsing
2. It is tugging on other objects gravitationally
3. It is shining and releasing vast amounts of electromagnetic radiation
4. As it collapses, it loses its spin (angular momentum) because physical matter is being ejected from it.

The heat being added to young stars is:

1. There is no significant external heat entering the star, all the heat is escaping the star. This is an observational fact of nature.

Stars are open systems, they exchange heat, light and matter with outer space, which is mostly vacuum not a physical body like a star. Unfortunately for the mainstream theorizers unless they can explain how heat and matter enters the star in larger amounts that it is lost in, they are in a pickle. They have to explain how stars ignore the first law of thermodynamics. The cooling principle of stellar metamorphosis is stated, "stars cool down until all of their heat is gone."