Why Young Stars Shine and Then Stop Shining

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October 5, 2019
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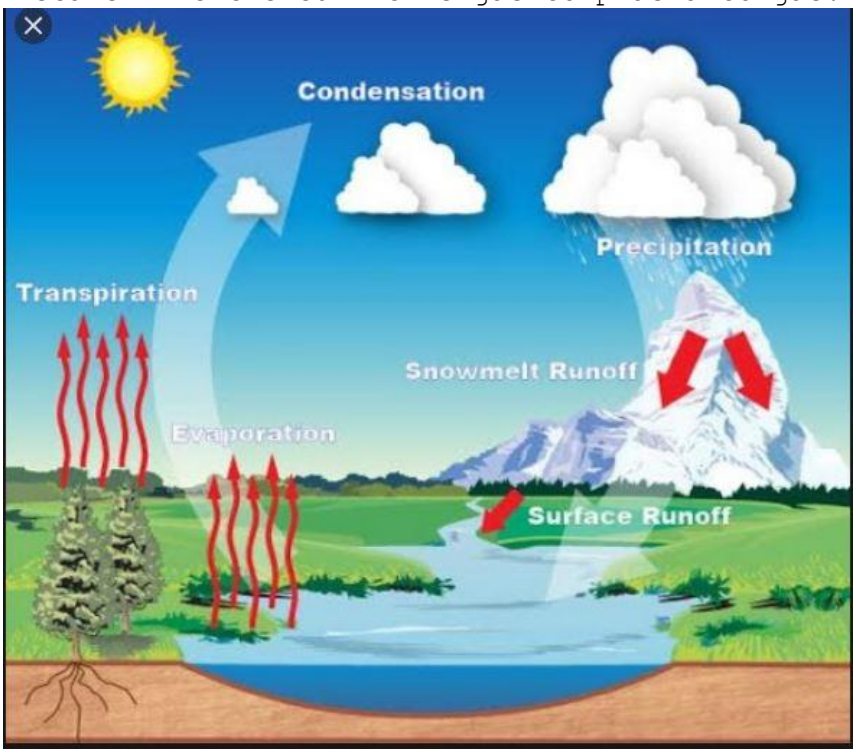
Abstract: There is an ignored feedback loop that makes young stars shine. No fusion is required. This is to introduce the possibility of simplicity in science, as anybody who has read a book on how stars are supposedly "powered" is sure to lose track of reality, with gigantic math equations that explain nothing, and imaginations that run wild into fantasy-land. In short, it is a simple feedback mechanism as observed in solar granulation. The plasma recombines to neutral gas, falls inwards, gains energy, gets ionized and then rises back up to recombine again. This is why stars shine. When that feedback loop is lost, the star loses its capacity to shine.

1. The Sun is composed of mostly two states of matter, gas and plasma. They are not the same state of matter.

2. Plasma recombination is why the Sun shines. The ionized hydrogen and helium gain electrons and release energy near the surface.

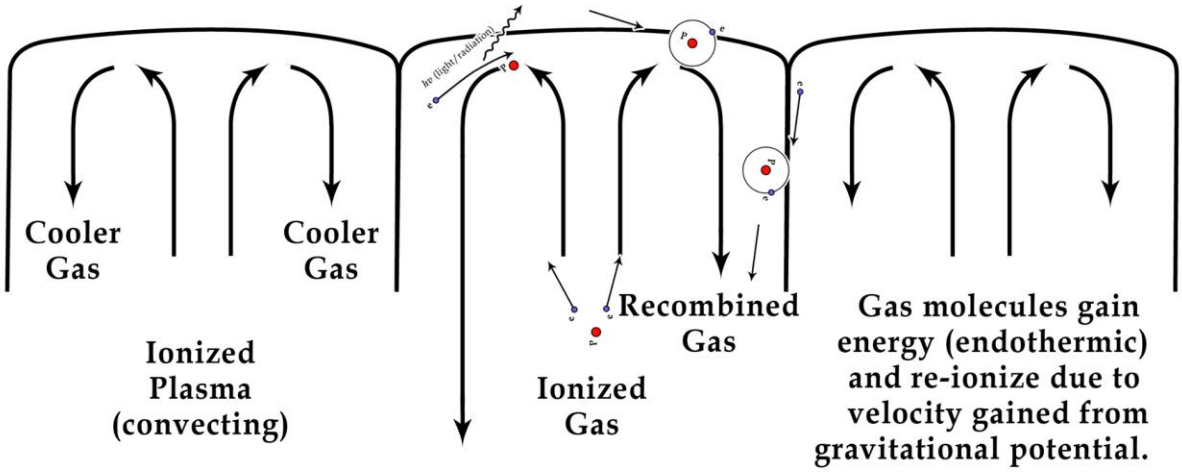
3. The then neutral hydrogen and helium drop back down into the Sun, at an acceleration of ~28 G's, and get re-ionized due to gravitational contraction, and the critical ionization velocity of the material being low enough. The escape velocity of the Sun is ~618,000 m/s, and the critical ionization velocity of hydrogen is ~50,900 m/s. What this means is that other factors not included, all stars that have escape velocities at the surface greater than the CIV of hydrogen, for the most part will be highly radiative and/or shine. If the ionized hydrogen escapes as a free proton, it cannot recombine (release heat and light), and fall inwards to complete the cycle. Same thing with the below example of rain, if the water vapor escapes after it evaporates, it cannot come down as rain.

4. In essence the Sun shines because of a feedback loop between ionizing and recombining hydrogen and helium gas. It is a phase transition feedback loop, like rain. Liquid, to gas, to liquid. Only with younger stars like the Sun it is gas to plasma to gas.



5. We know this is what happens because when the feedback loop stops, the star becomes too gravitationally weak to sustain the type of feedback loop. It needs to accelerate the gas back down so that it can get ionized (reach critical ionization velocity). We see these cells in solar granulation. The star basically convects and produces heat right where it is observed, the heat is not convected through the whole body. This means a large nuclear core is not needed, and the fusion model of stars is also not needed.

SOLAR GRANULATION



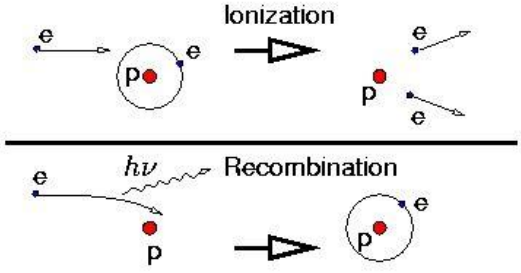
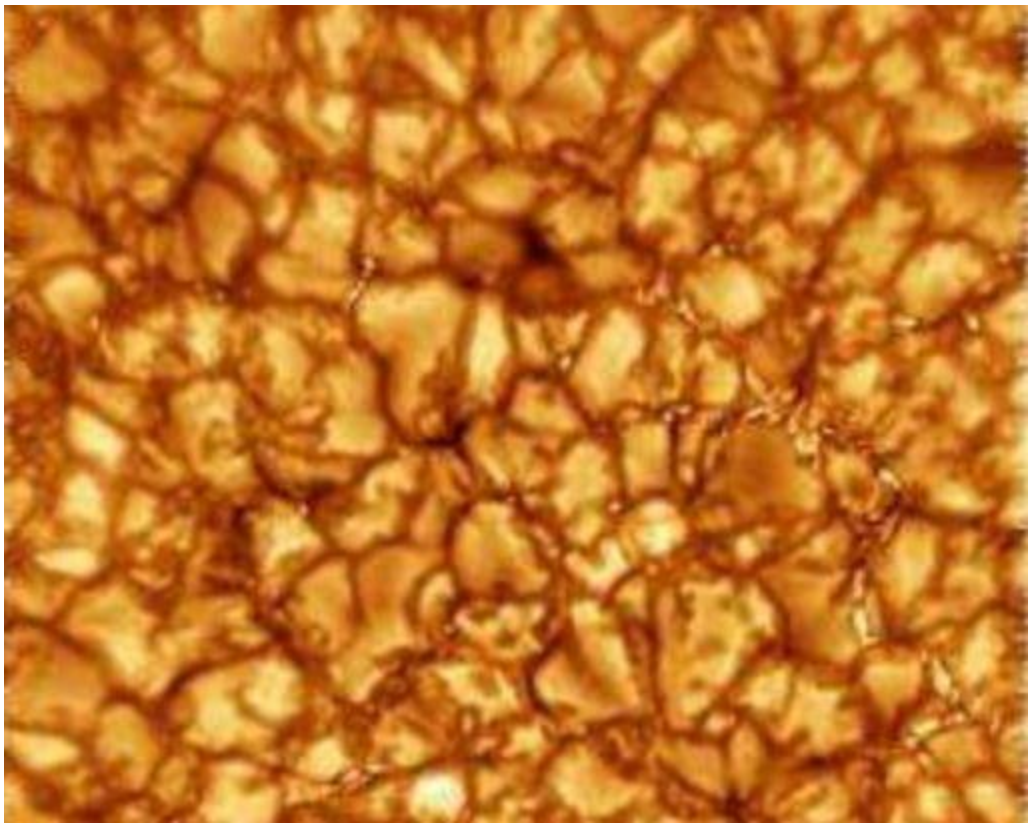


Figure 1.1: Ionization and Recombination



This is what the solar granulation looks like up close. This is a picture of the Sun's photosphere. Huge cells of convecting material right on the surface. It is a superheated plasma that is going to gas and back to plasma again. The feedback mechanism of ionized to recombined gas under a very high surface gravity. Remove the very high surface gravity, this type of feedback loop will fizzle out and the star will cease shining brightly, and the heat will move internal to the star. That will happen when the Sun reaches late brown dwarf stages of evolution. Let me be clear, the act of plasma recombination is what releases heat and light, the atom gains its electrons back, after being violently removed. No internal fusion reactor is needed. In fact, it is probably much cooler below this wild, very hot activity.