

Quiz

Q1: A star is observed to have a metallicity of $[\text{Fe}/\text{H}] = -1.3$.

The mass fraction of Fe in the sun is $X(\text{Fe}) = 8.7 \times 10^{-4}$. Recall that $\log_{10}(2) = 0.3$.

- Make reasonable assumptions about the H abundance in the observed star and in the sun, what is Fe mass fraction in the star? Justify your assumption.
- What is the metallicity of the star in terms of $Z = 1 - X - Y$? Assume that Fe scales with Z as the overall metal content is reduced from solar to metal-poor environments.

In the same star $[\text{C}/\text{Fe}] = 1.6$. How does the Fe abundance in that star compare to that in the sun?

Q2: What are the main types of supernova? How are they distinguished in terms of their evolutionary origin? What role do they play in the evolution of the universe and as an astronomical diagnostic tool?

Q3: What is the gravitational potential of a point source?

Q4: What is the escape velocity of an object with mass M and radius R?

Q5: What is formula for the ideal gas and for the radiation pressure in terms of density and temperature?

Q6: What is the equation for hydrostatic equilibrium in spherical symmetry?

Q7: What are the main nuclear burning stages?

Q8: What are the two main end points of stellar evolution as a function of initial mass?

Q9: Through which nucleosynthesis processes are elements heavier than Fe made?

Q10: What is the age of the sun?

Q11: What is the final fate of a star like the sun?