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A map of the stars

Python (Google Colab) plotting guide

For classes with coding access, use this Colab notebook to query real Gaia data, generate an HR diagram, and compare it with the hand-plotted version. The notebook includes comments explaining each step and can be modified for advanced learners.

How to compute absolute magnitude using apparent magnitude?

- Distance in parsecs:

$$d = \frac{1000}{parallax\ (mas)}$$

- Absolute magnitude formula:

$$M = m - 5log_{10}(d) + 5$$

Where: m: apparent magnitude; d: distance in parsecs

- Gaia data in Google Colab is rounded to 2 decimals for readability.

Reversing the magnitude axis
When plotting the Hertzsprung-Russell diagram, the magnitude axis is traditionally reversed, so that brighter stars appear at the top and fainter ones at the bottom. This convention follows the historical definition of stellar magnitude, where smaller (or negative) numbers indicate higher brightness. Reversing the axis helps students to interpret the H-R diagram correctly, showing them that an increase in brightness is represented by moving upwards on the axis. This matches how astronomers visualize stellar luminosity.