

Proposition de stage de M2 Recherche Année universitaire 2024-2025

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Subject : Visualisation of astronomical data

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Title : Stellar evolution in the SNAD viewer

Summary: Despite all the recent advances in machine learning and artificial intelligence, and regardless of the large amount of data being collected by modern astronomical surveys, discovery and detailed investigation will always require visual screening by a human expert before something new and relevant is reported. In this context, the larger the information content an expert can have access to, the better decision they will make regarding subsequent data analysis.

A good way to gather summarised information about a star is to study its placement in the HR diagram¹ (figure on the right). As stars are born, live and die, they move in regular patterns within this diagram. Understanding it gives us many clues about the astrophysical structure of a given astronomical source.

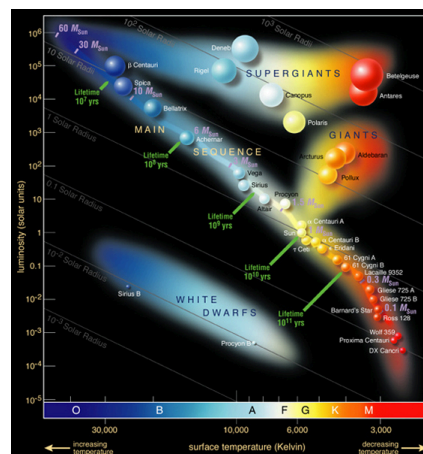


Figure 1. HR diagram. Credits:ESO

The SNAD viewer² is a webportal which enables quick cross-match with many different data sources, providing a lot of information about the same object and thus allowing the user to make a quick and informed decision about a particular astronomical source.

The goal of this project is to study the evolution of a sun-like star within the HR diagram and integrate its visualisation to the SNAD viewer.

This work will be divided in 4 parts: 1) astrophysical interpretation of the HR diagram and its implications; 2) literature research on the many different ways in which the diagram is presented; 3) construction of personalised visualisation and 4) integration to the SNAD viewer. We predict that 30% of the internship will be spent in items 1 and 2, while the remaining will be dedicated to the code implementation (items 3 and 4).

This work will be developed in collaboration with researchers from the Moscow State University (Russia) and the Carnegie Mellon University (USA). It will include frequent calls with remote collaborators; coding in Python; discussions and literature review on stellar evolution.

All the activities and discussions related to the work will happen in English.

¹ <https://www.cosmos.esa.int/web/cesar/the-hertzsprung-russell-diagram>

² <https://ztf.snad.space/>