Contribution ID: **10** Type: **Poster**

Investigating physical parameters of protostellar systems

Friday, 14 June 2024 15:30 (1h 40m)

Over the recent years our ability to model and observe young stars has increased dramatically, enabling the compilation of large catalogues of observed and in silico protostars. We have learned that accretion discs form immediately when a star is born, and that the first planets may form already while the star is still embedded inside a large, cold, and dusty envelope during the first million years.

This thesis is a three part project, including observational analysis, computational modelling, and machine learning. Each individual part contributes with its own methods to collaboratively create a better understanding of the protostellar systems and their environments.

The observational part focuses on using necessary tools to analyse the binary protostellar system's primary star, Ced110-IRS4A. We build an understanding of which physical properties can be extracted from the data, their limitations, and how they best can be compared to the large scale models of young stellar objects.

The modelling part focuses on extracting relevant physical parameters from the large scale MHD models of the protostellar systems, as well as creating synthetic images of the model through the means of radiative dust transfer models. The post processing will facilitate exploring what are the driving physical processes in star formation and give a better foundation for understanding and interpreting related observations.

The machine learning part enables a comparative analysis of synthetic and observed protostellar systems via similarity-based deep convolutional learning. By leveraging Deep Learning algorithms, we can reliably find similar images of these systems based on a similarity metric, defined by physical parameters extracted from the simulated systems. This results in a pipeline that ultimately estimates best-guesses for the physical parameters of observed protostellar systems.

Field of study

Astrophysics

Supervisor

Jes K. Jørgensen & Troels Haugbølle

Primary authors: Mr MOL, Anton (MSc Student); Ms SHAH, Krisha (MSc Student); UZBAK, Majid

Session Classification: Poster session: Enjoy the posters!