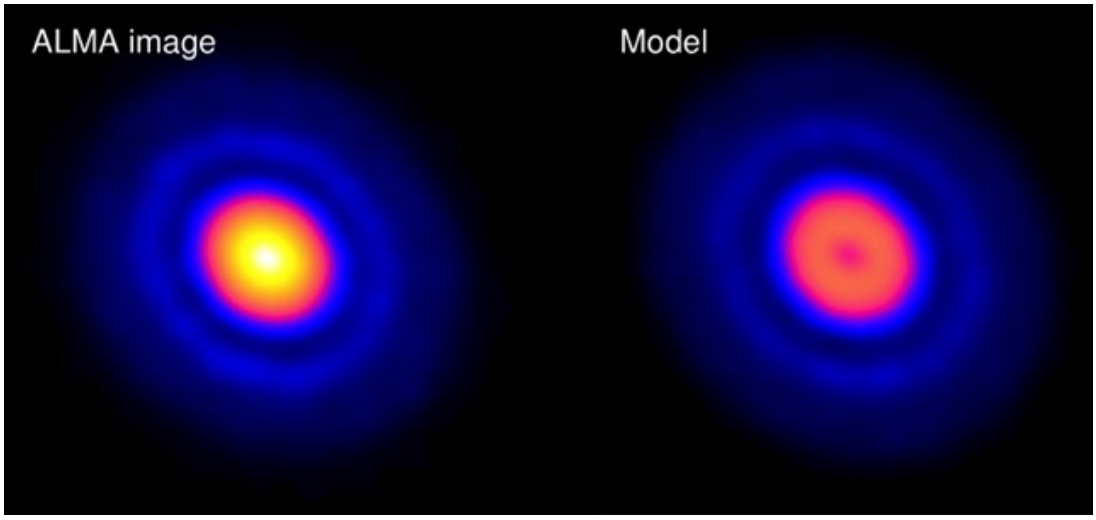
The building blocks of planets

- **Creating new theoretical/computational models of planet-forming discs.**
- **Simulating observations, in order to compare these models directly to ALMA observations.**
- **Using high-performance computing to study protoplanetary disc dynamics.**

Level	PhD
First Supervisor	Richard Alexander
Second Supervisor	Giovanni Rosotti
Application Closing Date	19 January 2022
PhD Start date:	26 September 2022

Project Details:

Planets form in cold discs of dust and gas around young, newly-formed stars. Solid particles ("dust") represent only a small fraction of the disc mass, but these particles are the initial building blocks of planetesimals and planets. The trace dust component also dominates the disc opacity, so most of our observations only "see" the dust rather than the gas. In this project the student will build new computational models of how dust and gas move in protoplanetary discs, and of how the dynamics of these planetary building blocks change in structures such as gaps and rings, and/or in the presence of planets. We will use a combination of 1-D, 2-D and 3-D calculations to study disc dynamics and evolution over a wide range of time-scales. We will then use radiative transfer modelling to generate synthetic observations, in order to test our models against new data from facilities such as ALMA and the ESO VLT. The overall aim of the project is to build up a detailed understanding the key physical processes that shape the appearance and evolution of planet-forming discs.



Observations and model of gaps and rings in the planet-forming disc Elias 24

References:

1 "Gas and multispecies dust dynamics in viscous protoplanetary discs: the importance of the dust back-reaction." - https://ui.adsabs.harvard.edu/abs/2018MNRAS.479.4187D/abstract

2 " Rings and gaps in the disc around Elias 24 revealed by ALMA " - https://ui.adsabs.harvard.edu/abs/2018MNRAS.475.5296D/abstract

3 "Dust dynamics during protoplanetary disc clearing" - https://ui.adsabs.harvard.edu/abs/2007MNRAS.375..500A/abstract

Further information on how to apply and funding can be found HERE