Work experience in an academic research group

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My role

A scientist
- What effect does wind have on interferometric observables?
- Co-authored paper due to be published over next couple of months

A team player
- Report back to weekly meetings with key results/findings
- Guided by more experienced PhD students
- Required to be an excellent communicator (also experienced online tutor)

A software developer
- Authored analysis/visualisation software for use of future undergrad students

Science

- Used the TORUS radiative transfer code to explore the interferometric observables associated with a PP disk

- Knowledge of disk composition has direct impact on understanding of planet formation

- SEDs generally exhibit "IR excess" – re-emission of star's radiation

- My visualisation software generated Spectral Energy Distributions (SEDs) from .fits data files
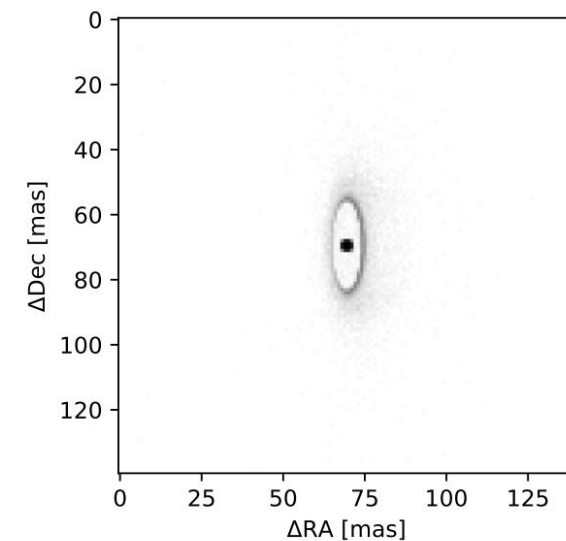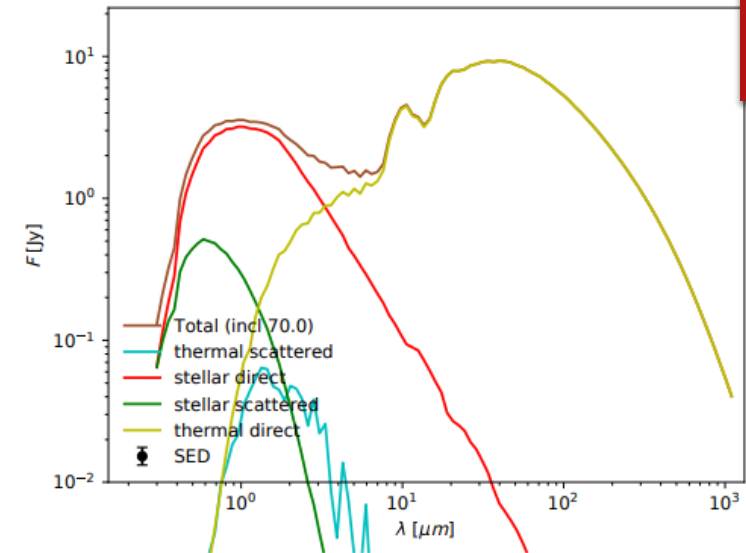
What we found

- SEDs showed:
  - Higher than expected contribution from thermal scattered spectrum (disk a lot "thicker" than expected)
  - Significant dependence on the exponent of mass loss (from star) per unit area
- Many trials were poorly resolved (shorter computation times)
  - The group will need to run more detailed simulations in the future
- Shape of inner disk was different to what is described in much of the current literature
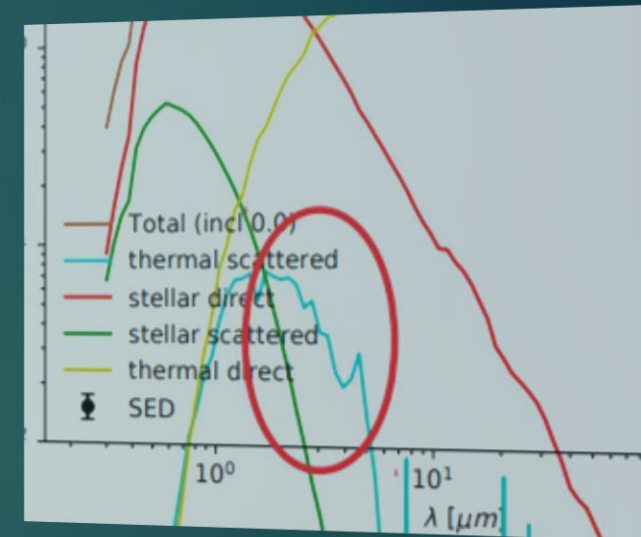
Working in a research group

Provided weekly updates to the group at weekly meetings

Discovered most accessible/interesting ways to present findings

Had to give two detailed presentations to undergrads, professors and external collaborators with very short notice

Enlisted the help of PhD students to help me decide what to include

Suggested enhancing the use of temperature (not just density) distributions when making conclusions

Temperature has the ability to "see" deeper into the PP disk and, in some cases, provides more detailed information than density

Technology

Authored many Python scripts:

Submitting jobs to supercomputer (ssh, scp, networking, etc.)

Visualisation (wrote a CLI for the VisIt visualisation software package)

Analysis (linear regression models, etc.)
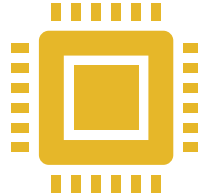
Required to use a range of Linux distros

Used several programming languages (e.g. Python, Bash, C, Fortran, LaTeX)

Why did I do this work experience?

- Was considering further study to PhD level
- Worked alongside experienced professionals
- Academically interesting & helpful with final-year project
- Software development
- Experience of creating innovative approaches to solve problems
  - Submission, analysis and visualisation tasks made significantly faster and more accessible

Questions?