

Probing the universe with JWST

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| <ul style="list-style-type: none"> ▪ Using data from the JWST to explore processes within galaxies. ▪ Ground-based telescope observations of galaxies | Level | PhD |
| | First Supervisor | Andrew Blain |
| | Second Supervisor | John Pye |
| | Application Closing Date | 19 January 2022 |
| | PhD Start date: | 26 September 2022 |

Project Details:

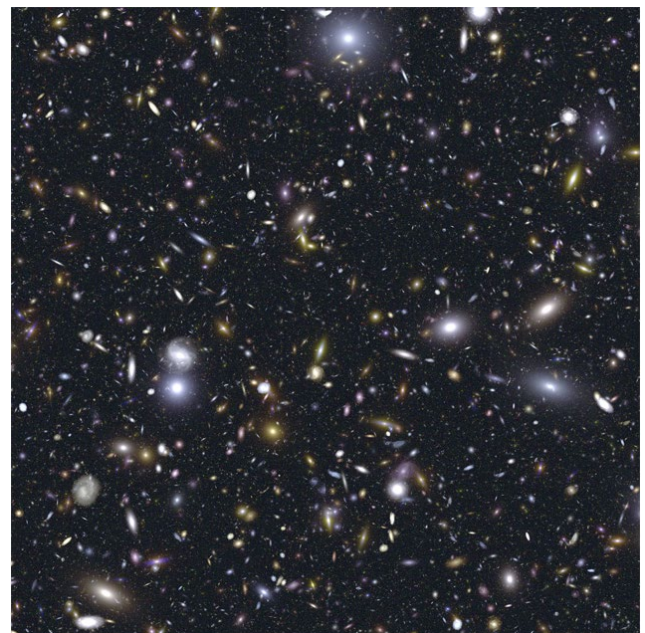
James Webb Space Telescope will provide an unprecedented view of both the first phase of galaxy formation, and the most heavily obscured regions of all subsequent galaxies, where the most intense star-formation and blackhole fueling activity is taking place. Using the access available to Leicester from the Guaranteed Time programme on the MIRI instrument and parallel data from the other instruments, and follow-up observations elsewhere, we will seek the answers to the formation of galaxies that lie hidden in the data that should start to flow in 2022.

By observing both deeper and at higher resolution than any previous telescope, JWST will give us a genuinely new look at the processes in galaxies, building on the team's experience with chasing the most luminous galaxies using the data from the WISE satellite. We will be able to investigate the sources of emission that we see stirring up galaxies' contents with the ALMA telescope in Chile.

If JWST does not enter service successfully, we will use ground based telescopes, and the forthcoming Euclid space mission to investigate the behaviour and nature of some of the most remarkably luminous galaxies ever found, the WISE "HotDOGs": see Diaz-Santos et al. (2021b).

Andrew Blain works on the evolution of dust-enshrouded galaxies, and gravitational lenses. John Pye has been a key player in delivering the MIRI instrument and JWST. Other students and staff will be working on the JWST data in Leicester, and there are groups in the UK and worldwide collaborating to make the most of this special, once in a generation opportunity.

Experience with astrophysics undergraduate degree courses and a keen interest in extragalactic astrophysics, galaxy formation, and making the most of data would be valuable preparation. However, JWST's new capabilities will challenge all of our knowledge and preconceptions, and so previous experience with space-based data is NOT required!



A simulated view of the deepest JWST field, from ESA.

References:

- 1 <https://jwst.nasa.gov/content/webbLaunch/index.html>
- 2 Diaz-Santos et al. 2021a JWST proposal. 2021jwst.prop.1712D, <https://ui.adsabs.harvard.edu/abs/2021jwst.prop.1712D/abstract>
- 3 Diaz-Santos et al. 2021b "Kinematics and star formation of high-redshift hot dust-obscured quasars as seen by ALMA", *Astronomy & Astrophysics*, vol. 654, p. A37, <https://ui.adsabs.harvard.edu/abs/2021A%26A...654A..37D/abstract>

