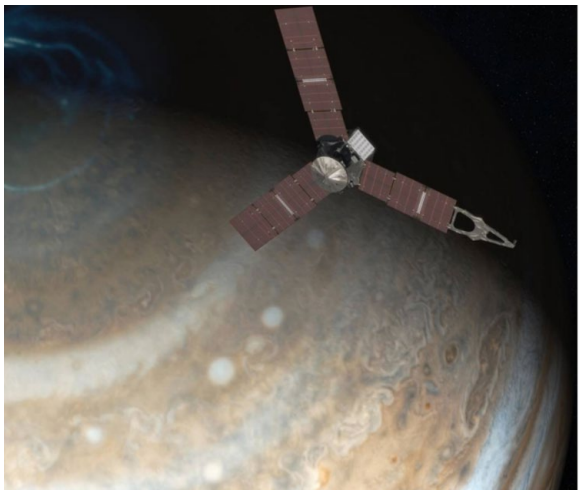
Analysing Jupiter's polar auroras with the Hubble Space Telescope

- **Using new Hubble Space Telescope FUV observations of Jupiter's auroras**
- **Characterising the enigmatic high latitude auroral emissions**
- **Comparisons with Juno data**

Level	PhD
First Supervisor	Jonathan Nichols
Second Supervisor	Tom Stallard
Application Closing Date	19 January 2022
PhD Start date:	26 September 2022

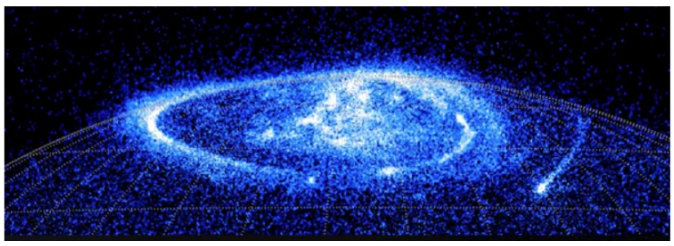
Project Details:

Jupiter possesses the strongest magnetic field and brightest auroras in the solar system. The dynamics of Jupiter's magnetosphere are dominated by the planet's rotation, rather than the interaction with the solar wind as at Earth. In this respect, Jupiter acts as an analogue for more distant rotationally-dominated astrophysical bodies such as exoplanets, brown dwarfs, and pulsars. Jupiter's high latitude polar region is replete with bright and dynamic auroras of undetermined origin, but which could hold the key to crucial dynamics of Jupiter's magnetosphere, such as how plasma originating from Io is lost from system, and how Jupiter's magnetosphere responds to the solar wind. This project will employ new Hubble Space Telescope data to shine a light on the behaviour and cause of these emissions.



Juno above Jupiter

It is presently an exciting time for the study of Jupiter's magnetosphere. The arrival in July 2016 of the NASA Juno spacecraft heralded an interval of unprecedented observation of the giant planet, including substantial programmes of observation of Jupiter's FUV auroras using the Hubble Space Telescope. In this project, data from the Hubble Space Telescope of the planet's FUV auroras will be analysed and compared with Juno in situ observations, in order to determine the behaviour and cause of the high latitude jovian auroras.



Jupiter's auroras

This project is computational in nature, involving data analysis and potentially computational modelling using the Python programming language.

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

References:

1 https://en.wikipedia.org/wiki/Magnetosphere_of_Jupiter

2 Clarke, J.T., Grodent, D., Cowley, S.W.H., Bunce, E.J., Zarka, P.M., Connerney, J.E.P., Satoh, T., 2004. Jupiter's aurora, in: Bagenal, F., McKinnon, W.B. (Eds.), Jupiter: The Planet, Satellites and Magnetosphere. Cambridge. Univ. Press, Cambridge, UK, pp. 639–670.

3 Nichols, J. D., S. V. Badman, F. Bagenal, S. J. Bolton, B. Bonfond, E. J. Bunce, J. T. Clarke, et al. 'Response of Jupiter's Auroras to Conditions in the Interplanetary Medium as Measured by the Hubble Space Telescope and Juno'. Geophysical Research Letters 44, no. 15 (2017): 7643–52. https://doi.org/10.1002/2017GL073029.

4 Grodent, D., Clarke, J.T., Waite Jr, J.H., Cowley, S.W.H., Gérard, J.-C., Kim, J., 2003. Jupiter's polar auroral emissions. J. Geophys. Res. 108, 1366.

5 Bagenal, F., Adriani, A., Allegrini, F., Bolton, S.J., Bonfond, B., Bunce, E.J., Connerney, J.E.P., Cowley, S.W.H., Ebert, R.W., Gladstone, G.R., Hansen, C.J., Kurth, W.S., Levin, S.M., Mauk, B.H., McComas, D.J., Paranicas, C.P., Santos-Costa, D., Thorne, R.M., Valek, P., Waite Jr, J.H., Zarka, P.M., 2014. Magnetospheric Science Objectives of the Juno Mission. Space Sci. Rev. 4–69.