## Space Plasma Turbulence Throughout the Solar System and Beyond

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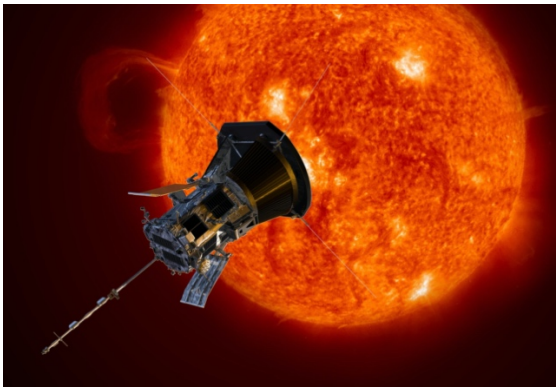
More information: https://www.qmul.ac.uk/spcs/astro/teaching/phd-programme/

The vast majority of the visible Universe is in a plasma state, and one of the most widespread behaviors observed in such plasmas is turbulence – the transfer of energy across a broad range of scales that leads to complex chaotic motions, structure formation, and energy conversion. Not only is this turbulence a fascinating area of fundamental plasma physics, it is thought to be important in a variety of important open questions in space and astrophysics, such as the heating of the solar corona, generation of the solar wind, structure of the heliosphere, acceleration of energetic particles, disk physics, galaxy cluster heating, and space weather.

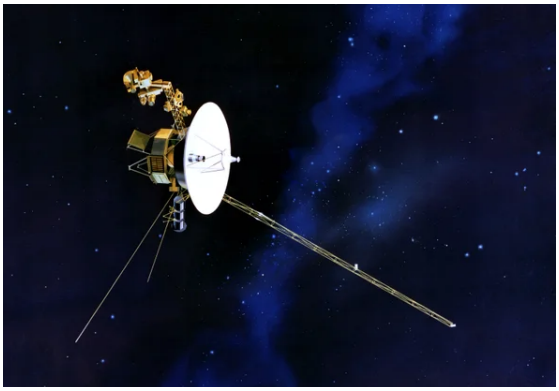
Within the solar system, spacecraft make direct in situ measurements, allowing the physics of turbulence, e.g., in the solar wind, to be probed and understood in great detail, which has been very fruitful in advancing our understanding, along with theory and simulations. However, due to its complexity, there remain many important questions about how it works at a fundamental level, and contributes to the processes that shape the space and astrophysical environments.

This project involves the analysis of data from the latest cutting-edge space missions, to learn more about how turbulence works in newly explored regions of space and contributes to shaping the space environment. For example, NASA Parker Solar Probe is moving ever closer to the Sun, making the first measurements within the solar corona where the turbulence powers the solar wind, but is fundamentally different to further out. The NASA Voyager spacecraft are newly exploring the interstellar medium, where again turbulence is found to be different in nature, allowing us to understand how this shapes our heliosphere and galactic processes.

You will work as part of a team at QMUL studying the fundamentals and impacts of plasma turbulence, and have the opportunity to work with international experts in space missions, data analysis, plasma theory, simulations, and laboratory plasma astrophysics experiments.



*Parker Solar Probe in the Sun's atmosphere*



*Voyager spacecraft in interstellar space*