Solar wind density turbulence

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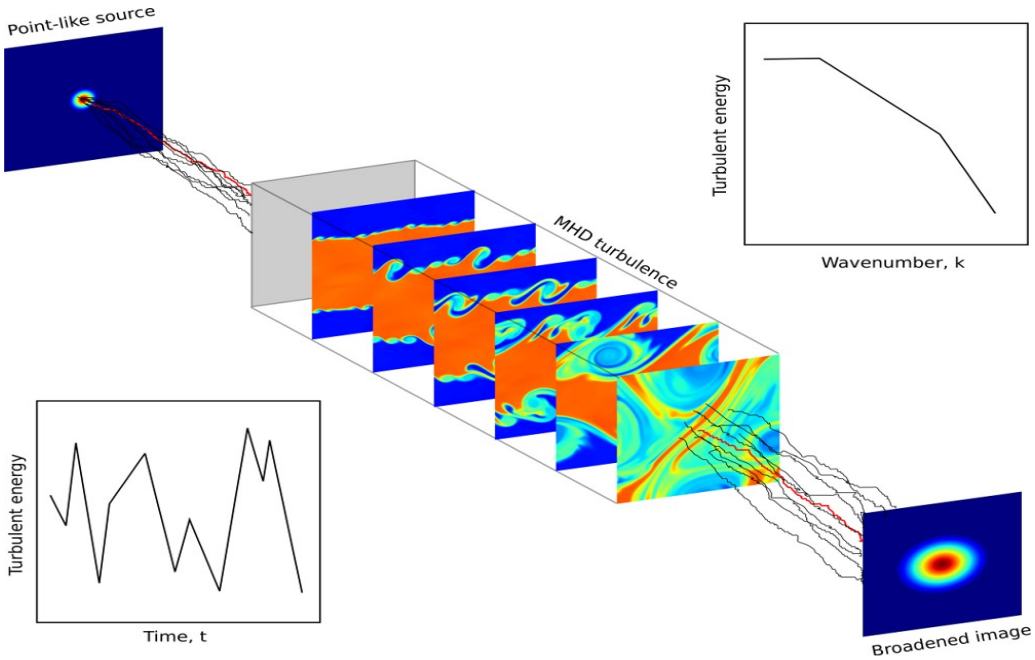

Fig: Scattering of radio waves through a turbulent medium.

Project statement:

Radio waves from astrophysical sources are scattered by solar wind density turbulence. Compact point sources, when observed near the Sun, are thus broadened as recently observed by the MeerKAT radio telescope.

In this project the student will:

1. Analyze solar wind plasma data to quantify density turbulence.
2. Develop a basic model to simulate the propagation of radio waves through a medium containing such density fluctuations.
3. Develop a numerical implementation of this model and compare to the results of a diffusion equation.
4. Compare the results to recent observations from the MeerKAT radio telescope.

Student development and recommended skills:

During this project, the student will become familiar with the theory of particle acceleration, particle transport, and plasma physics. Much of this work will be theoretical and an aptitude for theoretical plasma physics and mathematics is a requirement. Decent programming skills are recommended.