

# Space Weather: From the Sun to Saturn

Space Weather is influenced by phenomena operating across a multitude of scales, from the large-scale expulsion of coronal mass ejections from the solar corona, to particle-scale interactions within the Earth's radiation belts. My interests within plasma simulations focus on both large-scale fluid physics and particle-scale processes and the interplay between them. In this seminar I will start with Sun-to-Earth studies of coronal mass ejections and review some of the largest geomagnetic storms on record and examine under what solar wind conditions Carrington-scale events are possible. I will then discuss how these impulsive injections of energy flow through the coupled Sun-Earth system, compressing the terrestrial magnetosphere and dissipating their energy. In particular, I will focus on how radiation belt particles can be rapidly accelerated to ultra-relativistic energies across incredibly short time-scales and how particle dynamics can feature a complex combination of diffusive and advective transport. Following this, I will show cold plasmas in the outer solar system provided a novel class of spacecraft-plasma interaction for the Cassini spacecraft during its Grand Finale at Saturn and in the plumes of Enceladus, from which we still have much to learn.

**Thursday, March 3rd**

4:00-5:00 p.m.

725 Commonwealth Ave | Room 502

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