**Theoretical Plasma Physics to be tested in the SMART Experiment**

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The upcoming SMART (Space Measurement of A Rocket Released Turbulence) experiment will inject heavy atoms at high speed (~10 km/s) across the local magnetic field into the upper ionosphere. As these heavy atoms photoionize in sunlight, the local magnetic field traps them. The ions form a ring distribution, which is unstable to electrostatic lower-hybrid waves with perpendicular wavelengths much shorter than the electron skin depth. The lower-hybrid waves grow to a saturated amplitude that is controlled by the rate of induced nonlinear scattering of lower-hybrid waves into electromagnetic magnetosonic and whistler waves with wavelengths large compared to the skin depth. The electromagnetic waves have large group velocities, quickly escape the experimental region, and propagate into the radiation belts where the amplitude is expected to be similar to a large lightning generated whistler. In this talk, we will discuss the plasma physics processes that are expected to be induced by this injection, the current modelling efforts underway to quantitatively predict the experiment, and the ways that these plasma physics processes are expected to play important roles in the radiation belt dynamics.