Abstract Submitted
for the APR06 Meeting of
The American Physical Society

Charged Grains and the Dynamics of Saturn's F Ring LORIN MATTHEWS, TRUELL HYDE, Baylor University — The dynamics of Saturn's F Ring have been a matter of curiosity ever since the probes Pioneer 11 and Voyagers 1 and 2 sent back data revealing the ring's unusual features. Once again this dynamic ring is in the spotlight with Cassini now at Saturn sending back high-resolution images of its rapidly evolving features. The F Ring displays clumps, kinks, waves and braids, structures which evolve on the time scale of months, and has recently been described as a spiral ring. Several models have been proposed to explain these features; most of these invoke perturbations caused by the shepherding moons or km sized moonlets imbedded in the ring and are purely gravitational in nature. These models assume that both the plasma densities at the F Ring and the charges on the grains are small enough that electromagnetic forces can be ignored. Most models also assume that the effects of solar radiation pressure and solar gravity act on a timescale of thousands of years and thus don't contribute to the evolving features. This study shows that electromagnetic and radiation forces can lead to significant perturbations of the orbits of micron sized grains, even for very small grain charges, and may have implications for the steep size-distribution seen in the F Ring.

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Date submitted: 14 Jan 2006 Electronic form version 1.4