Abstract Submitted
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Novel Techniques for Exploring the Physics of the Radiation Belts[1] KONSTANTINOS PAPADOPOULOS, University of Maryland — The plasma physics of the Radiation Belts (RB) is a premier scientific topic with important technological implications. A new mission the Radiation Belt Storm Probes (RBSP) will be launched in August, 2012, fully instrumented to explore the RB Physics with emphasis on particle interactions with low frequency plasma waves that control the rates of energetic particle precipitation, acceleration and transport. An important difficulty with passive observation, such as the RBSP, is the "chicken & egg" problem. Namely particles drive waves while waves precipitate, accelerate and transport particles. It is a complex, non-linear interaction with multiple feedbacks. The two-satellite coverage provided by RBSP and similar missions does not allow for uniquely identifying cause and effect. A new technology recently developed using ionospheric heaters – powerful HF transmitters or phased arrays - that allow controlled heating of the ionosphere provides us with means for injecting low frequency waves in the ULF/ELF/VLF range into the RB and using the satellites overflying the heater magnetic flux tubes to diagnose the wave particle interactions. The paper will provide a comprehensive planning of experiments that use the HAARP, Arecibo and SURA heaters in conjunction with RBSP and other satellite missions, such as the Air Force DSX and the Russian RESONANCE, to provide new inroads into the RB physics.

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