AAPPS-DPP 2018 Plenary speaker Name: Dr. Gurudas Ganguli
Affiliation: Naval Research Laboratory

Rationale: Dr. Ganguli has done outstanding work on interpretation and validation of space plasma phenomena using laboratory experiments and supporting theoretical work. He is also an excellent speaker. His talk (see abstract below) can be a lead-talk of a session devoted to experimental simulations of space plasma phenomena in the laboratory.

Talk Title: Use of Laboratory Experiments to Understand Space Phenomena

Short abstract: Space-time ambiguity associated with in-situ measurements made from a moving platform is an irreducible problem, which makes detection and characterization of a specific space plasma phenomenon difficult. Often when the orbiting sensor returns to the location of the original measurement the plasma has evolved and thus it is difficult to obtain a meaningful statistical ensemble of measurements of a particular event. In general, there are many variables and multiple forces operating simultaneously in the space environment. In such an environment, it is hard to pinpoint the causality of events and isolate a specific phenomenon for precise and repeated measurements necessary for definitive conclusion. To circumvent these difficulties, we complement in-situ measurements with laboratory experiments in a controlled environment scaled to the appropriate space plasma conditions in the Space Physics Simulation Chamber (SPSC) at the Naval Research Laboratory (NRL). Coordinated analyses using both laboratory and space data have clarified a number of subtleties of plasma behavior in the ionosphere and magnetosphere. This includes plasma response to highly localized electric fields, structure and dynamics of boundary layers such as dipolarization fronts, coherent and incoherent processes associated with triggered/chorus emissions frequently observed in the radiation belts, limits on the validity of the quasi-linear description often used to describe space plasma evolution, and the cause and effect of weak turbulence. Specific examples will be discussed to highlight the synergy derived from laboratory experiments in understanding the natural plasma phenomena.