



From Electron Scales To Ion Scales - An Exploration Using Low Temperature Laboratory Plasma Experiments

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Abstract: One of the goals of the laboratory plasma experiments is to study scale down physical phenomena and to investigate and innovate as science unfolds. Sometimes, experiments help to isolate and study in detail a particular fundamental physical phenomenon, which often becomes difficult in realistic situations wherein multiple physics issues get entangled. Also, a laboratory plasma experiment often leads to innovation in technology that uses plasma. Institute for Plasma Research (IPR) is engaged in a variety of laboratory plasma experiments - from large volume plasmas with external magnetic field wherein electron temperature gradient modes (ETG) and whistlers are studied to dusty plasmas to toroidal nonneutral and toroidal neutral plasmas to multi-cusp devices to quiescent plasmas, to mention a few.

After a quick overview of the experiments, this talk will present some of the ongoing research activities at IPR in two chosen areas. In the first part of the talk, novelty of an experimental device which produces plasma of highly quiescence collision-less plasma highlighting some unique features will be presented, which leads to the study of different instabilities and their interaction. Some observations related to ETG driven zonal flow, symmetric side band parametric instability and phase mixing will be presented. In the second part of the presentation, results from an un-magnetized dusty plasma device will be discussed. Here, the observation of rotation dust torus with void at the center will be presented. An explanation of the dusty torus with void at the torus will be given. This will be followed by a summary and planned future direction of work.

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