

# Seminar

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## Institute for Plasma Research

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**Title :** Extended hybrid kinetic-magnetohydrodynamic model for burning plasma

**Speaker:** Dr. Modhuchandra Laishram  
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Hefei

**Date :** 28th February 2020 (Friday)

**Time :** 03.30 PM

**Venue :** Seminar Hall, IPR

### **Abstract :**

In this talk, I will start from a brief review of the existing kinetic-magnetohydrodynamic(MHD) hybrid models for the alpha particle physics in burning plasma. Much is known about the behavior of alpha-particle physics in tokamak devices but much remains to be understood. Thus, a more comprehensive kinetic-multifluid model is proposed for a proper account of the dynamical regime of the burning plasma where both the energetic alpha and the helium ash particles are present. The Kinetic-multifluid model is further simplified into an extended hybrid kinetic-MHD model in the MHD limit. This reduction process demonstrates that the existing Pressure-Coupling Scheme(PCS) is more extensive than the Current-Coupling Scheme(CCS) and sufficient for the wide range of dynamical regimes. This analysis further shows a significant change in the model equations mainly the generalized Ohm's law due to the contributions of the alpha particles in the system. These models can be used for studies of collective effects involving fast ions characterized by a strong dependence on the fast ion distribution function. The proposed models can also be used for studies of low-frequency processes in space plasma such as the interaction of energetic solar wind with the magnetosphere, the ionosphere, and the thermosphere.

Furthermore, I will talk about some of the ongoing collaborative work in complex(dusty) plasma.

### **Reference:-**

1. Cesare Tronci et. al. , Plasma Phys. control. Fusion 56 095008(2014).
  2. W. Park et. al. , Phys. fluids B 4 033204(1992).
  3. M. Laishram et. al. , <https://arxiv.org/abs/1911.01741> (2019).
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