

Recent advances in plasma physics

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From the complexities of planetary magnetospheres to the core of future fusion reactors, plasma physics governs phenomena across a vast range of scales. This seminar explores the diverse world of plasmas, classified by the strength of inter-particle interactions relative to kinetic energy. We will focus on weakly coupled electrodynamic plasmas, where fundamental interactions give rise to complex collective behaviors, structure formation, and self-organization. Taking examples from space and fusion, we will discuss recent advances, including a new understanding of whistler wave chorus in planetary magnetospheres and the development of computationally validated predictive capabilities for fusion performance of burning plasmas under realistic reactor conditions.