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Fluctuations in the era of Burning plasmas

Introduction

Plasmas, and in particular Fusion plasmas represent a complex system where many interacting degrees of freedom coexist determining a variety of non-linear behavior spreading over a broad range of spatio-temporal scales [1, 2]. It is known since a lot of time that simplified diffusion paradigm can't correctly describe the transport of energy, particles and momentum and a different description of this dynamical system, generally found close to marginal stability needs to be used. Proper description of plasma dynamics require consequently to disentangle the role played by fluctuations, which are found to emerge at all spatial and temporal scales. My personal research activity has been indeed devoted to the analysis, interpretation and modeling of experimental and numerical results obtained in magnetized plasmas, with emphasis on magnetically confined ones. More in details I've focused my effort on electromagnetic fluctuations induced transport of energy, particle and momentum, with interpretation in the wider framework of turbulence theory. During my research activity I have collected a large experience on electromagnetic transport analysis, working on different magnetic configurations, from Reversed Field Pinches (working on RFX-mod operating in Padova, Extrap-T2R operating in Stockholm and TPE-1RM20 which was in operation in Japan), stellarators (with experimental activity on TJ-II heliac type operating in Spain) and Tokamaks (ASDEX-Upgrade and JET), and low temperature plasmas as the Simple Magnetized Torus experiment TORPEX at EPFL. In the following I will try to provide you with a brief overview of my principal research interests and resultMy general interest in non-linear dynamics motivated me to compare the results obtained in fusion plasmas with the observation obtained in the astrophysical plasma community

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