An Overview of Current Research in Space and Astrophysical Plasmas

Elena Amato[1]
Sergio Servidio[2]
[1] INAF - Osservatorio Astrofisico di Arcetri, Largo E. Fermi, 5, Firenze
[2] Dipartimento di Fisica, Università della Calabria, Rende, Cosenza

In this joint talk, we will provide an overview of plasma physics research in the context of space and astrophysical environments, charting a journey from our local heliosphere to distant compact objects. We will begin by covering the fundamentals of heliospheric plasmas, including the physics of the solar corona, the properties of the solar wind, and the dynamics of near-Earth plasmas [1]. We will then extend the discussion to astrophysical plasmas. We will mention the rich plasma dynamics associated with cosmic explosions, briefly discuss the properties and behaviour of relativistic outflows, and highlight the peculiarities of relativistic electron-positron plasmas [2]. Finally, we will review the interplay between astrophysical plasmas and cosmic rays, exploring the plasma physics processes at play in the acceleration and transport of energetic particles [3]. Our journey will culminate in a state of the art of plasma phenomena in the vicinity of compact objects such as black holes [4]. The tutorial will end with an overview of the current active research in space and astrophysical plasma physics within the Italian community.

References:

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