



UNIVERSITÀ
DI TRENTO

Dipartimento di
Fisica



PhD Program in Space Science and Technology - SST

The Earth's Magnetosphere: A Complex Dynamical System

Specific Seminar – Curriculum 2

June 18, 2026, 3.00 p.m.

Speaker:

Dr. Giuseppe Consolini – Institute of Space Astrophysics and Planetology - National Institute for Astrophysics

Abstract:

The interaction between the solar wind and Earth's magnetosphere gives rise to a range of phenomena, most notably auroral emissions, magnetospheric substorms, and geomagnetic storms. Recent research increasingly supports the hypothesis that Earth's magnetospheric dynamics is characterized by substantial complexity and may operate in a near-critical state, as suggested by the self-similar behavior of geomagnetic indices and the scale-invariant nature of energy deposition in polar ionospheric regions during magnetospheric substorms. A plausible explanation for the observed dynamical complexity and near-critical behavior of Earth's magnetosphere in response to variations in the solar wind may reside in the dynamics of multiscale coherent magnetic and plasma structures in the geomagnetic tail regions. In this presentation, I review key results and relevant literature addressing the near-criticality and stochastic properties of magnetospheric dynamics in response to variations in the solar wind and the interplanetary medium.

Short bio:

Giuseppe Consolini is a Research Director at the Istituto Nazionale di Astrofisica, where his work focuses on space plasma physics, solar physics, and Sun–Earth interactions, with particular emphasis on turbulence, complexity, and Space Weather phenomena. He obtained his degree in Physics from the Università degli Studi di Roma La Sapienza and has developed a long-standing research activity on nonlinear dynamics and transport processes in space plasmas, contributing to the understanding of self-organized criticality and scale invariance in magnetospheric dynamics pulsing more than 240 works. In 2000, he was awarded the Dr. Giuseppe Borgia Foundation Prize by the Accademia Nazionale dei Lincei for pioneering experimental results on the critical nature of magnetospheric dynamics. Throughout his career, he has led and contributed to numerous national and international projects, supporting both theoretical modeling and instrument development for studying the heliosphere and near-Earth space environment. He is also actively involved in graduate and doctoral teaching, as well as editorial activities for international scientific journals.

Online attendance:

Information on remote participation can be requested by sending an e-mail to dn_sst@unitn.it

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