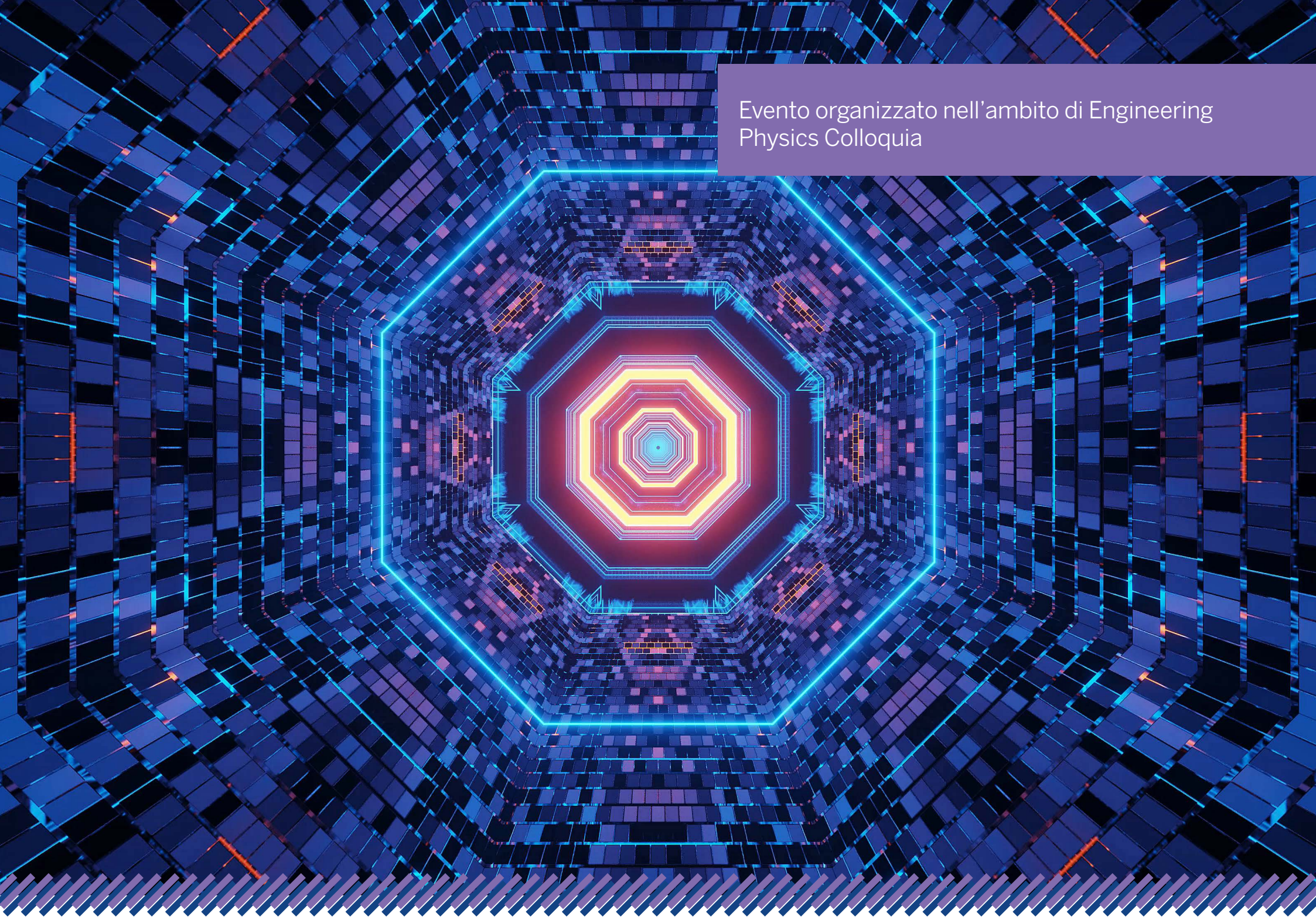

Evento organizzato nell'ambito di Engineering Physics Colloquia

Ca' Foscari University of Venice

Department of Molecular Sciences and Nanosystems

Emerging Frontiers in Orbitronics

24 settembre 2025, 11.00

Conference Room Orio Zanetto, Alfa Building

Dr. **Mario Cuoco**

CNR-SPIN (Italy)

Sarà possibile seguire il seminario anche da remoto, collegandosi al seguente link:
https://unive.zoom.us/j/86299185737
Password: seminar1

Organizzazione di
Domenico De Fazio
Stefano Bonetti

Unlike traditional electronics, which rely on charge manipulation, or spintronics, which exploits electron spin, orbitronics focuses on utilizing the electron's orbital angular momentum and orbital textures to develop new device concepts. In this presentation, I will explore some of the most fascinating and significant phenomena observed in orbitronics within quantum materials. I will begin by introducing the concept of orbital Rashba coupling and then discuss how orbital angular momentum filtering occurs, providing insights into the origins of chiral-induced spin selectivity. Next, I will compare Berry curvature and Hall effects driven by orbital degrees of freedom with those driven by charge and spin, highlighting their unique features. The presentation will also cover orbital Edelstein effects, orbital vortex phases, and the emergence of high-orbital-moment Cooper pairs in superconductors. Finally, I will touch upon the design possibilities for multipolar orbital phases and chiral orbital ordering. Throughout the seminar, I will present material examples, fundamental theoretical models, and mechanisms that describe these phenomena, as well as discuss their potential applications in the development of advanced electronic devices.