

Colloqui della Classe di Scienze

Anno Accademico 2026/2027

Sala Stemmi

Palazzo della Carovana
Scuola Normale Superiore
Piazza dei Cavalieri, 7 - PISA

20 OCTOBER 2026

h 3.00 p.m.

FABIO MALTONI

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THE QUANTUM FABRIC OF THE UNIVERSE

ABSTRACT:

Quantum mechanics not only underpins our understanding of the Universe, matter, and its interactions, but also plays a central role in science and technology, with applications ranging from computing to secure communication. Although there is currently no compelling evidence that the quantum-mechanical framework requires modification at the energies explored so far, studying how its distinctive features manifest themselves at distances far shorter than atomic scales remains an exciting challenge.

High-energy colliders offer a unique setting for this exploration, as illustrated by the recent observation of spin entanglement in top-antitop quark pairs at the Large Hadron Collider. Beyond probing quantum phenomena in a new energy regime, collider experiments offer fertile ground for applying concepts and tools from quantum information to the study of particle interactions. This seminar will explore how entanglement and other quantum correlations can complement conventional observables, reveal aspects of the underlying dynamics, and potentially provide a new window onto physics beyond the Standard Model.

