

Colloqui della Classe di Scienze

Anno Accademico 2024/2025

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

5 FEBRUARY 2025
h 3.00 p.m.

Sir Michael Berry FRS
University of Bristol, UK

Geometric phases old and new

ABSTRACT:

The waves that describe systems in quantum physics can carry information about how their environment has been altered, for example by forces acting on them. This effect is the geometric phase. It occurs in the optics of polarised light, where it goes back to the 1820s. It influences wave interference; and it provides insight into the spin-statistics relation for identical quantum particles. The underlying mathematics is geometric: parallel transport, explaining how falling cats turn upright, and how to park a car. Recent results describe the typical behaviour of the geometric phase curvature and the related quantum metric. Incorporating the back-reaction of the geometric phase on the dynamics of the changing environment exposes an unsolved problem: how can a system be separated from its slowly-varying environment? The concept has a tangled history.

