

Colloqui della Classe di Scienze

Anno Accademico 2022/2023

Scuola Normale Superiore
Piazza dei Cavalieri, 7 - PISA

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h. 15.00

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*Spacetime, Quantum Mechanics
and Positive Geometry At Infinity*

ABSTRACT:

The past decade has seen the emergence of surprising new connections between the real-world physics of elementary particle scattering processes, and simple new mathematical structures in combinatorics, algebra and geometry. These ideas provide, in a number of examples, a different starting point for conceptualizing physics, where the fundamental principles of spacetime and quantum mechanics are not taken as primary, but instead emerge from a more primitive mathematical rubric. In this talk I will illustrate these ideas in their simplest settings, showing in a variety of examples how basic particle scattering processes are autonomously determined by "positive geometries", which are natural generalizations of simplices and polygons. The rules of spacetime and quantum mechanics emerge from the combinatorial geometry seen in the boundary structure of these spaces. This talk will be entirely self-contained; no previous knowledge of either the relevant physics or mathematics will be assumed or needed.

