



Department of
Theoretical Physics

THE QUANTUM SPACETIME SEMINAR SERIES

**Spacetime and Quantum Mechanics, Particles and Strings,
Polytopes and Binary Geometries**

(Zoom Seminar)

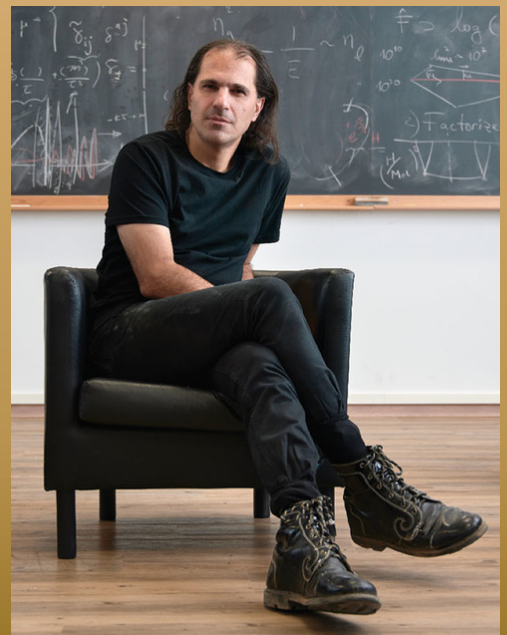
Nima Arkani-Hamed

(Institute for Advanced
Studies, Princeton)

Date: November 1, 2021

Time: 9.00 AM IST

Zoom link shall be shared separately



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 setting, showing how the most basic particle scattering amplitudes are determined by avatars of famous polytopes known as (generalized) associahedra. I will also show how the combinatorial relationships captured by the facets of these polytopes remarkably admit a "curvy" realization in terms of "binary geometries", having the physical interpretation of generalizing particles to strings. This talk will be entirely self-contained; no previous knowledge of either the relevant physics or mathematics will be assumed or needed