Theory Colloquium

Gemma De las Cuevas, Institute for Theoretical Physics, University of Innsbruck
"Quantum theory: From the whole to the parts, magic squares and shadows of infinity"

Abstract

The foundations of quantum theory rest on non-commutative spaces, where composition is given by the tensor product, positive elements play a distinguished role, and so do complex numbers. I will present our recent investigations on the interplay of these characters from three perspectives. First, I will present a framework to go from the whole to the parts, that is, to decompose elements of tensor product spaces while transferring invariance and positivity to the parts, including approximations. Second, I will talk about quantum magic squares and the fact that they cannot be "purified", that is, dilated to quantum permutation matrices. Finally, I will talk about shadows of infinity: one is the shadow of the hyperreal numbers to the reals, where I will show that the existence of bound entangled states with a negative partial transpose can be solved in the hyperreals, and the other is the undecidability of a related problem, which can be seen as an infinite set not admitting a finite description.

Wednesday | 15.12.2021 | 16:15

Zoom link:
https://zoom.us/j/96428272431?pwd=eUc2Vmo3M1UzS3NoWXB2NnZXaXFFdz09

Meeting ID: 964 2827 2431
Passcode: 776306