

# Colloquium

Department of Fundamental Research  
National Centre for Nuclear Research

**February 7 (Monday), 3:15 pm**

The meeting is held online:

<https://www.gotomeet.me/NCBJmeetings/gravity-physics>

(chrome browser is required)

## Professor Miguel Navascues

Institute for Quantum Optics and Quantum Information Vienna  
Austrian Academy of Sciences

### The world is not real

**Abstract:** Although most theories of physics are based on real numbers, quantum theory was the first to be formulated in terms of operators acting on complex Hilbert spaces. This has puzzled countless physicists, including the fathers of the theory, for whom a real version of quantum theory, with real operators and states, seemed much more natural. In fact, previous works showed that such a "real quantum theory" can reproduce the outcomes of any multipartite experiment, as long as the parts share arbitrary real quantum states. In this talk I will show that real and complex quantum theory make different predictions in network scenarios comprising independent states and measurements. This allows us to devise a Bell-like experiment whose successful realization would disprove real quantum theory, just as standard Bell experiments disproved classical physics.

Stanisław Mrówczyński and Włodzimierz Piechocki