

The **Vienna Center for Quantum Science and Technology (VCQ)**  
invites you to a

## COLLOQUIUM TALK

by

**Chiara Marletto**

*(University of Oxford)*

### ***Beyond quantum computation: the physics of can and can't***

The theory of the universal quantum computer has brought us rapid technological developments, together with remarkable improvements in how we understand quantum theory. There are, however, reasons to believe that quantum theory may ultimately have to be modified into a new theory: for instance, it will have to be merged with general relativity, to incorporate gravity; and some claim that it may be impossible to have quantum effects beyond a certain macroscopic scale. So what lies ahead of quantum theory, and of the universal quantum computer? To shed some light on these questions, we need a conceptual shift. Specifically, we can harness general principles about possible/impossible transformations, rather than dynamical laws and initial conditions. These general principles are ideal to describe the physics of 'hybrid quantum systems' - which include a quantum system interacting with another system whose exact dynamics are intractable or not fully known. I will describe my recent work in developing applications of this new approach to a number of interconnected problems within information theory and thermodynamics. I will also describe a few experimental implementations that I co-designed to illustrate these theoretical ideas.

**Monday, 9<sup>th</sup> January 2023,**

Lise-Meitner Lecture Hall, Boltzmannngasse 5, 1090 Vienna

\*talk will be live streamed to the lecture hall\*

**17:00 get-together with coffee and snacks!**

The seminar talk will be preceded by a VCQ Student Talk at 17:30 by

**Viktoria Kabel**

*(IQOQI Vienna)*

**Host: Časlav Brukner**

for further information and the zoom-link please visit

<https://vcq.quantum.at/colloquium-ws-22/>