



University of Crete  
Department of Physics

## *Physics Colloquium*

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Thursday, 14 May 2026 | 17:00 – 18:00, Seminar Room 3<sup>rd</sup> Floor

### **A resource theoretical unification of Mpemba effects: classical and quantum**

**Prof. John Goold**  
*Trinity College Dublin*

#### **ABSTRACT**

The Mpemba effect originally referred to the observation that, under certain thermalizing dynamics, initially hotter samples can cool faster than colder ones. This effect has since been generalized to other anomalous relaxation behaviors even beyond classical domains, such as symmetry restoration in quantum systems. In this talk I will show that resource theories, widely employed in information theory, provide a unified organizing principle to frame Mpemba physics. We show how the conventional thermal Mpemba effect arises naturally from the resource theory of athermality, while its symmetry-restoring counterpart is fully captured by the resource theories of asymmetry.

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