



## *Physics Colloquium*

Thursday, 15 May 2025 | 17:00 – 18:00, Seminar Room 3<sup>rd</sup> Floor

### **Open Competition in Quantum Technology: Magnetometers Developed by Humans and by Nature**

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#### **ABSTRACT**

In this talk I will review our recent work on quantum sensing and quantum biology, which fields have cross-fertilized each other over the last two decades. I will describe magnetic sensing using hot atomic vapors and radical-pair reactions. The latter are an ideal biochemical system demonstrating the premise of quantum biology, in short, because such reactions work like a quantum computer in vivo. Regarding quantum sensing with hot vapor magnetometers, and human-made quantum magnetometers in general, I will describe recent work [1] connecting quantum thermodynamics with the ubiquitous energy resolution limit. I will then discuss how this limit can inform us about biological magnetometers developed by Nature [2]. The discussion will lead to highlighting the scientific and technological potential of quantum biology, and its highly promising synthesis with modern quantum technology.

#### **References**

- (1) I. K. Kominis and E. Gkoudinakis, Approaching the quantum limit of energy resolution in animal magnetoreception, [PRX Life 3, 013004 \(2025\)](#).
- (2) I. K. Kominis, Quantum thermodynamic derivation of the energy resolution limit in magnetometry, [Physical Review Letters 133, 263201 \(2024\)](#).