

***Prof. Vincent MEUNIER***

***Rensselaer Polytechnic Institute (Troy, USA)***

**IMCN SEMINAR**

***Nanoscience and Second Quantum  
Revolutions: a Joined Destiny***

**Friday 8 November 2019 – 11:00 am**

**Auditoire J.-B. Carnoy (B059)**

**Croix du Sud, 4-5, 1348 Louvain-La-Neuve**

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### **ABSTRACT**

The realization that the world cannot be fully understood using the classical laws of physics led to the first quantum revolution early in the twentieth century. One hundred years after the Nobel Prize awarded to Max Planck for his ground breaking work on the blackbody radiation, a second quantum revolution is now under way. In this revolution, physicists now go beyond using the precepts of quantum mechanics to understand natural phenomena as they now aim at exploiting the rules of quantum mechanics to develop new technologies that are poised to offer unprecedented capabilities, such as quantum computing or quantum cryptography. These developments require a concerted approach where physicists, mathematicians, chemists, computer scientists, and engineers form multidisciplinary teams to tackle fundamental challenges posed by the deployment of these technologies. As a key step in these developments, nanomaterials have proven to be unique precursors and enablers of this revolution.

In this lecture, I will first position the second quantum revolution in the context of the milestones that have enabled the rise of quantum mechanics in the past century. Next, I will use examples from my group's research in computational nanophysics to illustrate the catalytic role played by the *nanoscience revolution* over the past 20 years in the advent of quantum technologies. Focusing on nanomaterials, I will describe how the possibility to control matter at the single atomic level has provided an opportunity to "quantum design" systems for targeted purposes. While the focus of the presentation will remain on fundamental physics and materials research, I will discuss how recent progress have opened unique opportunities for novel quantum technologies.

### **BIOGRAPHY**

Vincent Meunier is the Head of the Physics Department at Rensselaer Polytechnic Institute where he holds the Gail and Jeffrey L. Kodosky '70 Constellation Chair. Meunier earned a PhD from the University of Namur in Belgium in 1999 under the supervision of Professor Philippe Lambin. He was a Senior R&D staff member at Oak Ridge National Laboratory until 2010 when he joined Rensselaer as an Associate Professor. He became Full Professor in 2015.

Vincent Meunier leads the Innovative Computational Material Physics (ICMP) group at Rensselaer. His research uses computation to examine the atom-level details of materials. He is particularly interested in low-dimensional materials and specific domains (such as energy storage, photovoltaics, ...) where he can collaboratively work with engineers and experimentalists to optimize these materials, starting at the atomic level and targeting functionality. Since mid-August, Vincent Meunier has been invited as an International Francqui Professor by four Belgian universities (UNamur, UCLouvain, ULiège and UAntwerpen)

