Shannon Whitlock, University of Strasbourg

March 18, 2024 to March 21, 2024
ICFO Auditorium

SPRING SCHOOL:

Title: "Pushing the limits of quantum computer emulation"

Abstract: Simulating quantum systems on classical computers is a notoriously hard problem due to the exponentially growing complexity with system size. This is particularly important in the context of quantum computing, where today's noisy, intermediate scale quantum computers are pushing the limits of what can be simulated and verified even on the largest classical supercomputers. In this tutorial I will describe different methods used to efficiently simulate quantum computers focusing on exact and approximate methods. I will then introduce MIMIQ, a high performance quantum computer simulator developed by QPerfect. MIMIQ is particularly well suited for developing and testing new quantum algorithms and for benchmarking real quantum computers with hundreds of programmable qubits.

RESEARCH WORDSHOP:

Title: "Quantum Computing with Atoms and Light"

Abstract Arrays of optically trapped atoms excited to Rydberg states have emerged as one of the most competitive scalable physical platforms for digital quantum simulation and quantum computing, approaching the point where reliable quantum computations with hundreds of qubits and realistically thousands of multiqubit gates with low error rates are within reach for the first time. In Strasbourg we are building an open and public platform for digital quantum computing based on high quality qubits based on a dual species architecture. I will present our roadmap, focusing on the realization of a highly optimized universal gate set and advanced simulation tools for accelerating the large scale quantum revolution.

BIOGRAPHY:

Shannon Whitlock is a professor in experimental quantum physics at the European Center for Quantum Sciences and the University of Strasbourg, France. He leads the Exotic Quantum Matter group (EQM) which explores the physics of complex quantum systems and applications for quantum simulation, quantum sensing and quantum computing. Shannon completed his PhD at Swinburne University of Technology in Melbourne in 2007, followed by a Marie Curie postdoctoral fellowship at the University of Amsterdam. In 2010, he moved to the University of Heidelberg in Germany where he started his own research group and advanced quantum physics laboratory thanks to a prestigious Emmy Noether grant from the German Research Foundation (DFG). He is the coordinator of the French national public infrastructure for quantum computing aQCess and is strongly involved in several major research and training programmes at the European level.