

Joint CQSE-NCTS-CASTS-CTP Seminar

2021

April 23, Friday

TIME Apr. 23, 2021, 2:30~3:30pm
TITLE Quantum Computing and Simulation with Rydberg-interacting Neutral Atoms
SPEAKER Dr. Ying-Cheng Chen
Institute of Atomic and Molecular Sciences, Academia Sinica
PLACE Rm104, Chin-Pao Yang Lecture Hall,
CCMS & New Physics Building, NTU

Abstract:

Quantum computing is attracting significant attention due to its potential for solving classically intractable problems. However, its realization is notoriously difficult due to the requirement on accurate control of the strong interactions between large-scale qubits while maintaining weak coupling to the environment. Current leading platforms include the superconducting qubits and trapped ions, with achieved qubits number around 50 and average fidelity of two-qubit gates around 99%. To enable useful applications, significant improvements on these figure of merits are required. Recently, individual atoms trapped in optical tweezer arrays have emerged as one of the versatile platforms for quantum computing and simulation. Defect-free qubit numbers of a few hundreds have been routinely generated. Two qubit gates are implemented by coherent driving to highly excited Rydberg states, which exhibit strong and long-range interactions and a fidelity of around 98% has been achieved recently. While large-scale gate-based quantum circuits still wait to be demonstrated, this platform has been used to simulate quantum spin models in regimes beyond those accessible via numerical studies with modern supercomputer. In this talk, I will introduce the status and our future plan for the research along this direction.

Biography Brief:



Ying-Cheng Chen received his B.S., M.S, and Ph.D. in Physics from National Tsing-Hua University in 1993, 1995, and 2002, respectively. He was the adjunct assistant professor in NTHU during 2007 – 2014 and was the postdoctoral research fellow in Rice University, Houston, USA, under the supervision of Prof. Thomas C. Killian (2003 – 2004) and Prof. Randall G. Hulet (2002 – 2003). He is currently the associate research fellow at IAMS, Academia Sinica.

There are two main directions in his current research; one is to generate ultracold molecules and study their many-body interactions and the other is to utilize ultracold atomic samples to study the low-light-level nonlinear optics and their applications in quantum information science.

- N O T I C E -

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