

Quantum Information Science (QIS) Principal Investigators' Meeting
BES Breakout Sessions
Wardman Park Marriott Hotel

Thursday, March 12, 2019

- Virginia A Quantum Computing and Simulation – Applications in Materials Sciences**
Chair: Yongxin Yao (Ames Laboratory)
- 3:30 – 3:45 PM Introductory Comments from BES Management
Tom Settersten (Basic Energy Sciences)
- 3:45 – 4:00 PM *Trapped-ion quantum simulators for materials research*
Christopher Monroe (University of Maryland)
- 4:00 – 4:15 PM *Two-dimensional quantum gas with real time control of complete Hamiltonian*
Cheng Chin (University of Chicago)
- 4:15 – 4:30 PM *Simulating long-time evolution of driven many-body systems with next generation quantum computers*
James Freericks (Georgetown University)
- 4:30 – 4:45 PM *Resource-efficient quantum simulations on NISQ devices: Advancing the state-of-the-art*
Itay Hen (University of Southern California)
- 4:45 – 5:00 PM *Driven quantum matter, decoherence, and quantum simulations*
Nikolai Sinitsyn (Los Alamos National Laboratory)
- 5:00 – 5:15 PM General Discussion
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- Virginia B Quantum Materials: 2D Materials**
Chair: Jennifer Hoffman (Harvard University)
- 3:30 – 3:45 PM Introductory Comments from BES Management
Matthias Graf (Basic Energy Sciences)
- 3:45 – 4:00 PM *Programmable Quantum Materials EFRC*
Xiaoyang Zhu (Columbia University)
- 4:00 – 4:15 PM *Quantum Press for next-generation quantum information platforms*
Amir Yacoby (Harvard University)
- 4:15 – 4:30 PM *Planar systems for quantum information*
Jie Shan (Cornell University)
- 4:30 – 4:45 PM *Design, control and application of next-generation qubits*
Arun Bansil (Northeastern University)
- 4:45 – 5:00 PM *Controlled synthesis of solid-state quantum emitter arrays for quantum computing and simulation*
Tony Heinz (SLAC National Accelerator Laboratory/Stanford)
- 5:00 – 5:15 PM General Discussion

Virginia C Molecular Systems: Synthesis, Coherence, and Entanglement

Chair: Hai-Ping Cheng (University of Florida)

- 3:30 – 3:45 PM Introductory Comments from BES Management
Andrew Schwartz (Basic Energy Sciences)
- 3:45 – 4:00 PM *Creating and interfacing designer chemical qubits*
Danna Freedman (Northwestern University)
- 4:00 – 4:15 PM *Molecular control of spin-entangled triplet excitons from singlet fission*
Justin Johnson (National Renewable Energy Laboratory)
- 4:15 – 4:30 PM *Optical cycling of molecules*
Wesley Campbell (University of California, Los Angeles)
- 4:30 – 4:45 PM *Space-time quantum information from the entangled states of magnetic molecules*
Wilson Ho (University of California, Irvine)
- 4:45 – 5:00 PM *Molecular spins for next generation quantum technologies*
Stephen Hill (Florida State University)
- 5:00 – 5:15 PM General Discussion

Friday, March 13, 2019

Virginia A Quantum Computing and Simulation - Applications in Chemical Sciences

Chair: Edward Hohenstein (SLAC National Accelerator Laboratory)

- 12:30–12:45 PM *Quantum computation for quantum prediction of materials and molecular properties*
Rosa Di Felice (University of Southern California)
- 12:45–1:00 PM *Quantum computing algorithms for quantum chemistry*
Francesco Evangelista (Emory University)
- 1:00 – 1:15 PM *Quantum computing algorithms and applications for coherent and strongly correlated chemical systems*
Sabre Kais (Purdue University)
- 1:15 – 1:30 PM *Simulations of chemical processes with downfolded many-body Hamiltonians using quantum algorithms*
Karol Kowalski (Pacific Northwest National Laboratory)
- 1:30 – 1:45 PM *Efficient variational ansätze for molecular simulations on a quantum processor*
Edwin Barnes (Virginia Tech)
- 1:45 – 2:00 PM *Studying energy transfer models at the nanoscale with a trapped-ion quantum computer*
Hartmut Haeflner (University of California, Berkeley)
- 2:00 – 2:15 PM General Discussion
- 2:15 PM Concluding Remarks and Adjourn

Virginia B

Quantum Materials

Chair: Joseph Checkelsky (Massachusetts Institute of Technology)

- 12:30 – 12:45 PM *Metamaterial inspired quantum approaches to microwave photonics*
Irfan Siddiqi (Lawrence Berkeley National Laboratory)
- 12:45 – 1:00 PM *Integrated materials platform for topological quantum computing devices*
Vlad Pribiag (University of Minnesota)
- 1:00 – 1:15 PM *Aharonov-Bohm interference of fractional quantum Hall edge modes*
Michael Manfra (Purdue University)
- 1:15 – 1:30 PM *Quantum science with van der Waals materials*
Stevan Nadj-Perge (California Institute of Technology)
- 1:30 – 1:45 PM *Intrinsic topological superconductors*
Susanne Stemmer (University of California, Santa Barbara)
- 1:45 – 2:00 PM *The quest for a quantum spin liquid*
Collin Broholm (Johns Hopkins University)
- 2:00 – 2:15 PM General Discussion
- 2:15 PM Concluding Remarks and Adjourn

Virginia C

Quantum Entanglement, Transduction, and Sensing

Chair: Oskar Painter (California Institute of Technology)

- 12:30 – 12:45 PM *Center for Novel Pathways to Quantum Coherence in Materials*
Joel Moore (Lawrence Berkeley National Laboratory)
- 12:45 – 1:00 PM *Atom-defect hybrid quantum systems*
Ania Bleszynski Jayich (University of California, Santa Barbara)
- 1:00 – 1:15 PM *Understanding and controlling entangled and correlated quantum states in confined solid-state systems*
Stephen Jesse (Oak Ridge National Laboratory)
- 1:15 – 1:30 PM *Hybrid quantum systems: spins, photons and superconducting qubits*
Hong Tang, (Yale University)
- 1:30 – 1:45 PM *Coherent spin-magnon coupling for quantum-to-quantum transduction*
Gregory Fuchs (Cornell University)
- 1:45 – 2:00 PM *Parametrically-induced quantum engineering*
Archana Kamal (University of Massachusetts, Lowell)
- 2:00 – 2:15 PM General Discussion
- 2:15 PM Concluding Remarks and Adjourn