

Workshop on Theory and Practice of Adiabatic Quantum Computers and Quantum Simulation | (smr 2825)

Monday, 22 August 2016

08:15 - 10:00

- 08:15 **Registration 45'** (Leonardo Building - Lobby)
08:35 **Operations/Bank formalities 1h25'**
09:50 **WELCOME ADDRESSES 10'** (Leonardo Building - Budinich Lecture Hall)

10:00 - 12:00

- Convener: A. Scardicchio
10:00 **Entanglement in Adiabatic Quantum Computation 45'** (Leonardo Building - Budinich Lecture Hall)
Speaker: A. Green (London Centre for Nanotechnology)
10:45 **Simulating quantum spin systems 45'** (Leonardo Building - Budinich Lecture Hall)
Speaker: R. Moessner (Max-Planck-Institut für Physik Komplexer Systeme)
11:30 **Coffee Break 30'** (Leonardo Building - Lobby)

12:00 - 16:00

- Convener: A. Scardicchio
12:00 **Application of Quantum Annealing to Training of Deep Neural Networks 45'** (Leonardo Building - Budinich Lecture Hall)
Speaker: S. Adachi (Lockheed Martin Space Systems Company)
12:45 **Lunch Break 1h15'** (Leonardo Building - Cafeteria)
14:00 **Operations/Bank formalities 2h0'** (Enrico Fermi Building)

16:00 - 17:10

- Convener: A. Green
16:00 **Testing Adiabatic Quantum Computers Using Simple Quantum Simulation 45'** (Leonardo Building - Budinich Lecture Hall)
Speaker: P. Love (Tufts University)
16:45 **High-Tc Josephson junctions for quantum computation 25'** (Leonardo Building - Lobby)
Speaker: B. Chesca (Loughborough University)

Tuesday, 23 August 2016

09:00 - 11:00

- Convener: V. Oganessian
09:00 **Quantum Tunnelling & Ergodicity in Quantum Spin Glasses 45'** (Leonardo Building - Budinich Lecture Hall)
Speaker: B.K. Chakrabarti (Saha Institute of Nuclear Physics)
09:45 **Phase transitions in quantum error correction 45'** (Leonardo Building - Budinich Lecture Hall)
Speaker: S. Matsuura (Niels Bohr Institute)
10:30 **Coffee Break 30'** (Leonardo Building - Lobby)

11:00 - 14:30

- Convener: P. Love
11:00 **Adiabatic Evolution of the Random transverse-field Ising Spin Chain 25'** (Leonardo Building - Budinich Lecture Hall)
Speaker: P. Mason (Loughborough University)
11:25 **Hamiltonian engineering for many-body quantum systems by shortcuts to adiabaticity 25'** (Leonardo Building - Budinich Lecture Hall)

Speaker: K. Takahashi (Tokyo Institute of Technology)

11:50 **Quantum-Classical Monte Carlo Algorithm for Simulating AQC** 45' (Leonardo Building - Budinich Lecture Hall)

Speaker: I. Hen (USC Information Sciences Institute)

12:35 **Lunch Break** 1h55' (Leonardo Building - Cafeteria)

14:30 - 16:10 CONVENER: A. Perdomo-Ortiz

14:30 **Ground state expansion and the spectral gap of stoquastic Hamiltonians** 45' (Leonardo Building - Budinich Lecture Hall)

Speaker: E. Crosson (CALTECH)

15:15 **Computational property of quantum annealing of integer factorization problem** 25'

Speaker: C. Nakajima (Tohoku University)

15:40 **Coffee Break** 30' (Leonardo Building - Lobby)

16:10 - 17:20 CONVENER: I. Hen

16:10 **Expansion in large coordination number for the quantum Ising model** 25' (Leonardo Building - Budinich Lecture Hall)

Speaker: P. Navez (University of Crete)

16:35 **Spin-glass bottlenecks in quantum annealing** 45' (Adriatico Guest House - Terrace)

Speaker: S.Knysh (Nasa Ames Research Center)

Wednesday, 24 August 2016

09:00 - 11:00 Convener: E. Kapit

09:00 **Quantum Boltzmann Machine using a Quantum Annealer** 45' (Leonardo Building - Budinich Lecture Hall)

Speaker: M. Amin (D Wave Systems Inc.)

09:45 **A quantum-assisted algorithm for sampling applications in machine learning** 45' (Leonardo Building - Budinich Lecture Hall)

Speaker: A. Perdomo Ortiz (Nasa Ames Research Center)

10:30 **Coffee Break** 30' (Leonardo Building - Lobby)

11:00 - 14:30 Convener: E. Crosson

11:00 **Fictitious but Efficient Annealing Dynamics, and Role of Quantum Entanglement Therein** 25' (Leonardo Building - Budinich Lecture Hall)

Speaker: K. Imafuku (AIST)

11:25 **Parametric excitation of a superconducting qubit due to a nonadiabatic modulation of Lamb shift** 25' (Leonardo Building - Budinich Lecture Hall)

Speaker: V. Pogosov (Dukhov Research Institute of Automatics)

11:50 **Inhomogeneous quasi-adiabatic driving of quantum critical dynamics in disordered spin chains** 45' (Leonardo Building - Budinich Lecture Hall)

Speaker: M. Rams (Insitute of Physics)

12:35 **Lunch Break** 1h55' (Leonardo Building - Cafeteria)

14:30 - 16:10 Convener: S. Pilati

14:30 **DMRG and Many Body Localized Systems** 45' (Leonardo Building - Budinich Lecture Hall)

Speaker: S. Sondhi (Princeton University)

15:15 **Photonic Cat States from Strongly Interacting Matter Waves** 25' (Leonardo Building - Budinich Lecture Hall)

Speaker: U. Fischer (Seoul National University)

15:40 **Coffee Break** 30' (Leonardo Building - Lobby)

16:10 - 16:55 Convener: S. Pilati

16:10 **Scaling analysis and instantons for quantum spin tunneling and Quantum Monte Carlo simulations** 45' (Leonardo Building - Budinich Lecture Hall)

Speaker: V. Smelyanskiy (Google Inc)

- 16:55 - 19:30 **FLASH TALK SESSION**
 Location: Leonardo Building - Budinich Lecture Hall
- 16:55 **Quantum and Classical in Adiabatic Quantum Computation 5'**
 Speaker: P. Crowley (London Centre for Nanotechnology)
- 17:00 **Semi-classical potential for quantum annealing with antiferromagnetic fluctuation 5'**
 Speaker: Y. Susa (Tokyo Institute of Technology)
- 17:05 **Quantum simulation of the Anderson Hamiltonian with an array of coupled nanoresonators: delocalization and thermalization effects 5'**
 Speaker: M. De Oliveira (UNICAMP)
- 17:10 **Simulated quantum annealing of double-well and multiwell potentials 5'**
 Speaker: E. M. Inack (SISSA-ICTP)
- 17:15 **On the quantum spin glass transition on the Bethe lattice 5'**
 Speaker: G. Mossi (SISSA-ICTP)
- 17:20 **Quantum annealing speedup over simulated annealing on random Ising chains 5'**
 Speaker: T. Zanca (SISSA)
- 17:25 **Non-reversal Open Quantum Walks 5'**
 Speaker: H. Goolam Hossen (University of KwaZulu-Natal)
- 17:30 **Checker-board supersolid phase in the multi-component Bose-Hubbard model on the square lattice 5'**
 Speaker: F. Heydari-Nasab (IASBS)
- 18:00 **Poster Session and snacks 1h30'** (Leonardo Building - Terrace)

Thursday, 25 August 2016

- 09:00 - 11:00 Convener: G. Santoro
- 09:00 **Dynamics of Decoherence: Universal scaling of decoherence factors 45'** (Leonardo Building - Budinich Lecture Hall)
 Speaker: A. Dutta (Indian Institute of Technology)
- 09:45 **Classical simulation of open quantum systems 45'** (Leonardo Building - Budinich Lecture Hall)
 Speaker: M. ŽNIDARIČ (University of Ljubljana)
- 10:30 **Coffee Break/GROUP PHOTO 30'** (Leonardo Building - Lobby)
- 11:00 - 14:30 Convener: H. Katzgraber
- 11:00 **Universal scaling for a quantum discontinuity critical point and an adiabatic time evolution 45'** (Leonardo Building - Budinich Lecture Hall)
 Speaker: S. Suzuki (Saitama Medical College)
- 11:45 **Spin glasses and Adiabatic Quantum Computing 45'** (Leonardo Building - Budinich Lecture Hall)
 Speaker: A. Young (University of California at Santa Cruz)
- 12:30 **Lunch Break 2h0'** (Leonardo Building - Cafeteria)
- 14:30 - 21:00 Convener: P. Young
- 14:30 **Geometric and counter-diabatic optimization of quantum annealing protocols 45'** (Leonardo Building - Budinich Lecture Hall)
 Speaker: A. Polkovnikov (Boston University)
- 15:15 **Quantum vs classical optimization: A status update on the arms race 45'** (Leonardo Building - Budinich Lecture Hall)
 Speaker: H. Katzgraber (Texas A&M University)
- 19:00 **RECEPTION Dinner 2h0'** (Adriatico Guest House - Terrace)

Friday, 26 August 2016

09:00 - 11:00

Convener: C. Laumann

09:00 **Characterizing Quantum Supremacy in Near-Term Devices** 45' (Leonardo Building - Budinich Lecture Hall)

Speaker: S. Boixo (Google Inc)

09:45 **Quantum Simulated Annealing and open adiabatic dynamics in Ising ferromagnets** 45' (Leonardo Building - Budinich Lecture Hall)

Speaker: R. Fazio (ICTP)

10:30 **Coffee Break** 30' (Leonardo Building - Lobby)

11:00 - 12:20

Convener: R. Fazio

11:00 **Suppression of inhomogeneous broadening of qubit ensemble under optimized driving** 25' (Leonardo Building - Budinich Lecture Hall)

Speaker: S. Remizov (VNIIA)

11:25 **(De)-localization in mean-field quantum glasses** 45' (Leonardo Building - Budinich Lecture Hall)

Speaker: C. Laumann (University of Washington)

12:10 **Closing Remarks** 10' (Leonardo Building - Budinich Lecture Hall)