International Workshop
25 February - 1 March 2019

**Atomic tunneling Systems and fluctuating Spins interacting with superconducting Qubits**

**PROGRAM**

**Scientific coordinators:**
Christian Enss • University of Heidelberg, Germany
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Alexander Shnirman • Karlsruhe Institute of Technology, Germany

**Organisation:**
Maria Voigt • MPIPKS, Germany
The program will be continuously updated during the event. This Version was printed on February 26, 2019
Program

Sunday, 24 February

18:00 - 20:00  Registration at guest house 4, library
19:00 - 21:00  Welcome reception and dinner at the MPIPKS
20:00 - 21:30  Informal discussions
Monday, 25 February

Probing individual TLS

10:15 - 10:30  
**Michael Genkin** (MPIPKS) &  
**scientific coordinators**  
Opening

*Chair morning talks: Christian Enss*

10:30 - 11:15  
**Jürgen Lisenfeld**  
(Karlsruhe Institute of Technology)  
Mapping the position of defects in superconducting qubits

11:15 - 12:00  
**Yaniv Rosen**  
(Lawrence Livermore National Laboratory)  
Probing two level systems at the material interfaces of superconducting devices

12:00 - 13:00  
Lunch break

13:00 - 14:00  
Discussions

*Chair afternoon talks: Georg Weiss*

14:00 - 14:45  
**Andrew Fefferman** (CNRS - Institut Néel)  
Toward mechanical measurements of individual TLSs

14:45 - 15:30  
**Kevin Osborn** (University of Maryland)  
Two-level systems driven coherently out of equilibrium
15:30 - 16:00  **Alexander Bilmes**  
(Karlsruhe Institute of Technology)  
Resolving the Location of Parasitic Defects in Superconducting Qubits

16:00 - 16:30  Coffee break

*Chair tlsqu19-colloquium: Alexander Eisfeld (MPIPKS)*

16:30 - 17:30  **John Martinis** (Google and University of California, Santa Barbara)  
tlsqu19-colloquium: Fluctuations of Energy-Relaxation Times in Superconducting Qubits

*Chair discussions: Alexey Ustinov*

17:30 - 19:00  Discussions

19:00 - 20:00  Dinner

20:00 - 21:00  Informal discussions
**Program**

**Tuesday, 26 February**

**Noise in Superconducting Qubits**

*Chair morning talks: Gerd Schön*

09:15 - 10:00  **Sergey Kubatkin**  
(Chalmers University of Technology)  
Direct Identification of Dilute Surface Spins on Al2O3: Origin of Flux Noise in Quantum Circuits

10:00 - 10:30  Coffee break

10:30 - 11:15  **Sebastian de Graaf**  
(National Physical Laboratory)  
Probing the origin of TLS using superconducting resonators

11:15 - 12:00  **Clemens Müller** (IBM Research - Zurich)  
Correlating decoherence in transmon qubits: Low frequency noise by single fluctuators

12:00 - 13:00  Lunch break

13:00 - 14:00  Discussions

*Chair afternoon talks: John Martinis*

14:00 - 14:45  **Clare Yu** (University of California, Irvine)  
Flux Noise in Superconducting Qubits

14:45 - 15:30  **Joakim Bergli** (University of Oslo)  
Pure phase decoherence in a ring: a geometric approach
15:30 - 16:00  Matthias Mergenthaler (IBM Research - Zurich)  Investigating coherence limitations in transmon qubits

16:00 - 16:30  Coffee break

Chair late afternoon talks: Jared Cole

16:30 - 17:00  Jonathan Burnett (National Physical Laboratory)  TLS induced decoherence-instabilities in superconducting qubits

17:00 - 17:45  Dagmar Gerthsen  (Karlsruhe Institute of Technology)  Optimization of the structural properties of Al/AlOx/Al-layer systems for Josephson junctions

17:45 - 19:00  Poster session I

19:00 - 20:00  Dinner

20:00 - 21:00  Poster session II
Wednesday, 27 February

**Noise in Superconducting Devices**

*Chair morning talks: Sebastian Kempf*

09:15 - 10:00 **Pertti Hakonen** (Aalto University)
High-quality superconducting junctions using suspended single-walled carbon nanotubes

10:00 - 10:10 Group photo
(to be published on the event’s web page)

10:10 - 10:30 Coffee break

10:30 - 11:15 **Yuri Galperin** (University of Oslo)
Two-level fluctuators, 1/f noise and decoherence of qubits

11:15 - 12:00 **Nadav Katz** (The Hebrew University of Jerusalem)
Quality factors of high kinetic inductance Tungsten Silicide resonators

12:00 - 13:00 Lunch break

13:00 - 13:45 Discussions
13:45  Departure to the Altstadt of Dresden by tram from the institute *(meeting point: reception of MPIPKS)*

14:30 - 15:15  Coffee break at the **Grand Café Coselpalais**, An der Frauenkirche 12, Tel.: +49 351 498 98 12

15:15 - 15:30  Walk along the Brühlsche Terrassen to the Royal Castle Dresden

15:30 - 17:00  Guided English speaking tour of the **Royal Castle Dresden**, Taschenberg 2, Tel.: +49 351 491 420 00

17:00 - 18:00  Guided walking tour from the Altstadt to the Neustadt of Dresden

18:00 - 20:00  Menu-dinner at the restaurant **Hierschönesse**, Görlitzer Str. 20, Tel.: +49 351 256 528 98
**Program**

**Thursday, 28 February**

**Physics and Dynamics of TLS**

*Chair morning talks: Moshe Schechter*

09:15 - 10:00
*Georg Weiss* (Karlsruhe Institute of Technology)
Dielectric measurements of the dynamics of atomic tunneling systems in thin-film AlOx

10:00 - 10:30
Coffee break

10:30 - 11:15
*Jared Cole* (RMIT University)
Microscopic models of TLS, atomic structure and phonons

11:15 - 12:00
*Martin Cyster* (RMIT University)
Simulation of the fabrication and electronic properties of Al/AlOx/Al Josephson junctions

12:00 - 13:00
Lunch break

13:00 - 14:00
Discussions

*Chair afternoon talks: Kevin Osborn*

14:00 - 14:45
*Alexander Burin* (Tulane University)
Theory of nonlinear absorption by interacting two-level systems

14:45 - 15:30
*Shlomi Matityahu* (Ben Gurion University of the Negev)
Dynamical decoupling of two-level systems by coherent multiple Landau-Zener transitions
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15:30 - 16:00  **Andreas Fleischmann** (Heidelberg University)
Nuclear spin driven dynamics in non-equilibrium disordered quantum systems

16:00 - 16:30  Coffee break

*Chair late afternoon talks: Yuri Galperin*

16:30 - 17:00  **Vassiliy Lubchenko** (University of Houston)
Low-temperature anomalies in disordered solids: a cold case of contested relics?

17:00 - 17:30  **Daniel Kaplan** (Weizmann Institute of Science)
Microscopic realization of the two TLS model

*Chair discussions: Clare Yu*

17:30 - 19:00  Discussions

19:00 - 20:00  Dinner

20:00 - 21:00  Informal discussions
Program

Friday, 01 March

**Physics and Fabrication of SC Devices**

*Chair morning talks: Sergey Kubatkin*

09:15 - 10:00 **Lara Faoro** (Centre National de la Recherche Scientifique)
TLS dynamics and charge noise in superconducting circuits

10:00 - 10:30 Coffee break

10:30 - 11:15 **Jukka Pekola** (Aalto University)
Photonic heat transport controlled by superconducting qubits

11:15 - 12:00 **Sebastian Kempf** (Heidelberg University)
Recent insights in low-frequency excess flux noise of superconducting quantum devices

12:00 - 13:00 Lunch break

*Chair afternoon talk: Alexander Shnirman*

13:00 - 13:45 **Peter Nalbach** (Westfälische Hochschule Gelsenkirchen)
Frustrated relaxation due to non-commuting noise

13:45 - 14:00 Closing remarks

14:00 - 16:00 Informal discussions & departure