

David Leiner

Group of Prof. Steffen Glaser,
Technische Universität München



Short CV

1987: born in Landau i. d. Pfalz, Germany

2009-2014: studied electrical engineering at Technische Universität München, Germany

2014: master of Science (on quantum nano electronics under Prof. Lugli)

Since Nov 2014: ExQM PhD student in group of Prof. Steffen Glaser, Technische Universität München

External collaborations:

D. Sugny, L. Van-Damme - University of Burgundy,

B. Dive – Imperial College London

PhD Project: “Wigner representation of systems consisting of a small number of qubits and NMR quantum information experiments”

In my PhD project, I investigate theoretical and experimental aspects of quantum systems consisting of a small number of qubits using methods of nuclear magnetic resonance (NMR). In particular, I focus on a general Wigner-type representation of quantum mechanical spin operators that can be visualized by a set of spherical functions with characteristic shapes. A general methodology was developed to experimentally map these shapes directly using a novel probing approach based on expectation values of rotated axial spherical tensor operators. This approach was demonstrated experimentally for operators in systems consisting of up to three qubits.

In addition, my work covers fields in quantum optimal control theory. An important part was the experimental verification of a quantum-version of the so-called tennis racket effect in spin systems in joint work with Dominique Sugny and Leo Van-Damme from the University of Burgundy facilitating the design of optimal shaped pulses. An experimental demonstration of a new algorithm of quantum self-optimization is currently under investigation with Florian Mintert and Ben Dive from Imperial College London.

Presentations at conferences:

2016: Pasteur workshop Helmholtz-Zentrum Neuherberg (Ger), “quantum state tomography in DROPS representation”

2016: Munich Quantum Symposium 2016, poster: “Wigner tomography of operators in multi-qubit systems”