# ANNOUNCEMENT

UNIVERSITÄT SALZBURG

Seminarreihe Materialforschung & Physik

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Universität Wien

## "Large-Scale interfaces for solid-state qubits"

**Mittwoch, 28. Juni 2017**,
**17:00 s.t., SR I**,
Jakob-Haringer-Strasse 2a, JAK2AOG1.33

Defects in semiconductors such as silicon, diamond and silicon carbide are promising candidates for the implementation of quantum bits (qubits) and sensors given their long spin coherence lifetimes. An overview of these defects and their applications, with particular focus on the nitrogen-vacancy (NV) defect in diamond, will be given, as well as a summary of our work towards their implementation.
Many of the envisaged applications will require control over a large number of sites, and quantum computing in particular will require exquisite control over millions of qubits. However, controlling large numbers of tightly packed defects is a daunting task as access for control lines needs to be provided, and cross-talk can be deleterious.
A method for the efficient control of large-scale qubit registers based on quantum interference, which mitigates both of these challenges, will be presented. The number of controlled sites increases quadratically with the number of control lines, and the method provides precise local, multi-site or global control. The principle is demonstrated experimentally using microfabricated control structures on a diamond chip to manipulate nitrogen-vacancy centres.
Factors affecting site separation, control errors and control speed will be discussed, together with methods to increase the surface density of controlled sites using multi-line pulse sequences. With these methods, the presented control architecture shows promise for simplifying the development of applications in large-scale quantum technology.