The handle http://hdl.handle.net/1887/21759 holds various files of this Leiden University dissertation.

**Author:** Wijts, Geert  
**Title:** Magnetic resonance force microscopy at milliKelvin temperatures  
**Issue Date:** 2013-09-19
I would like to acknowledge the indispensable contributions to the work that is described in this thesis of the following people:

Dian van der Zalm and Gert Koning have designed and machined the fine mechanical components of our experimental setup, as well as various prototypes of the current experimental chamber. Also, they have realized the modifications to the cryostat and the surrounding laboratory space. Dian has been actively involved in planning the technical aspects of the research project.

Bert Crama and Raymond Koehler have installed and characterized the radio-frequency circuitry for spin excitation inside the cryostat and assisted in acquiring and setting up the electronic equipment.

Federica Galli has developed the one-dimensional coarse approach motor that was used in our measurements on electron spins in silicon. Also, she has assisted in cryogenic STM measurements.

Marcel Hesselberth and Daan Boltje have been responsible for keeping the Scanning Electron Microscope and the nanomanipulator, which we used to assemble our cantilevers, running.

Klara Uhlirova has assisted in microfabricating our detection coil on strontium titanate using e-beam lithography.

Jennifer Mathies and Peter Gast have magnetized our cantilever magnets in their EPR setups.

Martin van Son has performed the EPR characterization measurements on strontium titanate, Tim Verhagen has provided me with the sample holder for these experiments, and Edgar Groenen has helped me in interpreting the results.

Evan Jeffrey and Petro Sonin have suggested the use of the PiezoKnob cryogenic motors. They shared their experience in implementing them in a cryostat and measuring their displacement capacitively.

Hans Brom has educated me on the adaptation of existing nuclear spin diffusion theory to incorporate electron spins.

Ben Chui has provided us with cantilever chips, which he developed in the group of Dan Rugar at IBM Almaden Research Center.

Phani Peddibhotla has shared Labview programs for cantilever control with us, which he developed in the group of Martino Poggio at the University of Basel.

Wim Bosch has consulted us on cryogenic techniques and measured the temperature of the mixing chamber stage during all experiments described in this
thesis, using low-temperature thermometers that he developed. Peter Heemskerk has performed preliminary measurements on SQUID-based cantilever detection and has taught me how to assemble the cantilever and the magnet. Bob van Waarde has assisted in modeling the interactions between a magnet and a superconductor. Marc de Voogd and Jehner Wagenaar have been involved in the interpretation of the measurement data on silicon and strontium titanate. Laurens Schinkelshoek has fabricated the first generation of detection coils and RF wires on silicon chips. Arthur den Haan has developed software for cantilever feedback. He has also implemented and tested the Piezoknob cryogenic motors, characterizing them using STM. Moreover, he has been actively involved in the measurements on strontium titanate and the cantilever feedback cooling experiments. Sasha Usenko has been involved in installing the cryostat and in getting the SQUID detection of the cantilever motion to work. He has provided us with SQUIDs and electronics from his own setup, MiniGRAIL. He has written Labview VI’s for the characterization of cantilevers. He performed measurements and analyzed the data of the experiments in which we cooled a cantilever to 25mK. Andrea Vinante has, together with Sasha, set up the cryostat and developed the SQUID detection of the cantilever motion. He was actively involved in all experiments described in this thesis, most notably in the measurements and modeling of electron spins on silicon, and in the cantilever feedback cooling experiment. Tjerk Oosterkamp has conceived the SQUID-based MRFM measurements and acquired funding to finance the experiments. He has been responsible for the planning of the scientific project, and has been actively involved in all experiments described in this thesis, in measurements as well as in data interpretation.

I am very grateful to all people mentioned here for their contributions and shared wisdom. I very much enjoyed collaborating with them during the coarse of my PhD research.

Geert Wijts
Leiden, August 2013