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Magnetic resonance force microscopy for condensed matter

Wagenaar, J.J.T.

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Author: Wagenaar, Jelmer J.T.

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Stellingen

Behorend bij het proefschrift

Magnetic Resonance Force Microscopy for Condensed Matter

- I. Magnetic Resonance Force Microscopy can be used to probe the electronic susceptibility of two dimensional states of matter.

Chapters 5 and 8

- II. By removing the need for a radio-frequency source to be aligned in close vicinity of the sample and force sensor, we have made MRFM a less difficult technique for probing condensed matter physics.

Chapter 6

- III. A commercial MRFM will be available within three years from now.

Chapter 8

- IV. The signal strength in saturation experiments in MRFM highly depends on the duration and the strength of the radio-frequency pulse.

Chapter 4

- V. In previous analyses of MRFM experiments, the spin-resonator coupling was approximated or defined in the wrong way.

D. Rugar *et al.*, *Nature* **360**, 563 (1992)

Degen *et al.*, *Proc. Natl. Acad. Sci. USA* **106**, 1313 (2009)

- VI. The slowly decaying frequency shifts in the electron spin resonance experiment of Vinante *et al.* are not caused by the polarization of the electron spins but by nuclei.

Vinante *et al.*, *Nat. Comm.* **2**, 572 (2012)

- VII. It is incorrect to attribute the unexpected spin diffusion by Cardellino *et al.* to the large inhomogeneous line broadening due to field inhomogeneities or lattice damage.

J. Cardellino *et al.*, *Nat. Nanotechnol.* **9**, 343 (2014)

- VIII. Besides the findings of Kuehn *et al.*, magnetic dissipation adds to non-contact friction in MRFM experiments.

S. Kuehn *et al.*, *Phys. Rev. Lett.* **96**, 156103 (2006)

- IX. Science would benefit if scientists would more often smoke cigars.

- X. Minder weten is meer meten.

*Jelmer J. T. Wagenaar
July 5, 2017*