Probing quantum materials with novel scanning tunneling microscopy techniques

Bastiaans, K.M.

Curriculum Vitae

I, Koen Mathijs Bastiaans, was born on 7 April 1990 in Leiden, and always kept a strong connection to my city of birth. After graduating from the Stedelijk Gymnasium in Leiden in 2008 with double study profiles (Science & Health and Science & Technology), I started my studies in Business Administration at the Vrije Universiteit in Amsterdam. Soon after, I realized how much I truly enjoy the challenges and beauty of the natural sciences and therefore decided to enroll for the Physics program at Leiden University in 2009. Early 2013 I obtained my BSc degree in Physics after having worked under the supervision of Prof. S.J. van der Molen on a project where we studied the conduction properties of spin-transition molecules in a gold nanoparticle network. I continued my studies in Physics at Leiden University following the MSc 'Experimental Physics'-track, where I worked on two thesis projects. One under the supervision of Prof. T.H. Oosterkamp studying the low temperature dissipation of superconductors and one with Dr. M.P. Allan working on a Spin Hall effect-based STM tip. I obtained my MSc degree in Physics in 2015 and decided, driven by the passion I found for experimental physics, to continue to pursue a PhD in Physics under the supervision of Dr. M.P. Allan, working on novel experimental probes to investigate the mysteries of strongly correlated quantum materials.

List of Publications

11. **K.M. Bastiaans**, T. Benschop, D. Chatzopoulos, D. Cho, Q. Dong, Y. Jin and M.P. Allan, *"Amplifier for scanning tunneling microscopy at MHz frequencies",* Review of Scientific Instruments **89**, 093709 (2018) (*Chapter 2*).

10. **K.M. Bastiaans***, D. Cho*, T. Benschop, I. Battisti, Y. Huang, M.S. Golden, Q. Dong, Y. Jin, J. Zaanen and M.P. Allan, *"Charge trapping and super-Poissonian noise centers in a cuprate superconductor",* Nature Physics **14**, 1183 (2018) (*Chapter 3*).

9. **K.M. Bastiaans**, D. Cho, D. Chatzopoulos, M. Leeuwenhoek, C. Koks and M.P. Allan, *"Imaging doubled shot noise in a Josephson Scanning Tunneling Microscope",* Physical Review B **100**, 104506 (2019) (*Chapter 4*).

8. D. Cho*, **K.M. Bastiaans***, D. Chatzopoulos*, G.D. Gu and M.P. Allan, *"A strongly inhomogeneous superfluid in an iron-based superconductor",* Nature **571**, 541 (2019) (*Chapter 5*).

7. I. Battisti*, **K.M. Bastiaans***, V. Fedoseev, A. de la Torre, N. Iliopoulos, A. Tamai, E.C. Hunter, R.S. Perry, J. Zaanen, F. Baumberger and M.P. Allan, *"Universality of pseudogap and emergent order in lightly doped Mott insulators",* Nature Physics **13**, 21 (2017) (*Chapter 6*).

6. D. Chatzopoulos, **K.M. Bastiaans**, D. Cho, G.D. Gu and M.P. Allan, *"Tunable impurity states in the unconventional iron-based superconductor* $FeTe_{0.55}Se_{0.45}$*", in preparation.*

5. M. Leeuwenhoek, R.A. Norte, **K.M. Bastiaans**, D. Cho, I.Battisti, Y.M. Blanter, S. Gröblacher and M.P. Allan, *"Nanofabricated tips for device-based scanning tunneling microscopy",* Nanotechnology **30**, 335902 (2019).

4. I. Battisti, G. Verdoes, K. van Oosten, **K.M. Bastiaans** and M.P. Allan, *"Definition of design guidelines, construction, and performance of an ultra-stable scanning tunneling microscope for spectroscopic imaging",* Review of Scientific Instruments **89**, 123705 (2018).

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3. S. Tewari, **K.M. Bastiaans**, M.P. Allan and J.M. van Ruitenbeek, *"Robust procedure for creating and characterizing the atomic structure of scanning tunneling microscope tips"*, Beilstein Journal of Nanotechnology **8**, 2389 (2017).

2. I. Battisti, V. Fedoseev, **K.M. Bastiaans**, A. de la Torre, R.S. Perry, F. Baumberger and M.P. Allan, *"Poor electronic screening in lightly doped Mott insulators observed with scanning tunneling microscopy"*, Physical Review B **95**, 235141(R) (2017)

1. J.J.T. Wagenaar*, A.M.J. den Haan*, J.M. de Voogd, T.A. de Jong, M. de Wit, **K.M. Bastiaans**, D.J. Thoen, A. Endo, T.M. Klapwijk, J. Zaanen and T.H. Oosterkamp, *"Probing the nuclear spin-lattice relaxation time at the nanoscale"*, Physical Review Applied **6**, 014007 (2016)

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