

Aleksander Lasek

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Postdoctoral Scholar at the University of Maryland

Education

University of Cambridge **Cambridge, UK**
PhD Physics *2017–2021*

PhD Thesis: Numerical and theoretical study of spin qubit dynamics.

University of Cambridge **Cambridge, UK**
MASt Physics *2013–2014*

Durham University **Durham, UK**
BSc Physics *2010–2013*

Experience

University of Maryland **College Park, USA**
Postdoctoral scholar *Sept 2021– Present*
Working on quantum thermodynamics with noncommuting charges.

University of Cambridge **Cambridge, UK**
PhD Student *Sept 2017–June 2021*
Theoretical and computational studies of spin and charge qubits trapped in single and double quantum dots formed by Surface Acoustic Waves (SAWs).

Tutor **Kielce, Poland**
Private Physics/Maths Tutor *June 2015–Sept 2017*
Taught physics and maths to high school students and university applicants in my home town.

WSIntegration **Surrey, UK**
Software Engineer *August 2014–July 2015*
Development of banking data manipulation software.

CERN **Geneva**
Summer Student *June–Sept 2013*
An extremely competitive internship position that involved working on a computational project.

Publications

1. *Entanglement generation via power-of-swap operations between dynamic electron-spin qubits*, Hugo V. Lepage, A. A. Lasek, David R. M. Arvidsson-Shukur, and Crispin H. W. Barnes, *Phys. Rev. A* 101 , 022329 (2020).
2. *Quantum advantage in postselected metrology*, David R. M. Arvidsson-Shukur, Nicole Yunger Halpern, Hugo V. Lepage, A. A. Lasek, Crispin H. W. Barnes, Seth Lloyd, *Nat. Commun.* **11**, 3775 (2020).

3. *Isolation and manipulation of a single-donor detector in a silicon quantum dot*, A. A. Lasek, H. W. Barnes, T. Ferrus, Phys. Rev. B **106**, 125423 (2022).
4. *Experimental observation of thermalisation with noncommuting charges*, A. A. Lasek et al, PRX Quantum **4**, 020318 (2023).
5. *Non-Abelian symmetry can increase entanglement entropy*, S. Majidy, A. A. Lasek, D. A. Huse, and N. Yunger Halpern, Phys. Rev. **B** 107, 045102 (2023).
6. *Pulse-controlled qubit in semiconductor double quantum dots*, A. A. Lasek et al, Scientific Reports **13**, 21369 (2023).
7. *Noncommuting conserved charges in quantum thermodynamics and beyond* S. Majidy, W. F. Braasch Jr, A.A. Lasek, T. Upadhyaya, A. Kalev, N. Yunger Halpern, Nat. Rev. Phys. **5**, 689–698 (2023).

Teaching and Outreach

College supervisor: Supervised NST Maths 1A course in 2017 and 2018

Tutor: Tutored high-school students interested in physics for Cambridge Immerse in 2017, 2018, 2020

Awards

- "Information Engines Scholar", Information Engines at the Frontiers of Nanoscale Thermodynamics conference (20 July 2022).

Talks

- "Experimental observation of thermalisation with noncommuting charges", WOST III , online (26 May, 2022).
- "Thermalisation with noncommuting charges", QTD, online (27 June 2022).
- "Experimental observation of thermalisation with noncommuting charges", Information Engines at the Frontiers of Nanoscale Thermodynamics, Telluride, USA (20 July 2022)
- "Experimental observation of thermalisation with noncommuting charges", FXQI conference, Obergurgl, Austria (Feb. 5, 2023).
- "Experimental observation of thermalisation with noncommuting charges", APS March Meeting, Las Vegas, USA (Mar. 10, 2023).
- "Thermalization with noncommuting charges", Quantum Information Science Workshop, Arlington, VA, USA (Jul 29, 2023).
- "Can noncommutativity increase entanglement entropy?", Symposium KCIK-ICTQT on Quantum Information, Gdansk, Poland (May 16, 2024).

References

Crispin Barnes, chwb101@cam.ac.uk: Cambridge PhD supervisor

Nicole Yunger Halpern, nicoleyh@umd.edu: UMD PI

Thierry Ferrus, taf25@cam.ac.uk: Hitachi supervisor and collaborator