

Dr Yuefeng Yin

AEA Ignite Project Lead / Research Fellow · Theoretical Condensed Matter & Quantum Materials Physics — Research, Teaching & Translation

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43	1,211	19	9	A\$3.4M
ORIGINAL RESEARCH ARTICLES	CITATIONS	H-INDEX	PHDS MENTORED	FUNDING LED, CO-LED AND PARTICIPATED

Theoretical condensed matter physicist (PhD, Monash; nine years postdoctoral, seven in the physics-led ARC CoE FLEET) studying how **topology**, **Berry curvature** and **quantum geometry** shape the electronic, magnetic, **optical** and transport responses of quantum materials, and engineering them into **low-energy quantum devices**. First-principles, tight-binding and transport theory in a close predict-and-test loop with experimental physicists, paired with a sustained record of **teaching**, **HDR supervision** and **industry translation**.

EDUCATION

2012 – 2016 **PhD, Materials Science and Engineering**, Monash University. Thesis: *Tailoring the electronic structure of graphene via molecular adsorption*.

2007 – 2011 **B.Eng., Materials Science and Engineering** (2+2 program), Monash University / Central South University.

APPOINTMENTS

2024 – now **Research Fellow (Level B) / Lead Entrepreneur, AEA Ignite Project**, Department of Materials Science and Engineering / School of Physics and Astronomy, Monash University. Quantum-materials theory; prototyping a new low-energy transistor technology.

2017 – 2024 **Research Fellow**, Monash University, ARC Centre of Excellence in Future Low-Energy Electronic Technologies (FLEET) — a physics-led national Centre headquartered at Monash. Theory of topological materials, Berry-curvature transport, magneto-optics and spintronic systems for low-energy electronics.

TEACHING, SUPERVISION & OUTREACH

- Lecturer, Computational Materials Science** (2017–2019, 2023–2024), Central South University — delivered on behalf of Monash under the Monash–CSU "2+2" program.
- Designed its intensive **3-week curriculum** from first principles — foundations through DFT, HPC and AI, finishing in a group mini-assignment — expandable to a full 12-week program; materials open on GitHub.
- Training HDR students in research skills** — DFT training workshops and tutorials for Master's and PhD students, Monash University.
- Examiner** for 2 PhD candidates, Department of Materials Science and Engineering, Monash University.
- 9 PhD candidates** mentored/co-supervised (4 current, 5 graduated): Hanqi Wang, Minh Tien Le, Rahul Awale, Tung Huynh, Ziyuan Zhao, Enamul Haque, Bernard Field, Abin Varghese, Chutian Wang.
- 3 Bachelor's/Master's students** supervised, including Qile Li.
- Mentees first-authored papers in *Advanced Science*, *ACS Nano* and *Nano Letters*; one graduate now holds a joint postdoctoral position at the University of Cambridge and King's College London.
- Public engagement: Melbourne Knowledge Week (FLEET quantum-science outreach), annual **Gordon Godfrey Workshop (UNSW)**, and ongoing science communication via X, GitHub and Wikipedia.

GRANTS (FUNDING & COMPUTATIONAL RESOURCES)

2026 – Current **A\$650K**: Lead CI, Australia's Economic Accelerator (AEA) Ignite, Round 2, *"From Lab to Fab: Advancing a New Low-Energy Transistor Towards Large-scale Manufacturing."* Other CIs: Prof. Michael S. Fuhrer & Prof. Nikhil V. Medhekar, with industry partner TQ Transistors.

2026 – Current **A\$1.7M**: Key Participant, ARC Linkage Project, 2025R2, *"Prototyping a Breakthrough Low-Energy Topological Transistor for Future Electronics."*, Led by Prof. Michael S. Fuhrer. Other CI: Prof. Nikhil V. Medhekar, with industry partner TQ Transistors.

2024 – Current **A\$1.04M**: Co-CI, Industrial funding (TQ Transistors Pty Ltd), *"Materials Design for Novel Negative Capacitance Field Effect Transistors"*, Led by Prof. Nikhil V. Medhekar. Other CI: Prof. Michael S. Fuhrer.

2024 – Current	2M SU: Lead CI, NCI Adapter Scheme / NCI-Monash Computational Scheme, "Exploring new approaches of modeling defects in Materials."
2025 – 2026	1.5M CPU hours: Lead CI, Pawsey Fast Track Scheme, "Understanding the interfacial interactions for semiconductor-metal/semiconductor contact."

SELECTED PUBLICATIONS SINCE 2019 (lead-author papers first; full publication list on Google Scholar)

- 1. TOPOLOGY** L. Chen, **Y. Yin** **CO-FIRST**, T. Lu, *et al.* Uncovering complex phonon interactions in $\text{Mg}_3\text{Bi}_{2-x}\text{Sb}_x$: topology and avoided crossings. *Nature Communications* 2026, doi: 10.1038/s41467-026-71754-9.
- 2. TOPOLOGY** C. Wang, **Y. Yin** **CORR**, T. T. Huynh, M. S. Fuhrer, N. V. Medhekar. Edge-state stabilization and control in 2D topological crystalline insulators. *Materials Today Physics* 2025, 59, 101897.
- 3. TOPOLOGY** **Y. Yin** **FIRST**, C. Wang, M. S. Fuhrer, N. V. Medhekar. Extracting unconventional spin texture in the 2D topological crystalline insulator bismuthene via tuning bulk–edge interactions. *Materials Today Physics* 2023, 36, 101168.
- 4. TOPOLOGY** Q. Li, J. S. Smith, **Y. Yin** **CORR**, C. Wang, M. V. Klymenko, J. H. Cole, N. V. Medhekar. Localized Wannier-function-based tight-binding models for 2D allotropes of bismuth. *New Journal of Physics* 2021, 23, 063403.
Entries 2–4 form the "Bismuth trilogy" — five years leading 2D topological bismuth theory, from tight-binding models to edge-state control.
- 5. TOPOLOGY** C. X. Trang, Q. Li, **Y. Yin** **CO-FIRST**, *et al.* Crossover from 2D ferromagnetic insulator to wide-band-gap quantum anomalous Hall insulator in ultrathin MnBi_2Te_4 . *ACS Nano* 2021, 15, 13444.
- 6. TOPOLOGY** **Y. Yin** **FIRST**, M. S. Fuhrer, N. V. Medhekar. Selective control of surface spin current in topological pyrite-type OsX_2 ($X = \text{Se}, \text{Te}$) crystals. *npj Quantum Materials* 2019, 4, 47.
- 7. QUANTUM GEOMETRY** W. Zhao, Y. Zhang, **Y. Yin** **CO-FIRST**, *et al.* Giant Berry curvature in the amorphous ferromagnet Co_2MnGa . *Matter* 2025, 8, 101988.
- 8. QUANTUM GEOMETRY** Y. Zhang, **Y. Yin** **CO-FIRST**, G. Dubuis, T. Butler, N. V. Medhekar, S. Granville. Berry curvature origin of the thickness-dependent anomalous Hall effect in a ferromagnetic Weyl semimetal. *npj Quantum Materials* 2021, 6, 17.
- 9. TOPOLOGY** Z. Liu, B. Liu, **Y. Yin**, N. V. Medhekar. Generic approach to intrinsic magnetic second-order topological insulators via inverted p–d orbitals. *Nano Letters* 2024, 24, 11295.
- 10. QUANTUM GEOMETRY** W. Zhao, K. Xing, Y. Zhao, L. Chen, M. Hong, **Y. Yin**, *et al.* Room-temperature quantum metric effect in the kagome magnet TbMn_6Sn_6 . *Nature Communications* 2025, 16, 6837.
- 11. OPTICS** Y. Zhang, J. Sung, **Y. Yin**, *et al.* Giant temperature-independent ultraviolet circular dichroism in Co_2MnX ($X = \text{Ga}, \text{Ge}$) Heusler magnetic thin films. *Physical Review Applied* 2025, 24, 034052.
- 12. OPTICS** B. Mallett, Y. Zhang, C. Pot, ... **Y. Yin**, N. V. Medhekar, S. Granville. Using optical spectroscopy to probe the impact of atomic disorder on the Heusler alloy Co_2MnGa . *Physical Review Materials* 2023, 7, 094203.
- 13. SPIN DYNAMICS** J. Wang, Y. Zhang, J. Hu, ... **Y. Yin**, *et al.* Band-structure engineering to optimize spin-wave propagation in the Weyl ferromagnet $\text{Co}_2\text{MnGa}_{1-x}\text{Ge}_x$. *Advanced Materials* 2025, 37, 2505704.
- 14. SPIN DYNAMICS** M. Aoki, **Y. Yin**, S. Granville, *et al.* Gigantic anisotropy of self-induced spin–orbit torque in the Weyl ferromagnet Co_2MnGa . *Nano Letters* 2023, 23, 6951.

FIRST = first author; **CO-FIRST** = equal contribution; **CORR** = corresponding author.

TRANSLATION, SERVICE & COLLABORATIVE PRACTICE

- **Lead inventor** on a **US patent application** for a novel transistor material architecture (2025, US63/848,509) with start-up TQ Transistors, and contributed to its subsequent US funding application (2025–current).
- **Liaison** for a strategic **R&D partnership** between Monash University and Jiangxi Copper (Fortune 500), taken from first contact to a **formal MoU signed in August 2024**; also hosted delegations from Central South University, Wuhan University of Technology, and Shanghai University.
- **Peer reviewer** for *Nature Communications* and *Communications Physics*; presentations at the **APS March Meeting** and **ICON-2DMAT**.
- **Quantum-physics networks** — 4 papers (+3 under review) and 2 grants with Monash Physics and Astronomy since 2024; sustained partnerships with RMIT and Victoria University of Wellington / MacDiarmid Institute.

REFEREES

Prof. Michael S. Fuhrer, FAA — Vice-Chancellor's Distinguished Professor, School of Physics and Astronomy, Monash University.

Prof. Nikhil V. Medhekar — Professor, Materials Science and Engineering, Monash University.

Dr Simon Granville — Senior Scientist, Robinson Research Institute, Victoria University of Wellington, New Zealand.