**APPLICATION FOR LECTURER (LEVEL B) / SENIOR LECTURER (LEVEL C) — STRATEGIC RESEARCH CLUSTER INITIATIVE · FACULTY OF SCIENCE, UNSW SYDNEY**

# Response to Selection Criteria


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## SUMMARY

I am a computational materials scientist with a PhD in Materials Science and Engineering from Monash University and nine years of postdoctoral research experience, including seven years with the ARC Centre of Excellence in Future Low-Energy Electronic Technologies (FLEET). My work sits squarely within the intent of the **Digital-led Discovery and Design of New Materials** Cluster: I use first-principles modelling, tight-binding theory and large-scale high-performance computing to design functional thin-film and quantum materials, and I work almost exclusively at the interface between disciplines — my closest research partnerships are with physicists, not with my own department. That approach has produced more than 40 refereed publications, 14 of them since 2024 and six in journals with an impact factor above 10; more than A$3.4 million in competitive and industry research funding since 2024, including Australia's Economic Accelerator (AEA) Ignite as Lead CI and an ARC Linkage Project as Key Participant; and a U.S. patent application on which I am lead inventor. Alongside this I have designed and delivered a university course in computational materials science from first principles, trained Master's and PhD cohorts in density functional theory, and mentored nine PhD candidates. I am applying to help build a Cluster that turns computational capability into shared Faculty-wide infrastructure for materials discovery.


**NOMINATED STRATEGIC RESEARCH CLUSTER**

**Cluster 1 — Digital-led Discovery and Design of New Materials**

**NOMINATED HOST SCHOOL**

**School of Materials Science & Engineering**

**LEVEL**

**Senior Lecturer (Level C)**

also open to Level B

My disciplinary home is materials science and engineering — thin-film design, structure–property relationships, and the computational methods that connect them — which is why I nominate the **School of Materials Science & Engineering** as my host School. My research practice, however, is interdisciplinary by construction: the design rules I develop are only useful once they are tested by experimental physicists, turned into synthesis targets by chemists, and made statistically robust by applied mathematicians. **Cluster 1** is the natural home for that work, and the reason I am applying to UNSW rather than continuing along a single-School trajectory elsewhere.

## ALIGNMENT WITH THE ADVERTISED RESEARCH AREAS OF CLUSTER 1 — DIGITAL-LED DISCOVERY AND DESIGN OF NEW MATERIALS

| CLUSTER RESEARCH AREA (AS ADVERTISED) | FIT | EVIDENCE FROM MY RECORD |
|---|---|---|
| Computational and multiscale materials modelling | | Nine years of DFT, tight-binding and Wannier modelling; 40+ refereed papers built on it. |
| Functional and structural materials | | Heusler and Weyl ferromagnetic thin films, topological insulators, 2D bismuth allotropes. |
| Chemical and physical approaches to materials design | | Composition- and disorder-tuned design rules validated against experiment and taken to patent. |
| High-throughput experimentation and screening | | Lead CI on >5M service units of national HPC; composition and disorder ensembles at scale. |
| Artificial intelligence and machine learning for materials discovery | | Building this now: ML surrogates trained on my own high-throughput DFT data (see Stream 3). |

core expertise · strong, demonstrated · emerging / building · 5 of 9 advertised areas shown

## LEVEL B — SKILLS AND EXPERIENCE

### KNOWLEDGE & SKILLS PROFILE — THE TOOLKIT BEHIND THE RESPONSES THAT FOLLOW

| COMPUTATIONAL METHODS | THIN-FILM & FUNCTIONAL MATERIALS | QUANTUM MATERIALS | TEACHING & SCHOLARLY PRACTICE |
|---|---|---|---|
| Density functional theory (DFT) | Heusler alloy thin films ($Co_2MnX$, X = Ga, Ge) | Topological pyrite-type materials | Curriculum design & tertiary teaching |
| Tight-binding & Wannier modeling | Amorphous & disordered magnetic films | Magnetic topological insulators | HDR supervision (9 PhD candidates) |
| Quantum transport & device modeling | Berry curvature & spin-wave engineering | Phonon–topology interactions | Grant writing & manuscript preparation |
| Large-scale HPC (NCI & Pawsey; >5M SU as Lead CI) | Bismuth thin-film allotropes | Quantum metric phenomena | Peer review & research translation |

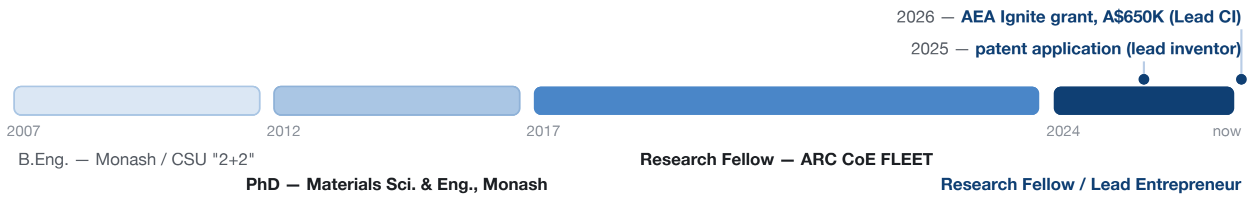
**1** *A PhD or equivalent qualification in a relevant discipline.*

**RESPONSE**

I hold a **PhD in Materials Science and Engineering** from Monash University, awarded for a thesis on tailoring the electronic structure of graphene via molecular adsorption. My undergraduate degree is a B.Eng. in the same discipline, completed through the Monash–Central South University "2+2" program.

That qualification is directly relevant to both the nominated Cluster and the nominated host School. My doctoral training was in the physics and chemistry of atomically thin materials approached computationally — the same combination of first-principles theory, structure–property reasoning and large-scale computation that Cluster 1 is built around. In the nine years since, that foundation has carried me from a student in Australia's leading Materials Science and Engineering department to an independent researcher who sets his own research direction, leads competitive grants, and takes discoveries as far as a filed patent.

**CAREER AT A GLANCE**




**2** *Demonstrated research excellence in an area aligned with one of the Faculty's Strategic Research Clusters.*

**RESPONSE**

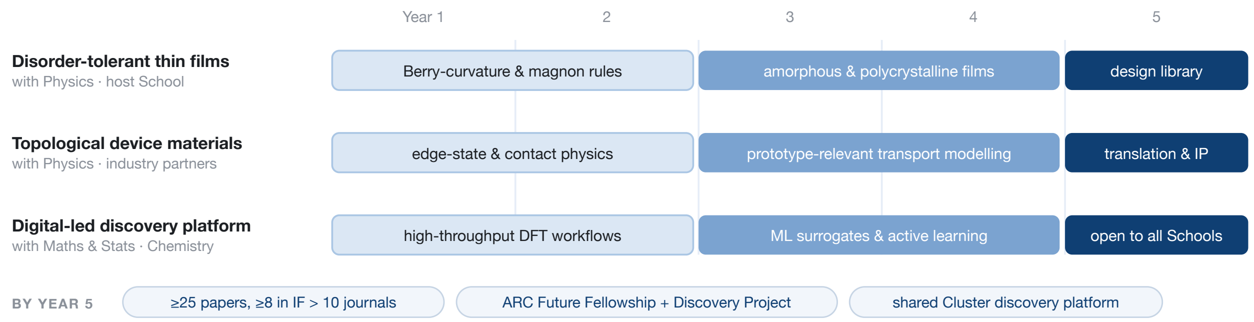
My research is in **digital-led discovery and design of new materials** — I use computation to predict which materials will have a useful property, and then work with experimentalists to check whether the prediction survives contact with a real sample. Three bodies of work demonstrate this.

- **Designing magnetic thin films that tolerate disorder.** Most predictions of exotic magnetic behaviour assume a perfect crystal, which is precisely what manufacturing cannot deliver. In the co-first-authored *"Giant Berry curvature in the amorphous ferromagnet $Co_2MnGa$"* (*Matter*, 2025, IF 15.7) I built the theoretical framework showing that a large Berry curvature survives the complete loss of long-range crystalline order — a result that moves a laboratory curiosity toward a manufacturable film. I then carried out the spin-wave band-structure analysis for *"Band-structure engineering to optimize spin-wave propagation in the Weyl ferromagnet $Co_2MnGa_{1-x}Ge_x$"* (*Advanced Materials*, 2025, IF 29.1), showing how composition tuning controls magnon dispersion for magnonic devices, and led the electronic-structure analysis behind *"Giant temperature-independent ultraviolet circular dichroism in $Co_2MnX$ (X = Ga, Ge) Heusler magnetic thin films"* (*Physical Review Applied*, 2025).
- **Leading a materials design program from first principles to device relevance.** As first author I developed the tight-binding theory of two-dimensional bismuth allotropes (*New Journal of Physics*, 2021), returned as corresponding author to uncover their unconventional spin texture (*Materials Today Physics*, 2023), and again to stabilise their topological edge states (*Materials Today Physics*, 2025). That five-year arc — foundational theory, then the follow-up work that makes it useful to a device engineer — is the shape of research program I would build in the Cluster.

- **Quantitative rigour at scale.** My contribution to collaborative projects is typically the quantitative core: designing the computational methodology, running and validating simulations on national facilities, and extracting statistically robust trends from high-dimensional datasets — composition series, disorder configurations, band-structure ensembles — that can be tested directly against measurement. Recent examples include the theoretical modelling of the room-temperature quantum metric effect in the kagome magnet $TbMn_6Sn_6$ (*Nature Communications*, 2025) and the electronic-structure calculations explaining the phonon anomalies in $Mg_3Bi_{2-x}Sb_x$ (*Nature Communications*, 2026, co-first author).

The roadmap below sets out how I would develop this into a Cluster-scale program. The third stream is the one I am most invested in: my existing high-throughput calculations already generate the data that machine-learning surrogate models need, but turning that into a usable discovery platform requires statistical expertise I do not have on my own — which is exactly the interdisciplinary dependency the Cluster is designed to create.

THE RESEARCH PROGRAM I WOULD BUILD IN THE CLUSTER — THREE STREAMS, ONE SHARED COMPUTATIONAL PLATFORM




I should be direct about one boundary. Of the nine research areas advertised for Cluster 1, five are areas where I can lead; the bio-facing areas — biomaterials, tissue engineering, soft and active matter, engineering biology — are not my subject expertise. My contribution there would be as a methods collaborator: the high-throughput screening and surrogate-model infrastructure I want to build is discipline-agnostic, and a colleague designing bio-inspired materials should be able to use it without writing a DFT input file.

3

> *Demonstrated ability and enthusiasm to contribute to interdisciplinary research and to actively participate in the development of a Faculty Strategic Research Cluster.*

**RESPONSE**

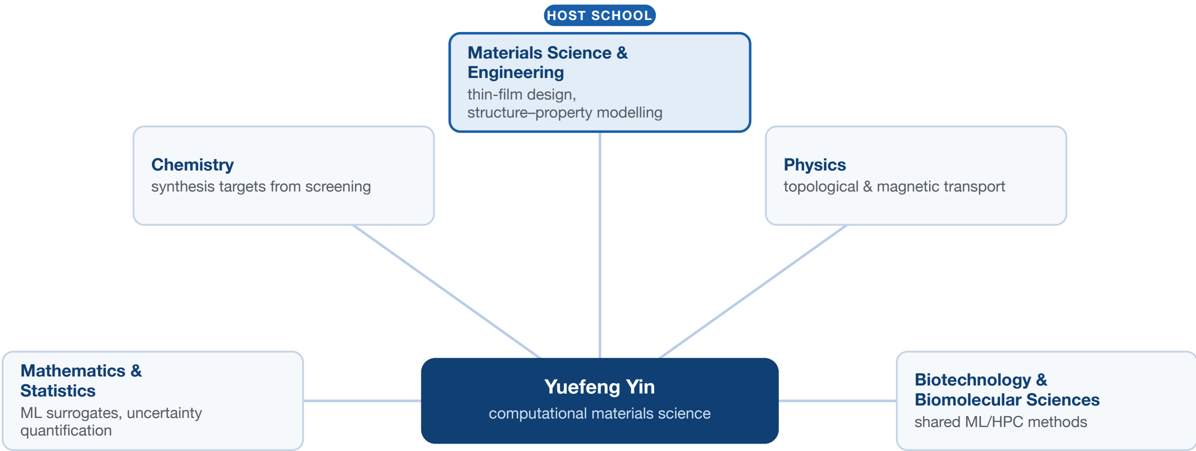
Interdisciplinary work is not something I would need to start doing at UNSW — it is already how my research operates. **My closest and most productive research partnerships are outside my own department.** Since my FLEET years I have co-authored four papers with colleagues in the School of Physics and Astronomy at Monash, with three more under review, and two of the grants I currently hold — the AEA Ignite project and the ARC Linkage Project — are joint applications with that School. A computational prediction that no experimentalist tests is not a result, and I have built my career on the partnerships that close that loop.

That experience gives me a concrete view of what makes a research cluster work rather than merely exist:

- **Shared infrastructure beats shared seminars.** Clusters cohere when members depend on something they hold in common. The discovery platform in Stream 3 of my roadmap is designed to be that: a screening and surrogate-modelling capability that a chemist, a physicist or a biomolecular scientist can use on their own problem. I would rather contribute a tool the Cluster uses weekly than a talk it hears once.
- **The interesting problems are at the boundaries.** The amorphous $Co_2MnGa$ result exists because a materials scientist asking “will this survive manufacturing?” met physicists asking “why is the Berry curvature still there?”. Neither question produces that paper alone.
- **Interdisciplinary work needs translators.** Much of my day-to-day value is explaining what a calculation can and cannot support to people who do not run calculations — experimentalists, industry engineers, and in one case intellectual-property attorneys. I expect to do a great deal of that inside a Cluster.

Practically, I would contribute to the Cluster's development by convening a regular computational-methods clinic open to all member Schools, by co-supervising HDR students across School boundaries, and by putting Cluster colleagues on grant applications as co-investigators from the first draft rather than at submission. The figure below sets out what I would bring to each School named in the advertisement, and — just as importantly — what I would need from them.

HOW I WOULD WORK ACROSS THE CLUSTER'S SCHOOLS — WHAT I BRING, AND WHAT I NEED FROM EACH




4 *Evidence of high-quality research outputs and the potential to develop an internationally recognised research profile.*

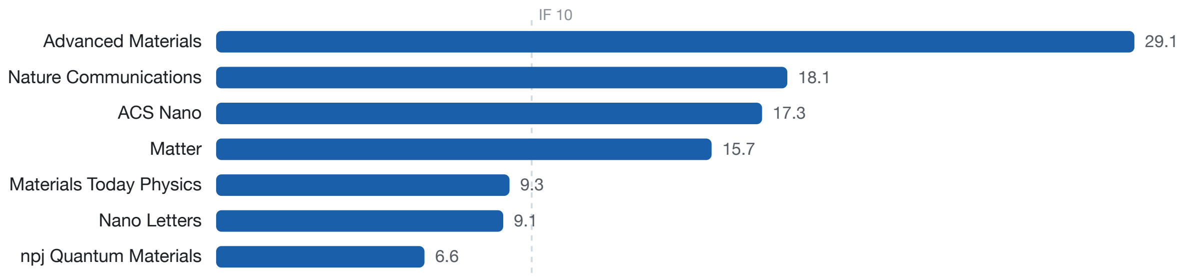
**RESPONSE**

My publication record comprises **43 refereed original research articles attracting more than 1,180 citations (h-index 19)**. Fourteen of those papers have appeared since 2024, six of them in journals with an impact factor above 10 — the recent trajectory matters more to me than the total, because it reflects a deliberate shift toward higher-stakes, more collaborative work.

- **Lead authorship in the areas that matter to this Cluster.** I hold first, co-first or corresponding authorship on work in *Matter*, *Nature Communications*, *npj Quantum Materials* (twice) and *Materials Today Physics* (twice). These are the papers where I set the research question, not only supplied a calculation.
- **International reach.** My collaborations span New Zealand (Victoria University of Wellington and the MacDiarmid Institute), Japan and China, sustained through exchange visits rather than correspondence alone. I have presented at the American Physical Society March Meeting and the International Conference on Two-Dimensional Materials, and I attend the annual Gordon Godfrey Workshop at UNSW.
- **Peer review.** I review for *Nature Communications* and *Communications Physics*, which keeps my standards for analysis and reporting calibrated against the field.
- **Outputs beyond papers.** A U.S. patent application on which I am lead inventor, openly released course materials and research code on GitHub, and public contributions to Wikipedia on thin-film physics.

The honest assessment of my profile is that it is **strong nationally and rising internationally**. What I have not yet had is the platform that converts a strong publication record into international standing: a named research program, a fellowship, and HDR students of my own. That is precisely what a continuing appointment inside a Cluster provides, and it is why I am applying.

SELECTED VENUES OF MY REFEREED PUBLICATIONS — JOURNAL IMPACT FACTOR




| | | | | |
|---|---|---|---|---|
| **43**<br>ORIGINAL RESEARCH ARTICLES | **14**<br>SINCE 2024 | **6**<br>IN IF > 10 JOURNALS SINCE 2024 | **1,180**<br>CITATIONS | **19**<br>H-INDEX |

5 *Demonstrated ability, or clear potential, to attract competitive research funding.*

**RESPONSE**

This criterion asks for demonstrated ability *or* clear potential. I can demonstrate the ability: **more than A$3.4 million in competitive and industry research funding since 2024**, in roles ranging from Key Participant to Lead CI.

- **A$650K — Australia's Economic Accelerator (AEA) Ignite, Round 2, as Lead CI** (IG250200225, *"From Lab to Fab: Advancing a New Low-Energy Transistor Towards Large-scale Manufacturing"*). I wrote and led this application. AEA Ignite is assessed on commercial as well as scientific merit, which required me to make the case to reviewers outside my discipline.
- **A$1.7M — ARC Linkage Project as Key Participant** (LP250200919, *"Prototyping a Breakthrough Low-Energy Topological Transistor for Future Electronics"*), led by Prof. Michael S. Fuhrer with industry partner TQ Transistors.
- **A$1.04M — industry research funding as Co-CI** (TQ Transistors Pty Ltd), on materials design for negative-capacitance field-effect transistors.
- **Computational resources as Lead CI** — approximately 2 million service units per year, through the NCI Adapter Scheme, the NCI–Monash Computational Scheme and the Pawsey Fast Track Scheme. These are separately peer-reviewed competitive schemes, and they are what make high-throughput work possible.

I am also clear-eyed about what is missing. I have not yet held a personal fellowship, and my ARC record is as a participant rather than a lead investigator. A continuing appointment changes my eligibility profile materially: I would be eligible to lead ARC Discovery Projects immediately and to apply for an ARC Future Fellowship as a mid-career researcher. The pipeline below is what I would actually submit, not an aspiration — the Year 1 Discovery Project application is already drafted in outline around the disorder-tolerant thin-film stream.

**COMPETITIVE RESEARCH FUNDING — SECURED SINCE 2024, AND THE PIPELINE I WOULD RUN AT UNSW**

SECURED SINCE 2024 — A$3.39M ACROSS THREE SCHEMES


Plus ≈2M service units per year of national HPC won as Lead CI (NCI Adapter Scheme; Pawsey Fast Track).

APPLICATION PIPELINE I WOULD RUN AT UNSW

**Year 1**
- ARC Discovery Project — Lead CI
- Faculty Cluster seed / internal scheme
- NCMAS national compute — Lead CI

**Year 2**
- ARC Future Fellowship
- ARC LIEF with Cluster co-applicants
- industry R&D contract hosted at UNSW

**Year 3**
- ARC Linkage with an industry partner
- AEA Innovate (lab-to-fab follow-on)
- international scheme with NZ / Japan partners

6 *Evidence of effective teaching and a commitment to delivering an outstanding student experience.*

**RESPONSE**

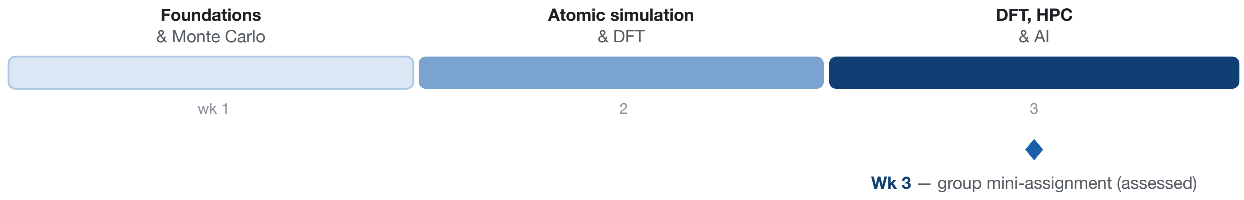
I have taught at undergraduate and postgraduate level across six years, and I have built a course from nothing rather than inheriting one.

- **Lecturer, *Computational Materials Science*** (2017–2019, 2023–2024), Central South University, delivered on behalf of Monash University under the Monash–CSU "2+2" program. This was an elective for third- and fourth-year undergraduates covering condensed matter fundamentals, density functional theory, high-performance computing and applied modelling projects. I was responsible for the course structure, all teaching materials, lectures, tutorials and assessment. The materials are openly available at `github.com/yyfforce/CMS_Lec_Notes_CSU_Monash`.
- **Postgraduate research training.** I regularly deliver DFT workshops and tutorials for Master's and PhD students at Monash, helping them choose an appropriate computational method for their own problem rather than the one they happened to encounter first.

My commitment to student experience rests on two convictions. The first is that computational subjects fail students when they are taught as software training; I teach the derivation and the physical reasoning first, and the software as the thing that automates it, because a student who understands why a calculation is set up a certain way can adapt when the software changes. The second is that abstract concepts need to be made visible — I lean heavily on interactive visualisation and worked examples, an approach I have since extended to explaining our materials research to industry partners and patent attorneys.

I would bring this to UNSW as service teaching in computational and materials subjects, and I would welcome the chance to build an elective around AI-assisted materials design, which almost no Australian undergraduate program currently offers.

### "COMPUTATIONAL MATERIALS SCIENCE" — THE INTENSIVE 3-WEEK STRUCTURE I DESIGNED




**7** *Demonstrated ability to collaborate across disciplines and build productive research partnerships.*

**RESPONSE**

Beyond the academic collaborations described under criterion 3, I have built partnerships across three quite different kinds of boundary.

- **Across disciplines.** My working collaborators are physicists, chemists and engineers as much as materials scientists. The AEA Ignite project alone requires me to coordinate first-principles theory, device fabrication and commercialisation strategy — three groups that use the same words to mean different things, and where most of my effort goes into making sure a "yield" or a "gate" means the same thing to everyone in the room.
- **Across institutions.** My partnership with Dr Simon Granville at Victoria University of Wellington's Robinson Research Institute has run for years and produced multiple joint papers; I have sustained it with reciprocal visits rather than email. Through FLEET — a national Centre whose nodes included UNSW — I maintain active collaborations at RMIT and elsewhere, and I have made research visits to ANU, RMIT, UNSW and UQ.
- **With organisations outside the university.** I helped establish the Monash–Jiangxi Copper partnership from first contact through to a formal Memorandum of Understanding signed in August 2024, and I am the lead inventor on a U.S. patent application filed with the Australian start-up TQ Transistors.

My approach in all three cases is the same, and it is unremarkable: agree at the outset what success looks like for each party, communicate on a schedule rather than only when something goes wrong, and be generous about credit. That is why partnerships such as the ones with the School of Physics and Astronomy, RMIT and Victoria University of Wellington have survived multiple projects and several years.

**8** *Experience in supervising, or the capacity to supervise, Higher Degree Research students.*

**RESPONSE**

I have mentored or co-supervised **nine PhD candidates** — five graduated, four current — supervised **three Bachelor's and Master's** research students, and served as **examiner for two PhD candidates** in my Department.

My supervision philosophy is that a research student's job is to become someone who can choose their own problems, and that a supervisor's job is to withdraw scaffolding on a schedule. In practice that means being closely involved in the first project — often working through calculations alongside the student — and progressively handing over the choice of what to compute next. It also means being explicit that computational results are not finished until someone has tried to break them; I ask students to attack their own conclusions before I do.

The outcomes I am proudest of are the students', not the papers': mentees have gone on to first-author work in *Advanced Science*, *ACS Nano* and *Nano Letters*, and one graduated candidate now holds a joint postdoctoral appointment at the University of Cambridge and King's College London.

As a continuing academic I would be eligible to act as principal supervisor for the first time. I would expect to build to a group of three to four HDR candidates within five years, and I would deliberately co-supervise at least one across School boundaries within the Cluster — a student jointly supervised with a statistician or a chemist is the most durable form of interdisciplinary collaboration there is.

### HIGHER DEGREE RESEARCH SUPERVISION AND EXAMINATION TO DATE


Mentees have first-authored papers in Advanced Science, ACS Nano and Nano Letters.

One graduate now holds a joint postdoctoral appointment at the University of Cambridge and King's College London.

**9** *Excellent interpersonal, communication and organisational skills.*

**RESPONSE**

- **Communication across very different audiences.** In a single week I might write for a physics readership, explain a band-structure argument to a device engineer, brief an intellectual-property attorney on what a calculation does and does not establish, and teach an undergraduate who has never opened a terminal. I have learned to change the level without changing the substance. During my FLEET years I also worked with professional staff on public-facing quantum-science outreach, including Melbourne Knowledge Week and content for FLEET's social channels.
- **Organisation under real constraint.** As Lead CI of the AEA Ignite project I am responsible for a A$650K budget, an interdisciplinary team spanning two Schools and an industry partner, and milestone reporting to a funder that assesses commercial as well as scientific progress. Separately, I manage approximately 2 million service units of national computing per year, which requires planning allocations quarters in advance and reallocating when a project changes direction.
- **Interpersonal work that is not glamorous but matters.** When Monash hosted the Jiangxi Copper delegation, the substantive work was not the meeting itself: it was identifying which academics across three departments had genuinely relevant expertise, approaching them individually, and briefing both sides beforehand so the discussion started at concrete research opportunities rather than at introductions. That kind of preparation is invisible when it works.
- **Listening first.** In project meetings — including with the groups of Prof. Julie Karel and Prof. Michael Fuhrer — I make a point of understanding someone's position before offering my own assessment. It is a slower way to run a discussion and a much faster way to reach a decision that holds.

**10** *Demonstrated commitment to equity, diversity and inclusion, and to fostering a respectful and collaborative academic environment.*

**RESPONSE**

I am an international academic who arrived in Australia as an undergraduate through a joint program, and much of my career has been spent moving between academic cultures with different norms about how disagreement, hierarchy and credit work. That experience shapes how I run a research environment.

- **Making the implicit explicit.** A great deal of academic practice is transmitted informally — how to approach a potential collaborator, when it is acceptable to disagree with a senior colleague, what authorship order signifies. Students who did not grow up inside this system are disadvantaged by that, so I say these things out loud to my mentees rather than assuming they will absorb them. My own group of nine PhD mentees has been diverse in nationality, gender and academic background.
- **Lowering barriers to entry in computational research.** Computational materials science has a specific access problem: it looks as though it requires resources and prior programming experience that many students do not have. I release my course materials and research code openly, and I design teaching so that a student without a computing background can start from physical reasoning rather than from software fluency.
- **Credit and visibility.** I am deliberate about giving junior collaborators first authorship where they have earned it, and about naming contributors in talks. The mentees who have gone on to first-author papers in *Advanced Science*, *ACS Nano* and *Nano Letters* did so because the work was theirs and was credited as theirs.
- **On UNSW Science's gender equity commitment.** I support the Faculty's target of at least 50% women in this recruitment round. In a research group, equity is built through concrete practice — how candidates are shortlisted, who gets the conference-presenting opportunity, how parental leave interacts with a project timeline — and I would expect to be held to it in those specifics rather than in principle.

I am committed to working in a manner consistent with the UNSW Code of Conduct and Values, and to contributing to an environment where colleagues and students are treated with respect.

**11** *Knowledge of health and safety responsibilities and commitment to attending relevant health and safety training.*

**RESPONSE**

I understand that health and safety obligations apply to every staff member, not only to those running laboratories, and that they cover psychological as well as physical safety.

- **My own practice.** I have completed the mandatory health and safety training required in my current role and comply with University policies and procedures. Although my research is computational, I work in and around experimental laboratories with collaborators and students, and I follow the local safety requirements of those spaces as a visitor.
- **Workspace and shared-environment obligations.** I take reasonable care that my actions or omissions do not affect the safety of others. A recent example: when the Department's Operations Coordinator asked me to reorganise my workspace to meet departmental and occupational health and safety standards, I sought clarification on exactly what was required and completed it promptly rather than treating it as an administrative irritation.
- **Supervisory responsibility.** As a mentor of HDR students I regard workload, deadline pressure and the isolation that can come with computational work as genuine safety matters, and I check in on them explicitly rather than waiting for a problem to surface.
- **Commitment at UNSW.** I would complete all UNSW health and safety induction and mandatory training on commencement, keep refresher training current, and undertake any additional training required by the host School and by the laboratories I work alongside.

## LEVEL C — ADDITIONAL CRITERIA

**12** *Demonstrated national recognition and an established research profile in a relevant discipline.*

**RESPONSE**

*The criteria in this section apply to appointment at Senior Lecturer (Level C), and are addressed in addition to those above.*

My national standing rests on seven years inside Australia's flagship centre for low-energy electronics and on the funding and collaboration record that came out of it.

- **A national Centre of Excellence.** I was a Research Fellow with the ARC Centre of Excellence in Future Low-Energy Electronic Technologies (FLEET) from 2017 to 2024 — a Centre spanning Monash, UNSW, RMIT, ANU and other nodes. My collaborations at RMIT and beyond date from that period and remain active.
- **Recognition through competitive national schemes.** Being awarded AEA Ignite as Lead CI, and being named a Key Participant on a A$1.7M ARC Linkage Project, are assessments of standing by national panels. So, in a quieter way, are the NCI and Pawsey allocations: national compute is competitively assessed, and holding roughly 2M service units per year as Lead CI reflects a view about whose calculations are worth the resource.
- **An established profile in a defined area.** I am known nationally for computational work on thin-film magnetic and topological materials — 43 papers, 1,180 citations, h-index 19, with lead authorship in *Matter*, *Nature Communications*, *npj Quantum Materials* and *Materials Today Physics*. The bismuth-allotrope series in particular established a line of work that others now build on.
- **Service and presence.** Peer review for *Nature Communications* and *Communications Physics*; presentations at the APS March Meeting and ICON-2DMAT; research visits to ANU, RMIT, UNSW and UQ; annual attendance at the Gordon Godfrey Workshop at UNSW; and examination of PhD theses in my Department.

I would characterise my profile as **established nationally and developing internationally**. If the panel assesses that the international dimension is not yet at Level C, I would be glad to be considered at Level B; the research program I have set out is the same either way.

**13** *Sustained success in securing competitive research funding.*

**RESPONSE**

The full funding record is set out under criterion 5. What is relevant here is the pattern rather than the total.

- **Sustained rather than singular.** Funding has come in every year since 2024 and across four distinct schemes — AEA Ignite, ARC Linkage, direct industry investment, and national computational merit allocations. These are assessed by different panels against different criteria, which is a better indicator of durability than a single large success.
- **Progression in role.** My trajectory runs from named participant, to Co-CI on industry funding, to Lead CI of a A$650K national program that I conceived and wrote. That progression is the relevant evidence for Level C: I have moved from contributing to other people's applications to originating my own.

- **Attracting non-government investment.** The A$1.04M industry contract and the associated patent application demonstrate an ability to secure funding from partners who are spending their own money, which imposes a different and in some ways harder standard than a grant panel.
- **Renewal, not just award.** The TQ Transistors relationship has been sustained across multiple years and has generated successive funding rounds, a patent application and a contribution to a subsequent U.S. funding application — the partner has chosen to keep investing.

I am not going to overstate this: I do not yet hold an ARC Discovery Project as lead investigator or a personal fellowship, and a Level C appointment carries the expectation that I will. The pipeline under criterion 5 is my plan for meeting it.

14 *Evidence of academic leadership in research, teaching and supervision.*

**RESPONSE**

- **Leadership in research.** As Lead CI of the AEA Ignite project I set the research direction, assembled the team across two Schools and an industry partner, and hold responsibility for delivery against milestones. I also independently established my own research direction within FLEET — proposing a new class of topological semimetals with unconventional surface spin textures — rather than working within a direction set for me. Leading the bismuth-allotrope program across five years, from foundational theory through to device-relevant edge-state control, is the clearest example of setting and sustaining an agenda.
- **Leadership in translation.** I am lead inventor on the patent application arising from that work, and I acted as the internal liaison who took the Monash–Jiangxi Copper relationship from first contact to a signed Memorandum of Understanding. I also consult to the Monash Centre for Additive Manufacturing on connecting industry partners with University expertise.
- **Leadership in teaching.** I designed *Computational Materials Science* from first principles — structure, materials, assessment — rather than adapting an existing offering, and released the materials openly so that colleagues elsewhere can use them.
- **Leadership in supervision and mentoring.** Nine PhD mentees, several of whom have first-authored papers in strong journals and one of whom now holds a joint postdoctoral position at Cambridge and King's College London. I also examine PhD theses within my Department, which is a form of quality assurance the discipline depends on.
- **What I would lead in the Cluster.** Concretely: the shared discovery platform in Stream 3, a recurring computational-methods clinic open to all member Schools, and mentoring of early-career colleagues on grant applications — the AEA process in particular taught me a great deal about writing for panels that are not made up of specialists, and that is transferable.

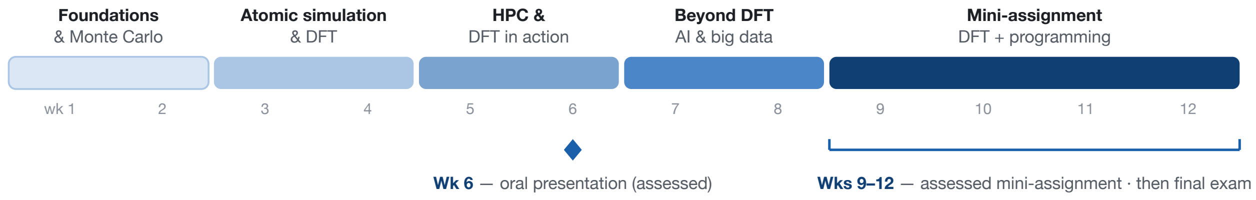
15 *Demonstrated success in curriculum development and innovation.*

**RESPONSE**

I designed the *Computational Materials Science* elective at Central South University from scratch, delivered on behalf of Monash under the “2+2” program. The intensive three-week structure shown under criterion 6 was built around a single design decision: students should be able to run a meaningful calculation on a real problem before the course ends, which meant compressing foundations hard and treating the assessed group mini-assignment as the destination rather than the postscript. The structure expands cleanly into the full 12-week version below, which is what I would bring to a UNSW program.

Three things about the design are worth drawing out. First, **assessment is authentic**: the mini-assignment asks students to apply DFT software and programming to a problem with no published answer, which is the actual work of the discipline. Second, **the sequencing is deliberately inverted** relative to how computational subjects are often taught — physical reasoning and derivation come first, software second, high-performance computing third, so that the tooling is always in service of a question the student already has. Third, **the materials are open**: releasing them on GitHub means the curriculum can be reused, criticised and improved by people I will never meet.

## EXPANDED INTO A FULL 12-WEEK COURSE — THE VERSION I WOULD BRING TO A UNSW PROGRAM




**Where I would take this next.** Curriculum innovation in computational science now has to confront AI directly, and I think the profession is at risk of two opposite mistakes: pretending students are not using these tools, or letting the tools substitute for the understanding the degree is supposed to certify. My position is that we should integrate AI-assisted learning explicitly — including tools such as NotebookLM for working through dense primary literature — while shifting assessment weight decisively toward derivation, physical reasoning and the critique of results. A student who can tell when a plausible-looking answer is wrong is the graduate the field needs, and that capability has to be taught and assessed on purpose. I would like to develop a Cluster-facing elective on AI-assisted materials design along these lines, which would also serve HDR students from any member School.

**16** *Experience developing strategic collaborations with industry, government or other external partners.*

### RESPONSE

- **Industry: a multi-year partnership taken to intellectual property.** My relationship with the Australian start-up TQ Transistors has run for several years and has produced A$1.04M in direct research investment, a U.S. patent application (US63/848,509) on which I am **lead inventor**, a contribution to the company's subsequent U.S. funding application, and the industry partnership underpinning both the AEA Ignite and ARC Linkage projects. This was not a transaction; it was built by understanding what the company actually needed from a materials calculation and delivering it repeatedly.
- **Government-backed translation.** Australia's Economic Accelerator is a national program aimed explicitly at moving research toward manufacturing. Leading an AEA Ignite project means being accountable to a funder that assesses commercial viability, which has taught me to state what a computational result is worth in terms a non-specialist assessor can evaluate.
- **International corporate engagement.** I established and led the Monash-side liaison for a strategic R&D relationship with Jiangxi Copper, a Fortune 500 company — identifying relevant academics across three departments, coordinating the technical exchange, briefing both sides, and carrying it through to a formal Memorandum of Understanding signed in August 2024. I have also hosted delegations from Central South University, Wuhan University of Technology and Shanghai University.
- **Consulting.** I work with the Monash Centre for Additive Manufacturing to connect advanced-manufacturing expertise with new industry partners.

What I would bring to UNSW is not only these particular relationships but a workable model for building them: start from the partner's problem rather than from your capability, deliver something small and useful early, and be honest about what computation cannot yet answer. Partners return because of the third one.

## STRATEGIC RELATIONSHIPS SPANNING ACADEMIA, INDUSTRY AND GOVERNMENT-BACKED TRANSLATION