

C2 Statement by the Administering Organisation

The University of New South Wales (UNSW Sydney) fully supports the application **FT240100267** “Non-commutative Laplacians, quantum symmetries, and the Chern character” by Dr Zanin for a Future Fellowship, Level 2.

Dr. Zanin is a Senior Lecturer in the School of Mathematics and Statistics, and one of the foremost researchers Mathematical Analysis in Australia. His research predominantly focuses on the field of Functional Analysis (with applications to the fields of Geometry and Mathematical Physics). This research project deals with subtle issues concerning the foundations of Non-commutative Geometry and notions paramount to the modern development of Non-commutative Analysis. Dr. Zanin is well prepared to attack these important problems: during 2018-2022, he held a UNSW Scientia Fellowship and developed deep results in Noncommutative Analysis which substantially improved our understanding of the theory, its problems, and approaches. It should be pointed out that a number of the most distinguished mathematicians (such as Fields medal laureate Professor Alain Connes) are very enthusiastic about the suggested direction of research, and this strong endorsement from world leading experts, along with their commitment to joint research efforts is a strong acknowledgement that the candidate has the capacity to undertake the proposed research, as well as to the importance of such work.

Alignment with core or emerging strengths at UNSW

UNSW Sydney is one of Australia’s leading research and teaching universities, renowned for the quality of its graduates and its commitment to new and creative approaches to education and research. UNSW Sydney is one of the founding members of the Group of Eight, a coalition of Australian research-intensive universities, and of Universitas 21, a global network of research universities. In the most recent 2018 national ERA and its companion Engagement and Impact exercise, UNSW Sydney had more two-digit FoR units assessed as well above world average and of high impact than any other Australian university.

The research proposed in Dr Zanin’s application is closely aligned with UNSW Sydney’s research strength in ‘Fundamental and Enabling Sciences’, particularly our growing research activity in ‘Mathematics’.

Dr Zanin’s research program will be conducted in the School of Mathematics and Statistics within the UNSW Faculty of Science.

The School of Mathematics and Statistics at the University of New South Wales offers an excellent environment for this project. It is one of the largest and strongest departments of mathematics and statistics in Australia and is highly ranked. It has grade 5 (the highest rank) according to the most recent 2018 ERA ranking in both mathematics as well as in the research area of Dr Zanin. UNSW is the only Australian university to feature in the top 75 in the world for Mathematics in the three major and influential world university rankings in 2023 simultaneously: 2023 QS World University Rankings (48), the 2022-2023 US News Global Universities Ranking (73) and the 2023 Times Higher Education (71). During the past 5 years, UNSW is also consistently ranked as the top three universities in Australia in mathematics according to the US News Global Universities and the QS World University Rankings.

The School of Mathematics and Statistics in UNSW has a strong and growing Noncommutative Analysis group, several of whom work in Quantum Calculi and Pseudodifferential Operators. Among other areas the group is well versed in noncommutative harmonic analysis, noncommutative ergodic theory and dynamical systems, and noncommutative stochastic processes. In particular, the research of Prof. Fedor Sukochev, Dr. Denis Potapov, and Dr. Shiqi Liu aligns closely with Dr. Zanin’s work on the analysis of non-commutative Laplacians and the associated pseudodifferential calculi.

Dr. Zanin has a strong and expanding network of collaborators, both in the fields of quantum calculus and mathematical physics. Dr. Zanin has ongoing projects with Prof Fedor Sukochev and Dr. Shiqi Liu at UNSW, as well as with Dr. Ji Li at Macquarie University, Prof. Nigel Higson at Penn State University, Prof. Marius Junge at

University of Illinois Urbana-Champaign, Prof. Quanhua Xu at Harbin Institute of Technology, and Prof. Yong Jiao at Central Southern University.

The project provides an opportunity to further expand the collaborative network for Dr. Zanin. The topic of the proposed project has received significant attention during the last couple of years, presenting several new opportunities for collaboration. This will provide opportunity for Dr. Zanin to establish collaborations with Prof. Matthias Lesch at the University of Bonn, Prof. Elmar Schrohe at Leibniz University.

The project would contribute to the excellence in research, as part of the UNSW 2025 strategy, Strategic Priority A Theme 01.

Level of resources to be provided to support the Future Fellow

As per the requirements of the Scheme, UNSW Sydney will provide Dr. Zanin with an appointment at UNSW Sydney for the duration of the Future Fellowship and will fund the salary gap between that of the ARC salary rate and the appointed UNSW Sydney salary rate. This additional commitment will depend on the level and step of the Future Fellowship appointment.

The School of Mathematics and Statistics will provide an additional \$10,000 per year in research support to the Fellow. These funds may be utilised to support a specialist conference that the Fellow aims to organise during the Fellowship, for conference travel (including travel of PhD students associated with the project), collaborative visits, computing hardware, journal publication costs and any other reasonable expenses occurred in carrying out the project. The school will also provide Dr Zanin with the usual office and School facilities.

In addition to the resources provided by the School, Dr. Zanin will also have access to the wide-ranging facilities of the university, including computing and the library. Since 2023, UNSW provides a higher level of higher degree research scholarships at the rate of \$35,000 per annum, which is well above the Department of Education's standard rate of \$29,863 for 2023. The amount of this stipend will be further increased to \$37,684 in 2024. The school will additionally support any PhD students associated with the project with \$5,000 p.a. top-up to their scholarships. The UNSW Graduate Research School also supports \$3,000 for HDR students for conferences during their candidature via the UNSW development and research training grant (DRTG) scheme.

The University assists its researchers in developing and maintaining pathways for their ongoing development and has established several initiatives that provide research staff with professional support in planning and developing their careers. Formal performance appraisals are undertaken in all Faculties and researchers are proactively mentored through an innovative Researcher Development Framework program.³

Integration of the Future Fellow into UNSW research activities after the fellowship

The goal of this work is to establish and nurture a strong research group in quantum calculi and analysis of noncommutative Laplacians. In doing so, Dr. Zanin will mentor a number of young postdoctoral researchers, as well as doctoral candidates. This will develop exciting new research opportunities for UNSW, in a rapidly developing field with deep connections to problems in mathematical physics, and expand the research capabilities of the school of mathematics and statistics, as well as establishing UNSW as an international centre of expertise in modern operator theoretic methods in the study of these problems.

After the end of the Fellowship, Dr Zanin will return to his continuing appointment at the School of Mathematics and Statistics.

In closing, UNSW Sydney strongly supports the application of Dr. Zanin for a Future Fellowship and welcomes the opportunity provided by the Australian Research Council to promote and support research both for the benefit of Australia and the University.