

Genome Innovation Hub

Guide for 2022 GIH External Project Applications

About the Genome Innovation Hub

Genome Innovation Hub (GIH) is a University of Queensland initiative and part of UQ Research Infrastructure. GIH aims to develop innovative approaches to advance technologies in the structural and functional analysis of genomes. The Innovation Hub will act as a collaborative research centre, working with UQ clinicians and scientists to implement novel and promising methodologies in projects focussed on the key areas of health, agriculture and the environment. Once implemented by GIH, these innovations (methods, protocols, software, expertise, etc.) will be made available through UQ Research Infrastructure Services, other UQ Service Providers, or through research groups willing to collaborate and/or train research staff in the newly developed approaches. A list of collaborative projects being undertaken at GIH is provided at the end of this document.

GIH Call for External Collaborative Projects

Following yet another year of successful engagement of collaborative research projects across UQ, GIH is now inviting applications from UQ researchers for collaborative projects to start in 2022. An anticipated 3-5 projects will be supported in 2022. For successful applications, GIH staff and potential funding towards GIH consumables will support each project to develop cutting-edge technology breakthroughs (methods and pipelines). Proposals can be entirely wet-lab-based, entirely bioinformatics-based, or a combination of the two and will vary in requirements for GIH budget and/or GIH staff support.

Collaborating research groups will work closely with GIH in the design and development of projects and actively contribute to projects, including co-investment in funding and personnel expertise. Projects will be prioritized on the basis of novelty and transformative impact in advancing genomic applications and/or those that significantly drive down the costs of these applications. Proposals will also be evaluated on the basis of feasibility, broad impact, and clearly outlined paths for future access and uptake. The number of projects accepted will depend on feasibility, budget and timelines.

For selection criteria, timelines and submission process please refer to the application guidelines overleaf.

Application guidelines

Project Selection Criteria and Ranking

1. Genomic Innovation (40%)	Is this a major new capability that will help UQ to establish or maintain a competitive position nationally and internationally?
2. Broad applicability/Uptake (20%)	Has wide-ranging potential for uptake at UQ based on research interest and expertise in this space been illustrated? Has a clear path for future application of techniques been outlined? https://research.uq.edu.au/research-infrastructure
3. Team Quality & Feasibility (20%)	Does the collaborating team have track record/capability in the proposed area? Does rationale/preliminary experiments convincingly demonstrate feasibility of project and fit with GIH wet-lab and bioinformatic expertise in the areas of CRISPR gene editing, single cell and long read (Nanopore, PacBio Sequel) sequencing?
4. Co-contribution (10%)	Does the proposal contain inclusion of leveraged support or in-kind contribution (from UQ researchers, Industry)?
5. Outcome (10%)	Is there a clear plan for the research outcomes (publications, funding applications, collaborations) and what is the contribution to current research goals?

Timelines for evaluation

Applications for 2022 External Projects will open on Wednesday, 13th October 2021 and will close on Friday, 26th November 2021.

Following the closing date, projects for possible funding will be ranked and shortlisted by the GIH Management Group, with interviews for shortlisted applicants conducted in January 2022. The final list of recommended projects will be forwarded to the GIH Steering Committee and the PVC Research Infrastructure for final approval. We anticipate being able to inform applicants of their success (or otherwise) by the end of January 2022.

Submission

Email completed GIH External Project Applications to GIHapplications@uq.edu.au

GIH collaborative projects

GIH's collaborative projects represent genomic innovation in a wide range of techniques including transcriptomics, long read sequencing, genome editing, proteomics and genomic data visualisation.

The projects are actively undertaken by the GIH team and the collaborating research groups working both together in project design and methods. GIH is looking forward to sharing all the innovations and developments these projects will bring with other UQ researchers.

Individual project information is available on our GIH website (gih.uq.edu.au). For updates on project outcomes, subscribe to the GIH newsletter and/or follow the @GIH_UQ twitter feed. Below is a list of GIH collaborative projects.

2021 GIH Collaborative projects

Enabling population scale epigenomics for crop improvement.

Peter Crisp, Kai Voss-Fels, Lee Hickey. School of Agriculture and Food Sciences (SAFS) and Queensland Alliance for Agriculture and Food Innovation (QAAFI).

Deciphering the epitranscriptome machinery using direct native RNA sequencing.

Cheong Xin Chan, Katherine Dougan, Mikael Bodén, Peter Erskine, Antony van der Ent. Australian Centre for Ecogenomics (ACE), School of Chemistry and Molecular Biology (SCMB), Sustainable Minerals Institute (SMI).

Developing new spatial proteomics capability and extending the applications of spatial transcriptomics to clinical archival tissue samples.

Quan Nguyen, Mitchell Stark, Kiarash Khosrotehrani, Brett McKinnon. Institute for Molecular Biosciences (IMB) and UQ Diamantina Institute (UQ-DI). GIH Progress Report June 2021 17

Utilising RNA velocity quantification of single cell transcriptomics to study differential cellular ontogeny in a single stage across different species.

Peter Kozulin, Laura Fenlon, Rodrigo Suarez. Queensland Brain Institute (QBI), School of Biomedical Sciences (SBMS).

Expanding the scope of multimodal single cell sequencing.

Christian Nefzger. Institute for Molecular Bioscience (IMB).

Genome-Phaser: End-to-end protocol for fully phasing whole genome variants using haplotagging.

Melanie Wilkinson, Elizabeth Ross, Frank Chan, Craig Hardner and Daniel Ortiz-Barrientos. School of Biological Sciences, QAAFI Centre for Horticultural Science, QAAFI Centre for Animal Science.

Developing a scalable genome browser and interactive repository for large and complex multi-omic datasets from non-model organisms of environmental and economic importance.

Sandie Degnan, Bernie Degnan and Dominique Gorse. School of biological sciences (SBS) and Queensland Cyber Infrastructure Foundation (QCIF Bioinformatics).

Culture-independent metagenomic diagnostics for genomic surveillance and infection control of pathogenic bacteria in clinical settings.

Brian Forde, Delaney Burnard, David Paterson, Patrick Harris. Centre for Clinical Research (UQCCR).

Assessing DNA Replication Dynamics in Cancer.

Mathew Jones and Paul Clarke. UQ Diamantina Institute (UQ-DI).

High throughput single cell CRISPR technology for experimental validation of population genetics and functional genomics discovery in endometriosis as a model disease.

Brett McKinnon and Quan Nguyen. Institute for Molecular Biosciences (IMB).

Optimised bioinformatics and validation pipeline for genome-wide CRISPR screening data.

Rebecca San Gil, Adam Walker. Queensland Brain Institute (QBI).

2020 GIH Collaborative projects

Simultaneous identification of RNA-chromatin interactions and transcriptomes in single cells

Dr. Seth Cheetham, Prof. Geoffrey Faulkner and Dr. Adam Ewing. UQ Mater Research Institute, Queensland Brain Institute (QBI).

A genomic dissection of metaorganisms: molecular approaches for teasing apart the hologenome

Dr Cheong Xin Chan, A/Prof. Peter Erskine, Dr Lauren Messer, Dr Antony van der Ent. School of Chemistry and Molecular Biosciences (SCMB), Sustainable Mines Institute (SMI).

Understanding host-pathogen interactions through development of new co-transcriptomic single-cell RNA sequencing technologies

Dr. Ronan Kapetanovic and Prof. Matt Sweet. Institute for Molecular Biosciences (IMB).

Single-cell transcriptome and chromatin profiling in plant cells

Dr. Milos Tanurdzic. School of Biological Sciences (SBS).

Targeted capture and detection of 16s rRNA gene applying PCR-free long read sequencing

Dr Sanjaya Kc. Institute for Molecular Biosciences (IMB).

OmniCRISPR: a simultaneous and combinatorial approach to the generation of multiple precise genomic alterations in a human stem cell model

Dr. Dmitry Ovchinnikov. Australian Institute for Bioengineering and Nanotechnology (AIBN).

TraDIS-Vault: an interactive searchable genome browser and repository for TraDIS data

Prof Ian Hendserson, Dr. Dom Gorse. QCIF Bioinformatics, Institute for Molecular Biosciences (IMB)

Combining novel scSLAM-seq technology with 10x Genomics Chromium to track microchanges in newly synthesised RNA at the single-cell level during macrophage efferocytosis

Dr. Denuja Karunakaran. Institute for Molecular Biosciences (IMB)

2019 GIH Collaborative projects

Spatial genomics technologies to study cancer and genetic diseases in tissue contexts

Dr Quan Nguyen, A/Prof Andrew Mallett, Institute for Molecular Biosciences (IMB)

Automated single cell quantitative in situ gene expression in cells and tissues (AutoMerFISH)

Prof Ernst Wolvetang, A/Prof Jessica Mar, Dr Shyuan Ngo, Australian Institute for Bioengineering and Nanotechnology (AIBN)

Applying long-read sequencing technology to understand telomere repair and DNA replication

Dr Mathew Jones, Prof Paul Clarke. UQ Diamantina Institute (UQ-DI)

Discovery of new regulatory networks with long-read transcriptomics

A/Prof Scott Beatson, Prof Mark Schembri, Prof Mark Walker. School of Chemistry and Molecular Biosciences (SCMB)

Genome-wide CRISPR screening for modifiers of diverse cellular phenotypes

Dr Rebecca San Gil, Dr Adam Walker, Queensland Brain Institute (QBI)

Using transposon-sequencing to probe whole cell protein-protein interactions

Dr Emily Goodall, Prof Ian Henderson. Institute for Molecular Biosciences (IMB)