

Open call for research project

Indo-Korea Science and Technology Center, Korea Institute of Science and Technology (KIST)

Control number: IKST/Research/2024-10/04102024

Indo-Korea Science and Technology (IKST), Bengaluru calls proposals for commissioned research project as below.

1. Classification: Research & Development (Development of Quantum Algorithms)

No.	Field	Title of project	Budget	Period	Note
1	Research	Development and Testing of Quantum Algorithms for Materials Science	Rs. 15,00,000	15/11/2024 ~14/11/2025	

2. Qualification and application

A. Qualification for application

- ① Ph.D. degree holder in related area

B. Period of tender: 08. 10. 2024 (Tues) ~ 21.10. 2024 (Mon)

C. Required documents

- ① Official letter (one copy, English)
② Project proposal (original two copies, English)

※ Email submission of above documents is mandatory to Brunda (91 9901202787, hr@ikst.res.in), parallel with direct or postal submission

D. Application

- Deadline: 17:30, 21. 10. 2024 (Mon)
- Submission (Direct or Post)

- Address: 3rd Floor, NCC Urban Windsor, Opposite Jakkur Aerodrome, New International Airport Road, Yelahanka, Bangalore, Bangalore North, Karnataka, India 560 064

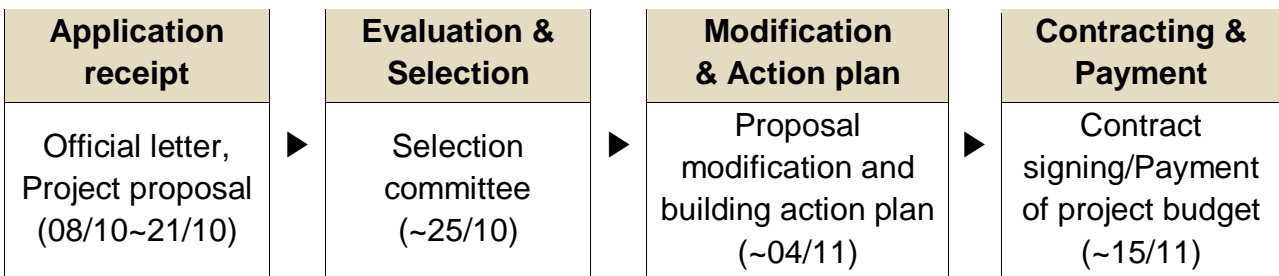
※ Please contact Brunda B V (+91 9901202787, hr@ikst.res.in) for any inquiry

Attachments: 1. Selection and operation plan for research project
2. Request for proposal
3. Project proposal (format)
4. Project result report (format). End.

Selection and operation plan for research project

1. Selection procedure and criteria

Selection procedure



※ Selection procedure timeline is subject to changes depending on internal schedules

Evaluation & Selection

Method: Written and presentation evaluation

Criteria

- Fundamental qualification of institute and P.I.
- Clarity of objectives, differentiation of performance strategy, feasibility of research contents against the budget
- Creativity and innovativeness of objectives and contents, application availability of research results

Modification & Action plan

Modification and improvement of project proposal of final candidate

Building an action plan such as interim review, regular meetings etc.

Contracting & Payment

Signing a commissioned survey research contract

Major conditions/terms of contract

- Objectives/Contents In final project proposal
- Contract period: 15.11. 2024. ~ 14. 11. 2025 (1 year)

- Payment: Advance (Inclusive tax, 100% of contracted amount, payment after contracting)

2. Result report

- Result reports (original two copies) submission within two months from the last date of research period.

3. Notice

- Selection result will be announced through email to individual(s)
- Duration for presentation evaluation is for 30 minutes (20 minutes for presentation and 10 minutes for Q&A)
- No documents will be returned after submission

Request for Proposal (RFP)

Title: Development and Testing of Quantum Algorithms for Materials Science

Abstract: Quantum computing is emerging as a transformative technology with the potential to revolutionize materials science by enabling simulations and analyses of complex quantum systems that are intractable for classical computers. This RFP seeks proposals for projects focused on the development of new quantum algorithms and computational methodologies specifically designed to advance materials science applications.

The proposed project is expected to have the following aims:

- **Integrate Deep Neural Networks (DNNs):** Explore the integration of deep neural networks with quantum algorithms beyond the Variational Quantum Eigensolver (VQE), such as Quantum Phase Estimation (QPE) and Quantum Approximate Optimization Algorithm (QAOA). The goal is to enhance the performance and accuracy of quantum simulations in materials science by leveraging machine learning techniques for better initialization, parameter optimization, and error mitigation.
- **Develop Optimization Techniques for Noisy Devices:** Create and implement advanced optimization methods tailored for noisy intermediate-scale quantum (NISQ) devices. This includes developing noise-resilient algorithms, error correction strategies, and efficient quantum circuit designs that can operate effectively despite the inherent noise and decoherence present in current quantum hardware.
- **Address Complex *ab-initio* Material Modeling Problems:** Utilize the power of quantum computing combined with DNNs to tackle complex *ab-initio* material modeling challenges that are currently infeasible with classical methods. This may involve simulating strongly correlated electron systems, predicting novel material properties, or modeling large-scale quantum systems with high accuracy.
- **Enhance Scalability and Efficiency:** Focus on optimizing quantum algorithms to improve scalability and computational efficiency. This includes reducing resource requirements, minimizing gate counts, and enhancing parallelization to handle larger and more complex material systems.

Project Proposal (Arial, Bold, 18 pt)

(Paragraph spacing 1.15)

1. Overview of project (Arial, Bold, 12pt)

- Title (Arial, 12pt)
- Period
- Budget

2. Information of P.I.

- Name:
- Affiliation: Position, Dept., Name of Institute
- Educational qualification:
- Contact
 - Tel.:
 - Mobile:
 - Email:

3. Necessity and objectives (Max. 1 page)

4. Details (Max. 3 pages)

5. Strategies, methods and system

6. Expected achievements and application plan

7. Deliverables

8. Timeline

9. List of participants and budget plan

Project Result Report (Arial, Bold, 18 pt)

(Paragraph spacing 1.15)

1. Overview of project (Arial, Bold, 12pt)

- Title (Arial, 12pt)
- Period
- Budget

2. Information of P.I.

- Name:
- Affiliation: Position, Dept., Name of Institute
- Educational qualification:
- Contact
 - Tel.:
 - Mobile:
 - Email:

3. Objectives (Max. 1 page)

4. Details (No limit of pages)

4.1 Introduction

4.2 Methods

4.3 Results

4.4 Conclusion

5. Deliverables

6. Expenses