**Global Research Outreach\_2025\_Call for Proposal**

**Theme: New Computing**

**- Sub-Theme: Quantum Computing**

The realization of practical and useful fault-tolerant quantum computing (FTQC) requires two core technologies: (1) logical qubit implementation using quantum error correction (QEC), and (2) large-scale distributed quantum computing system for 1M qubits.

Due to fundamental limitations in lowering physical qubit error rates caused by various sources of decoherence implementing error-corrected logical qubits is essential. Research into lower overhead and lower threshold QEC codes will play a critical and crucial role in accelerating the timeline for useful quantum computing.

At the same time, scaling monolithic quantum processor unit faces physical constraints such as chip area, thermal load, and control complexity. Distributed quantum computing which interconnects multiple quantum computing modules offers a scalable solution. This approach requires integrated advancements in modular control, inter-module entanglement, and distributed QEC.

We are highly interested in fundamental research that solve problems arising in the above areas, such as but not limited to:

* Next-generation quantum error correction codes
* Physical qubit architectures optimized for quantum error corrections
* Architectures for scalable distributed quantum computing systems
* Hybrid modular quantum systems with heterogeneous qubit types
* Fault-tolerant control stack design including real-time decoding, control and feedback integration for logical qubit operations
* System-level co-design strategies

※ *The topics are not limited to the above examples and the participants are*

*encouraged to propose the original idea.*

※ *Funding: Up to USD 150,000 per year*