

# Qubit Mapping and Routing tailored to Advanced Quantum ISAs: Not as Costly as You Think

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**Abstract**—We propose CANOPUS (Canonical Optimized Placement Utility Suite), A qubit mapping/routing framework tailored to advanced quantum ISAs adaptive to versatile hardware architectures.

## I. INTRODUCTION

Advanced ISAs—Can [1],  $\sqrt{iSWAP}$  [2]

CANOPUS (Canonical Optimized Placement Utility Suite) is a qubit mapping and routing framework that is tailored to advanced quantum ISAs, such as Can [1] and  $\sqrt{iSWAP}$  [2], which are adaptive to versatile hardware architectures. CANOPUS is designed to optimize the placement of qubits and the routing of quantum gates, taking into account the specific requirements of these advanced ISAs.

## REFERENCES

- [1] J. Chen, D. Ding, W. Gong, C. Huang, and Q. Ye, “One gate scheme to rule them all: Introducing a complex yet reduced instruction set for quantum computing,” in *Proceedings of the 29th ACM International Conference on Architectural Support for Programming Languages and Operating Systems, Volume 2*. La Jolla, CA, USA: ACM, 2024, pp. 779–796.
- [2] C. Huang, T. Wang, F. Wu, D. Ding, Q. Ye, L. Kong, F. Zhang, X. Ni, Z. Song, Y. Shi, H.-H. Zhao, C. Deng, and J. Chen, “Quantum instruction set design for performance,” *Physical Review Letters*, vol. 130, p. 070601, Feb 2023. [Online]. Available: <https://link.aps.org/doi/10.1103/PhysRevLett.130.070601>