Quantum Thermal Logic Gates

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We propose a new concept for quantum thermal logic gates – analogous to classical electronic logic gates – where we exploit the heat current in a coupled quantum-dots, tunnel-coupled to electronic thermal reservoirs for logic operations in a quantum circuit. We obtained a remarkable one-to-one correspondence with the classical electronic logic gates. An experimental setup is presented that demonstrates a realizable nano-electronic quantum circuit architecture for implementing such quantum thermal logic operations.

SG and AG acknowledge the support from PMRF and IIT Kanpur, respectively. BD acknowledges the support funded by ANRF under the ANRF-PMECRG grant with the project number ANRF/ECRG/2024/003114/PMS, support from the IIT Indore YFRSG grant, and support from PAIR Network of SAKSHAM funded by ANRF, India, through the grant ANRF/PAIR/2025/000018/PAIR, administered and mentored by IIT Indore.