# Logarithmic Operator Entanglement Growth in Non-Integrable Quantum Circuits

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Understanding how quantum information spreads in many-body systems is central to quantum simulation and quantum computation. In chaotic systems, operator entanglement is generally expected to grow linearly in time, limiting classical simulability.
In this talk, I present a class of clean, non-integrable quantum circuits that instead exhibit logarithmic growth of operator entanglement, despite the absence of disorder or integrability.
This behavior arises in semi-ergodic dual-unitary circuits, which lie between chaotic and non-interacting dynamics.
I will present analytical insights based on an effective mapping to a reduced scattering problem, together with numerical results for operator entanglement, correlation functions, and operator size distributions. These findings provide a concrete example of intermediate scrambling dynamics and suggest new directions for understanding classical simulability in quantum many-body systems.