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Single-qubit gates by graph scattering[1] MICHAEL S. UNDERWOOD, BENJAMIN A. BLUMER, DAVID L. FEDER, IQIS, University of Calgary — Continuous-time quantum walkers with tightly peaked momenta can simulate quantum computations by scattering off finite graphs. We enumerate all single-qubit gates that can be enacted by scattering off a single graph on up to $n = 9$ vertices at certain momentum values, and provide numerical evidence that the number of such gates grows exponentially with n. The single-qubit rotations are about axes distributed roughly uniformly on the Bloch sphere, and rotations by both rational and irrational multiples of π are found.

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