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Dynamical decoupling by shaped pulses with partial local control LEONID PRYADKO, PINAKI SENGUPTA, UC, Riverside, DANIEL LIDAR, University of Toronto, MARK DYKMAN, Michigan State University — We present an efficient scalable scheme for pulse-based coherent control in qubit systems with partial local control. The globally applied sequence of narrow-band NMR-like X and Y pulses used in combination with local Z pulses (level splitting individually controlled at each qubit) is shown to allow for universal quantum computation. The scheme applies to a number of proposed quantum dot-based designs, both solid-state and based on the electrons on helium, the designs based on charge- or flux-dominated superconducting Josephson junction circuits, etc. Compared to control schemes based on tuning qubits in and out of resonance, this scheme allows for faster gates with narrower frequency band for controlling pulses. We demonstrate several two-qubit quantum gates with concurrent refocusing of both the inter-qubit and a low-frequency bath couplings.

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