Abstract Submitted
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A two-qubit gate based on a multi-terminal double barrier Josephson[1] SERHII SHAFRANIUK, Northwestern University — A multi-terminal double barrier SISIS junction (S and I denote a superconductor and an insulating barrier respectively) is suggested as a two-qubit gate with tunable intrinsic coupling. Two quantum wells are formed in vicinities of the left and right SIS subjunctions. This gives two individual qubits, which are intrinsically coupled via the middle S layer due to phase coherence. The inter-qubit coupling J is tuned by two bias supercurrents I_1 and I_2 across each of the SIS subjunctions independently. Additional coupling is accomplished by transport supercurrents $I_l^{\rm tr}$ along adjacent S layers. Using a microscopic model we compute major qubit characteristics and study sources of the intrinsic decoherence. We compute the entanglement of the two qubit states, leakage and fidelity characteristics versus J, and discuss the readout process.

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