Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

A quantum measurement of the double barrier junction (DBJ) qubit[1] SERHII SHAFRANJUK, Northwestern University — A quantum measurement on a double barrier junction (DBJ) qubit performed by a coupled by an SIS junction is studied. The DBJ qubit state $|s\rangle$ is monitored by entangling of it with the SIS "meter" state $|m\rangle$. The the coupling strength J between the ABS qubit and the meter is controlled by a Josephson flux transistor. The efficiency of the measurement versus the coupling strength between DBJ and SIS is computed. It is found that the information gained in the quantum measurement depends on J and on the ratio $\mu = \varepsilon_m/\varepsilon_q$ (where ε_q and ε_m are the qubit and the meter level splitting correspondingly. Using a linear circuit approach we also compute the spectral density $J^s_{eff}(\omega)$ of the qubit noise induced during the measurement. An evaluation of noise and decoherence made shows that they depend on the characteristic times of the equivalent circuit of the qubit system, and thus may be optimized to improve the overal qubit performance.

[1]supported by NSF grant EIA-0218652

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Date submitted: 08 Dec 2004 Electronic form version 1.4