1067-92-720 **Boris S Gutkin***, 29 rue d'Ulm, 75005 Paris, France. *Probing intrinsic bistability in neurons with noise: a case of inverse stochastic resonance.* Preliminary report.

We report results for single neurons with type II dynamics (subcritical Andronov-Hopf bifurcation present), specifically noise-induced changes in the repetitive firing of Hodgkin-Huxley model neurons. When such models are stimulated with a constant additive current, there is a critical input current density at which sustained periodic firing occurs. For input near this critical value, we find that the firing rate is greatly reduced by noise, even of quite a small amplitude. We also find that the firing rate undergoes a minimum as the noise increases, a phenomenon which is opposite in character to stochastic resonance and hence can be named "inverse stochastic resonance". We discuss the geometric and dynamical conditions for this phenomenon to occur, including the bistability between the stable rest point and sustained firing. We then show that such inverse stochastic resonance occurs in cerebellar Purkinje neurons. This suggests that Purkinje neurons are indeed bistable and that this bistability is an intrinsic membrane property, allowing rapid switching between active and quiescent states. (Received September 14, 2010)