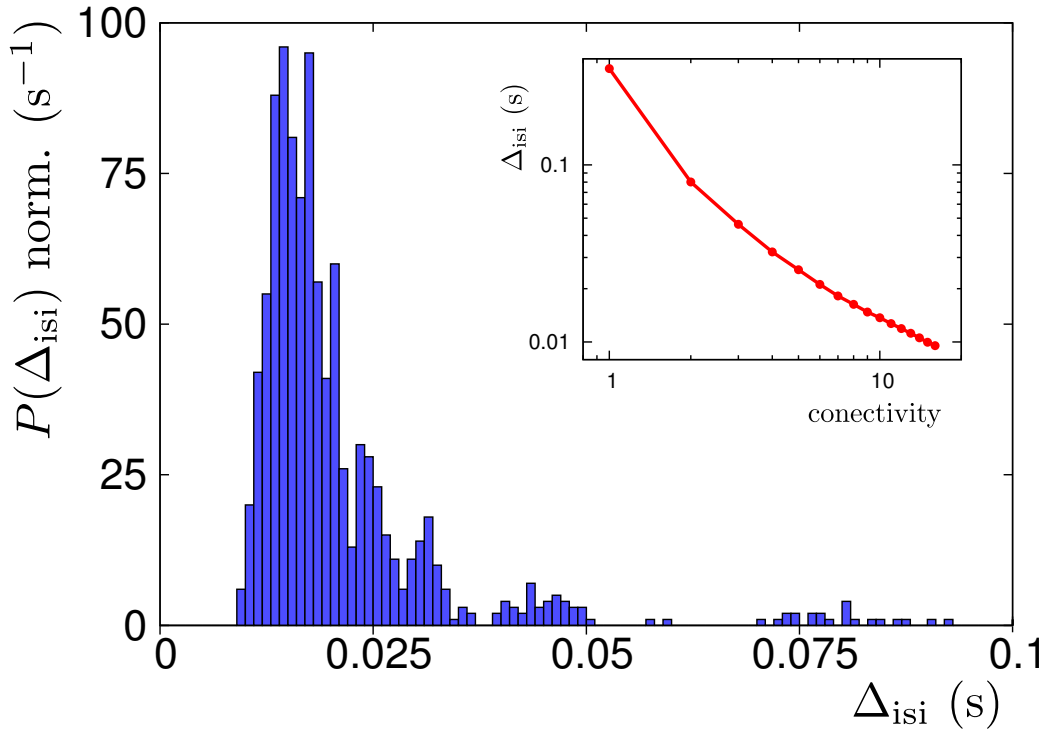


# Appendix S5 for “Stochastic Amplification of Fluctuations in Cortical Up-states”

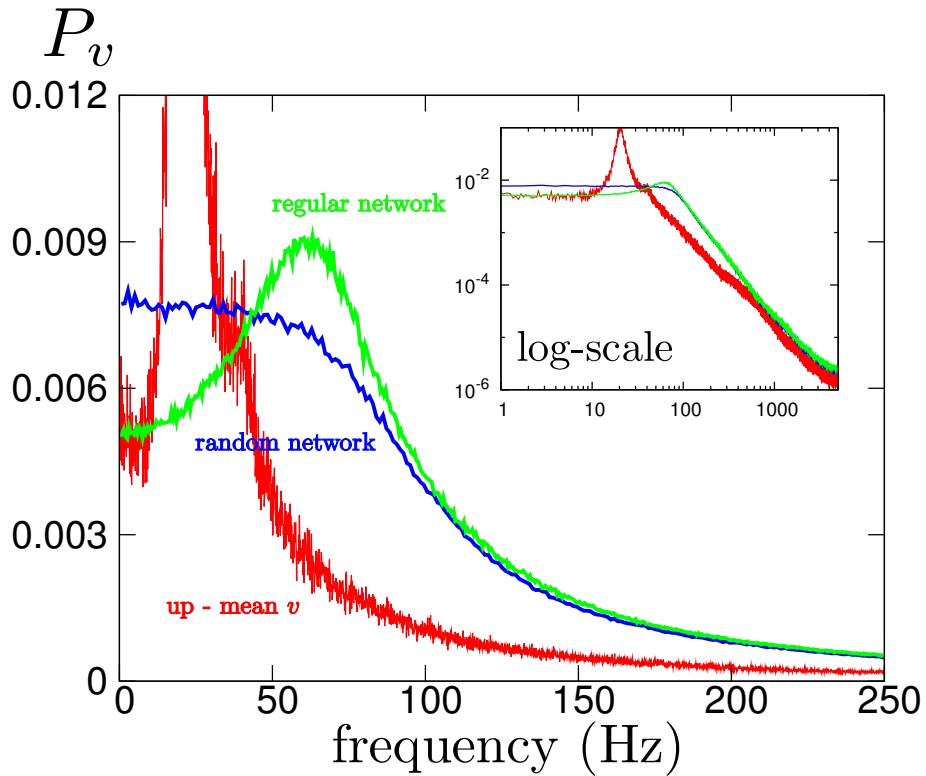
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## Characteristic frequencies for individual neuron membrane potentials



**Figure S5-1.** Probability distribution of the inter-spike-intervals in the random network; its average gives  $\langle \Delta_{\text{isi}} \rangle \approx 17$  ms, corresponding to a mean firing rate of  $f \approx 60$  Hz. This result perfectly agrees with mean firing rate of Fig. S5-2. Heterogeneity in the average inter-spike-intervals stems from the different connectivity degrees, as illustrated in the inset. In the latter, we show the average value of  $\Delta_{\text{isi}}$  for different (pre-synaptic) connectivity levels, exhibiting a  $\sim 1/K$  dependency.



**Figure S5-2.** Averaged power spectra for individual neuron membrane-potential time-series for both a random network with average connectivity  $K = 7.5$  (blue) and a regular network with connectivity  $K = 7$  (green) in the Up state. A sharp peak (around 60 Hz) is seen for regular networks; instead in random networks the peak is blurred owing to node-to-node heterogeneity. In any case, there is no peak at the characteristic frequency of the global, network-averaged membrane potential,  $\approx 20$  Hz (peak of the red curve): individual neurons do not lock to the collective rhythm within Up states. The inset shows a similar plot in logarithmic scale, putting forward the presence of a distinct peak for regular networks together with a  $w^{-2}$  tail for all spectra.