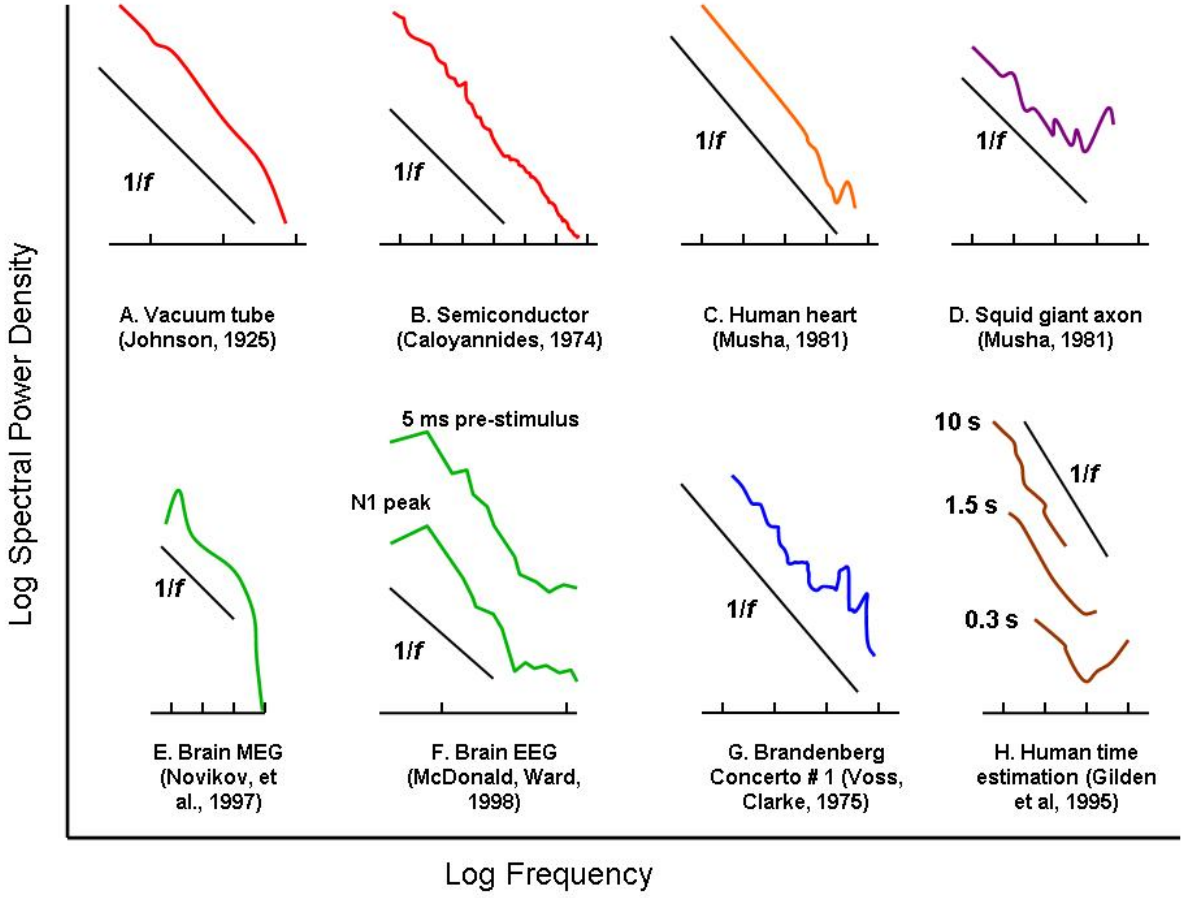
Some Examples of Physical Systems Exhibiting 1/*f* Noise:



Fractional Brownian Motion, Fractional Brownian Noise

A dynamical system that obeys fractional Brownian noise (fBn), *e.g.* electrical noise in a carbon composition resistor, is a single-valued function of time $V(t)$. The ***increments*** of the dynamical system from one moment to the next $\Delta V(\Delta t) = V(t_2) - V(t_1)$ obey a Gaussian probability distribution function (PDF):

$$f\left(\Delta V(\Delta t);\sigma_{\Delta V}\right) = \frac{1}{\sqrt{2\pi}\,\sigma_{\Delta V}} e^{-\Delta V^2(\Delta t)/2\pi\sigma_{\Delta V}^2}$$

The frequency-domain power spectral density (PSD) function $S_V(f)$ associated with the time-domain fluctuating quantity $V(t)$ is a measure of the mean squared variation (*i.e.* variance) $\langle V^2(t)\rangle$ of $V(t)$ in a unit bandwidth centered on the frequency f. Note that if the physical units of $V(t)$ are *e.g. Volts*, the units of the PSD function $S_V(f)$ are *Volts*^{2}/*Hz*.