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**Rebecca E. Gasper\*** ([rebeccagasper@creighton.edu](mailto:rebeccagasper@creighton.edu)), Creighton University Dept. of Mathematics, 2500 California Plaza, Omaha, NE 68178-0610. *Can you hear me now? A PDE Model for Stochastic Properties of the Auditory Neuron.*

We create and analyze a PDE model for electrophysiological properties of the Auditory Nerve Fiber. This elegantly illustrates the stochastic nature of neurons with small diameter. Our probability density function lives in a state space of neurons which do or do not fire; we see how an independent set of neurons behave or a probabilistic understanding of a particular frequency being heard at the other end of a single neuron. From a 2D ODE to a multi-dimensional PDE with parallel computing, we can "gain" layers of understanding and "adapt" our understanding of signal in cochlear implants. (Received September 18, 2019)