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Rodrigo Bañuelos (banelos@purdue.edu), **Phaniel Mariano*** (pmariano@newhaven.edu) and **Jing Wang** (jingwang@purdue.edu). *Extremal Problems for the Expected Lifetime of Brownian motion and the Fundamental Frequency of a Drum.*

I will speak about the relationship between the fundamental frequency of a drum and probability. This connection will be through an inequality involving the fundamental frequency of a drumhead $D \subset \mathbb{R}^d$ and the maximum expected lifetime of Brownian motion started inside a domain $D \subset \mathbb{R}^d$. For larger drums the fundamental frequency becomes lower while the maximum expected lifetime increases. We improve on the constants of the known inequality and prove a new asymptotically sharp inequality involving the moments of the expected lifetime of Brownian motion. We discuss conjectures about the sharp inequality and present our partial results about the extremal domains and sharp constants. (Received January 17, 2020)