1141-35-297 **Dennis Kriventsove*** (dennisk@cims.nyu.edu). *Spectral optimization and free boundary problems.*

A classic subject in analysis is the relationship between the spectrum of the Laplacian on a domain and that domain's geometry. One approach to understanding this relationship is to study domains which extremize some function of their spectrum under geometric constraints. I will give a brief overview of some of these optimization problems and describe the (very few) explicit solutions known. Then I will explain how to approach these problems more abstractly, using tools from the calculus of variations to find solutions. A key difficulty with this approach is showing that the solutions (which are a priori very weak) are actually smooth domains, which I address in some recent work with Fanghua Lin. Our method revolves around relating spectral optimization problems to certain vector-valued free boundary problems of Bernoulli type (Received July 31, 2018)