Eigenvalue problems and free boundary minimal surfaces in spherical caps

Ana Menezes

Princeton University

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In a recent work with Vanderson Lima (UFRGS, Brazil), we introduced a family of functionals on the space of Riemannian metrics of a compact surface with boundary, defined via eigenvalues of a Steklov-type problem. In this talk we will prove that each such functional is uniformly bounded from above, and we will characterize maximizing metrics as induced by free boundary minimal immersions in some geodesic ball of a round sphere. Also, we will determine that the maximizer in the case of a disk is a spherical cap of dimension two, and we will prove rotational symmetry of free boundary minimal annuli in geodesic balls of round spheres which are immersed by first eigenfunctions.