

Sharp isometric questions and rigidity problems

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Abstract: In this talk we discuss some open sharp isoperimetric questions and conjectures. For manifolds with boundary they are of "filling-volume type" while for closed manifolds they are lower bounds on the volume in terms of the marked length spectrum. The case of equality in the inequalities is related to some long standing rigidity questions (boundary rigidity and geodesic conjugacy rigidity respectively). The boundary rigidity problem is known in geophysics as the inverse kinematic problem. The question is whether one can determine the index of refraction of a medium by measuring the first arrival times of seismic waves. Recent work on these questions in two dimensions (joint with Dairbekov and joint with Bangert, Ivanov, and Katz) will be presented. (The talk should be accessible to graduate students.)