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The Inverse Problem of Recovering a Riemannian Metric from Area Data

Broadly speaking, there are two classes of inverse problems — those that are concerned with the analysis of PDEs, and those that are geometric in nature. In this talk, I will introduce the audience to these classes by highlighting classical examples. Then, I will introduce the geometric problem of recovering a Riemannian metric from area data. I will connect this problem to questions which arise in the AdS/CFT correspondence. I will survey several cases where it is possible to determine a metric from knowledge of the areas of certain families of surfaces. A key feature of these results is that they combine techniques from both PDE and geometric perspectives.