Gunther Uhlmann : *Seeing Through Space Time*

Abstract :
We consider inverse problems for the Einstein equation with a time-depending metric on a 4-dimensional globally hyperbolic Lorentzian manifold. We formulate the concept of active measurements for relativistic models. We do this by coupling Einstein equations with equations for scalar fields.

The inverse problem we study is the question, do the observations of the solutions of the coupled system in an open subset U of the space-time with the sources supported in U determine the properties of the metric in a larger domain? To study this problem we define the concept of light observation sets and show that these sets determine the conformal class of the metric. This corresponds to passive observations from a distant area of space which is filled by light sources. We will also consider inverse problems for other non-linear hyperbolic equations. This is joint work with Y. Kurylev and M. Lassas