

EXPERIMENTAL DESIGN FOR TOMOGRAPHY: SEEKING WELL POSED QUESTIONS IN ILL POSED PROBLEMS

NICOLAS W HENGARTNER

ABSTRACT. Statistical inverse problems are notoriously hard when one considers the minimax rate of convergence of nonparametric estimates. The situation is somewhat better for estimating functionals of the underlying parameter: some functionals can be easily estimated while others will remain difficult. The design question for statistical inverse problems is to identify which functionals are easy to estimate. That is, we seek to identify the "well posed questions in ill posed problems".

In this talk, I present two examples: The first example concerns estimating the "soft error" cross-section of microchips caused by cosmic radiation (neutrons). The second example focuses on tomographic imaging of high Z material using background cosmic radiation (muons). In both examples, we will analyze what functionals can easily be estimated from the data to help with the design of the measuring instruments.

INFORMATION SCIENCES GROUP, LOS ALAMOS NATIONAL LABORATORY