

STATISTICS COLLOQUIUM

MONDAY, APRIL 07, 2008

TALK: 4:00 PM – SCIENCE CENTER, RM. 309

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“The integral geometry of random level sets”

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ABSTRACT

In various scientific fields from astrophysics to neuroimaging, researchers observe entire images or functions rather than single observations. The integral geometric properties, notably the Euler characteristic of the level/excursion sets of these functions, typically modelled as Gaussian random fields, have found some interesting applications in these domains. In this talk, I will describe some of the integral geometric properties of these random sets, particularly their curvature measures. I will focus on describing the results and some applications to brain imaging. These applications focus on a class of non-Gaussian random fields (built up of Gaussians), and for these random fields there is neat geometric relationship (which we refer to as a Gaussian Kinematic Formula) between the curvature measures of their excursion sets and the classical Kinematic Fundamental Formulae of integral geometry.