

Title:

**Maxima of Gaussian Random Fields and Moderate Deviation Approximations to Boundary Crossing Probabilities of Sums of Random Variables with Multidimensional Indices**

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Technical Report number (Dept. of Statistics, Stanford Univ.):

**2003-32**

Date:

**October 2003**

Abstract:

Several classical results on boundary crossing probabilities of Brownian motion and random walks are extended to asymptotically Gaussian random fields, which include multivariate empirical processes, sums of i.i.d. random variables with multidimensional indices, and scan statistics in change-point and signal detection as special cases. Some key ingredients in these extensions are moderate deviation approximations to marginal tail probabilities and weak convergence of the conditional distributions of certain "clumps" around high-level crossings. We also discuss how these results are related to the Poisson clumping heuristic and tube formulas of Gaussian random fields, and describe their applications to laws of the iterated logarithm in the form of the Kolmogorov-Petrovski-Erdős integral tests.