



Applied Mathematics



McGill & CRM Applied Mathematics Seminar

2:35 pm Monday 1 December 2003

At McGill, Burnside Hall 1205

“Stochastic gene expression in single cells”

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Coffee and refreshments will be served before the seminar

Abstract: Generation of phenotypic variability in clonal populations of cells is essential for many biological processes. Such heterogeneity is conjectured to arise from stochasticity, or noise, in gene expression. We show that noise can be decomposed into an intrinsic piece, particular to a given gene, and an extrinsic term, common to all genes in a cell, but variable from one cell to another. Using specially constructed strains in *Escherichia coli*, we are able to discriminate between, and measure, both types of noise. We demonstrate that intrinsic noise indeed exists in vivo and accounts for a substantial portion of cell-cell variation. An analytical description of gene expression is also presented, which contains all the major biochemical steps in transcription and translation. As transcription rate is varied, this model confirms experimental findings that the amplitudes of both noise components vary over a wide range. These results reveal how low intracellular copy numbers can fundamentally limit the precision of gene expression.

