STANFORD UNIVERSITY

DEPARTMENT OF STATISTICS

DEPARTMENTAL SEMINAR

4:15 p.m., Tuesday, April 25, 2000
Sequoia Hall Rm. 200
(Cookies at 3:45 in 1st Floor Lounge)

Iain Johnstone
Department of Statistics
Stanford University

The largest eigenvalue of a large white Wishart matrix

Let X be an $n \times p$ data matrix whose rows are independent draws from $N_p(0, \Sigma)$. In applications, it is now common for p as well as n to be quite large. The eigenvalues, or principal components, of the sample covariance matrix are then known to be more dispersed than the population eigenvalues, particularly when $\Sigma = \sigma^2 I$. In this latter case, the methods of random matrix theory quantify the effect precisely: they yield the limiting distribution of the largest eigenvalue as $n, p \to \infty$ with $n/p = \gamma \geq 1$. The approximation is informative for $\min(n, p)$ as small as 10, and may complement graphical tools, such as the screeplot, in isolating significant principal components.