

## *Research Seminar in Statistics*

---

Title: Donsker's central limit theorem for Estimating Lévy Measures  
Speaker: Richard Nickl, Cambridge University, Cambridge UK  
Date: Friday, June 22, 2012  
Time: 15.15h  
Room: HG G 19.1

### Abstract:

We consider the problem of statistical inference on the jump distribution of a Lévy process  $L_t$  from a sample of equidistant 'low-frequency' observations of the trajectory of the process. We construct a natural estimator  $\hat{N}$  for the cumulative distribution function  $N$  of the Lévy measure. Under a polynomial decay restriction on the characteristic function  $\phi$  a Donsker-type theorem is proved, that is, a functional central limit theorem for the process  $\sqrt{n}(\hat{N}_n - N)$  in the space of bounded functions away from zero. The limit distribution is a generalised Brownian bridge process with bounded and continuous sample paths whose covariance structure resembles the 'ill-posedness' of the problem, and which, as we show, is efficient, that is, it attains the semiparametric Cramer-Rao lower bound in this infinite-dimensional model. The class of Lévy processes covered by our result includes several relevant examples such as compound Poisson, Gamma and self-decomposable processes. The result can be used, as the classical Donsker theorem for empirical distributions, for various concrete statistical applications, such as the construction of confidence bands, Kolmogorov-Smirnov type goodness of fit tests, and can serve as an efficient plug-in estimator for various Hadamard differentiable functionals.  
(This is joint work with M.Reiss)

Auskunft:

Seminar für Statistik, ETH, 8092 Zürich  
<https://stat.ethz.ch/events/index>

mailto: [sekretariat@stat.math.ethz.ch](mailto:sekretariat@stat.math.ethz.ch)