

## DEPARTMENT OF STATISTICS AND BIOSTATISTICS

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NSF and Renyi Institute of Mathematics

*The Energy of Data***November 2, 2016****3:20 – 4:20pm**

Light refreshments will be served

**110 Frelinghuysen Road****Hill Center, Room 552**

**Abstract:** The energy of data is the value of a real function of distances between data in metric spaces. The name energy derives from Newton's gravitational potential energy which is also a function of distances between physical objects. One of the advantages of working with energy functions (energy statistics) is that even if the observations/data are complex objects, like functions or graphs, we can use their real valued distances for inference. Other advantages will be illustrated and discussed in the talk. Concrete examples include energy testing for normality, energy testing for symmetry, energy clustering, and distance correlation. Applications include genome, brain studies, and MCMC thinning for Bayesian computation. One of the ingredients of data energy is the Riesz energy of measures. We also plan to revisit Rényi (1959) axioms of dependence measures. --- Data energy was introduced by the speaker three decades ago but it became popular in statistical inference only after distance correlation was introduced ten years ago. Since then more than 3,000 papers apply data energy.

**Bio:** Gábor Székely is best known for introducing E-statistics or energy statistics. He received his PhD from Eötvös Loránd University, in 1971, with Alfréd Rényi as his advisor. He received his Candidate Degree in 1976 under the direction of Paul Erdős and Andrey Kolmogorov, and the Doctor of Science degree from the Hungarian Academy of Sciences in 1986. He was the first program manager of the Budapest Semesters in Mathematics, the founding chair of the Department of Stochastics of the Budapest Institute of Technology (Technical University of Budapest) and editor-in-chief of Matematikai Lapok, the official journal of the János Bolyai Mathematical Society. He is currently a Program Director of Statistics of the National Science Foundation as well as a Research Fellow of the Rényi Institute of Mathematics of the Hungarian Academy of Sciences. Dr. Székely is the author of two monographs, Paradoxes of Probability Theory and Mathematical Statistics, and Algebraic Probability Theory (with Imre Z. Ruzsa).

