Bo'az Klartag

Regularity through convexity in high dimensions

The course should be accessible to graduate students and researchers interested in interactions between Analysis, Geometry and Probability. The topics to be covered in this course include:

1. Introduction to the high dimension: The concentration phenomenon on the high-dimensional sphere. Approximately Gaussian Marginals and the "thin shell" theorem of Sudakov/Diaconis-Freedman. Nearly-radial marginals, and super-Gaussian marginals for any "truly high-dimensional" probability measure.

2. Introduction to log-concavity: Applications of Prékopa-Leindler, the isotropic constant, Laplace transform of log-concave densities, isomorphic slicing problem, the Giannopoulos-Paouris-Vritsiou's proof of the reverse Santaló inequality.

3. Central Limit theorem for convex sets: Paouris's centroid bodies, thin shell estimates following Fleury/Guédon-Milman.

4. Symmetries and the Bochner technique: The Bochner formula, unconditional log-concave measures, Barthe-Cordero treatment of other symmetries. Poincaré inequalities through transportation of measure and moment maps.

5. Relations of the central limit theorem for convex sets to stability of the Brunn-Minkowski inequality in high-dimensions, and to the slicing problem.