ON THE TORSION FUNCTION FOR SIMPLY CONNECTED, OPEN SETS IN $\mathbb{R}^2$

MICHIEL VAN DEN BERG (BRISTOL)

ABSTRACT. For a non-empty, open set $\Omega \subset \mathbb{R}^2$ let $\lambda(\Omega)$ denote the bottom of the spectrum of the Dirichlet Laplacian acting in $L^2(\Omega)$. Let w_Ω be the torsion function for Ω, and let $\|.\|_p$ denote the L^p norm. It is shown there exists $\eta > 0$ such that $\|w_\Omega\|_\infty \lambda(\Omega) \geq 1 + \eta$ for any non-empty, open, simply connected set $\Omega \subset \mathbb{R}^2$ with $\lambda(\Omega) > 0$. Moreover, if in addition the measure $|\Omega|$ of Ω is finite, then $\|w_\Omega\|_1 \lambda(\Omega) \leq (1 - \eta)|\Omega|$. Joint work with Dorin Bucur, Université de Savoie.

RANDOM SEPARATED SEQUENCES IN THE PLANE

XAVIER MASSANEDA (BARCELONA)

ABSTRACT. We study conditions under which a random sequence is almost surely separated. Our main focus is on determinantal point processes associated with generalized Fock spaces, that is, point processes in which the n-point correlation functions are given by

$$\rho(z_1, \dots, z_n) = \det\Big(K(z_j, z_k)\Big)_{1 \leq j,k \leq n}$$

where $K(z, w)$ is the Bergman kernel of a generalised Fock space. We compare the results with the Poisson process having the same first intensity measure, as well as with a mixed model in which the radii are taken from the determinantal process and the arguments are chosen uniformly and independently in $[0, 2\pi]$. This is joint work with Giuseppe Lamberti.

FUNCTIONS OF BOUNDED VARIATION AND POINT PROCESSES

JOAQUIM ORTEGA-CERDÀ (BARCELONA)

Abstract. I will present a joint work with J. Antezana, J. Marzo and M. Levi where we investigate the relationship between the analytical properties of functions of bounded variation and the statistical behavior of the fluctuations of hyperuniform stationary point processes.

DISCRETE COMPLEX AND HARMONIC ANALYSIS: PROBABILISTIC METHODS

RODRIGO BAÑUELOS (PURDUE)

ABSTRACT. The discrete Hilbert transform was introduced by David Hilbert in the first decade of the twentieth century, and its boundedness on ℓ^2, the space of square–summable sequences, first appeared in Hermann Weyl's doctoral dissertation in 1908. In 1925, Marcel Riesz proved that the continuous Hilbert transform on the real line is bounded on $L^p(\mathbb{R})$ for every $1 < p < \infty$. From this, he derived corresponding bounds for the discrete Hilbert transform on ℓ^p and showed that the norms of the two operators are comparable. Whether these norms are in fact equal remained an open problem for nearly a century, due in part to an incorrect proof given by Edward Charles Titchmarsh in 1926. Taking a historical perspective and avoiding technical details, this talk will describe the solution of this problem using probabilistic methods, together with applications to natural higher–dimensional analogues of the Hilbert transform on the lattice $\mathbb{Z}^d$, $d > 1$.