

# Meeting on Computational and Analytic Problems in Spectral Theory

Cardiff School of Computer Science & Informatics, June 6<sup>th</sup>-9<sup>th</sup> 2016

## Abstract of Talk

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### ON PÓLYA'S INEQUALITY FOR TORSIONAL RIGIDITY AND FIRST DIRICHLET EIGENVALUE

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Let  $\Omega$  be an open set in Euclidean space with finite Lebesgue measure  $|\Omega|$ . We obtain some properties of the set function  $F : \Omega \mapsto \mathbb{R}^+$  defined by

$$F(\Omega) = \frac{T(\Omega)\lambda_1(\Omega)}{|\Omega|},$$

where  $T(\Omega)$  and  $\lambda_1(\Omega)$  are the torsional rigidity and first eigenvalue of the Dirichlet Laplacian respectively. We improve the classical Pólya bound

$$F(\Omega) \leq 1,$$

and show that for convex sets in  $\mathbb{R}^2$ ,

$$F(\Omega) \leq 1 - \frac{1}{13000}.$$

For any  $\epsilon \in (0, 1)$  we construct an open set  $\Omega_\epsilon$  such that  $F(\Omega_\epsilon) \geq 1 - \epsilon$ . This is joint work with V. Ferone, C. Nitsch, C. Trombetti.