

# Geometrical estimates for the first eigenvalue of linear operators: the fractional Dirichlet-Laplacian and the Dirichlet-bilaplacian

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☺ June 9, 10:15

In this talk we discuss the existence of lower bounds in terms of the *inradius* of the set for the first eigenvalue  $\lambda_1^s$  of the fractional Dirichlet–Laplacian. We show that some topological constraints are needed: in particular, we prove such an estimate for the class of planar sets with a fixed number  $k$  of “holes” by exploiting the relation between the fractional capacity of a compact set and  $\lambda_1^s$ . We also discuss the optimality (in some sense) of its dependence with respect to the parameters  $s$  and  $k$ .

We finally arise this method of proof in different settings: in particular we show the existence of a lower bound in terms of the *inradius* for the first eigenvalue  $\Lambda_1$  of the Dirichlet–bilaplacian in dimension  $N = 2, 3$ .

Some of the results presented are obtained in collaboration with Lorenzo Brasco (University of Ferrara).