
COMPUTER-ASSISTED PROOFS AND COUNTEREXAMPLES IN SPECTRAL GEOMETRY

Javier Gómez-Serrano

University of Barcelona

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In this talk I will explain how to construct counterexamples for two problems in spectral geometry. The main novelty is that parts of the proofs will be done via a rigorous computer-assisted proof. In the first part of the talk, I will explain how to prove that a triangle is not determined by its first, second and fourth (Dirichlet) eigenvalues, solving a conjecture by Antunes and Freitas. In the second part I will construct a planar domain with 6 holes for which the nodal line is closed and does not touch the boundary. In particular, this domain does not satisfy Payne's nodal line conjecture. This gives a partial answer on a question posed by Hoffmann-Ostenhof, Hoffmann-Ostenhof and Nadirashvili asking what should be the minimal number of holes of such domains.

The results are joint work with Joel Dahne, Kimberly Hou and Gerard Orriols.