Null controllability for the heat equation

In the talk I discuss several uncertainty relations for functions in spectral subspaces of Schrödinger operators, which can be formulated as (stationary) quantitative observability estimates. Of particular interest are unbounded domains or (a sequence of) bounded domains, with multi-scale structure and large diameter. The stationary observability estimates can be turned into control cost estimates for the heat equation, implying in particular null-controllability. In particular, I will discuss sufficient and — in the case of the pure heat equation actually — sharp geometric criteria for null-controllability.

The talk is based on joint projects with M. Egidi, A. Seelmann, I. Nakić, M. Täufer, and M. Tautenhahn, see

- Michela Egidi, Albrecht Seelmann, Ivica Nakić, Matthias Täufer, Martin Tautenhahn, Ivan Veselić: Null controllability and control cost estimates for the heat equation on unbounded and bounded domains, submitted (2018).
- Michela Egidi, Ivan Veselić: Scale-free unique continuation estimates and Logvinenko-Sereda Theorems on the torus, https://arxiv.org/abs/1609.07020, (2016).
- Michela Egidi, Ivan Veselić: Sharp geometric condition for null-controllability of the heat equation on $\mathbb{R}^d$ and consistent estimates on the control cost, https://arxiv.org/abs/1711.06088.
  Arch. Math. 111:85-99, (2018).
- Ivica Nakić, Matthias Täufer, Martin Tautenhahn, Ivan Veselić: Scale-free unique continuation principle, eigenvalue lifting and Wegner estimates for random Schrödinger operators, https://arxiv.org/abs/1609.01953,
  Analysis & PDE 11:1049-1081, (2018).