

## An afternoon on the spectral theory of pseudo-differential operators

Dear colleagues,

On 9 april 2024 starting from 14:00 in room 34, 4th floor of the Department of Statistical Sciences, two seminars on non-local operators will take place. Here is the program. Please feel free to inform interested people.

Best regards,

Enrico Scalas

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14:00 - 15:00 Atsuhide Ishida (Tokyo University of Science, Tokyo, Japan)

### *Mourre inequality for non-local Schrödinger operators*

We consider the Mourre inequality for the following self-adjoint operator  $H = \Psi(-\Delta/2) + V$  acting on  $L^2(\mathbb{R}^d)$ , where  $\Psi: [0, \infty) \rightarrow \mathbb{R}$  is an increasing function,  $\Delta$  is the Laplacian and  $V: \mathbb{R}^d \rightarrow \mathbb{R}$  is an interaction potential. Mourre inequality immediately yields the discreteness and finite multiplicity of the eigenvalues. Moreover, the Mourre inequality together with the limiting absorption principle can be used to show absence of the singular continuous spectrum. In addition, Mourre inequality is also used for the proof of the minimal velocity estimate that plays an important role in scattering theory.

In this talk, we report that Mourre inequality holds under a general  $\Psi$  and  $V$  by choosing the conjugate operator  $A = (p \cdot x + x \cdot p)/2$  with  $p = -i \nabla$ , and that the discreteness and finite multiplicity of the eigenvalues hold. This talk is a joint work with J. Lőrinczi (Alfred Rényi Institute) and I. Sasaki (Shinshu University).

15:00 - 15:30 Coffee break

15:30 - 16:30 József Lőrinczi (Alfred Rényi Institute, Budapest, Hungary)

### *Embedded eigenvalues for a class of non-local Schrödinger operators*

Generally, the spectrum of a non-local Schrödinger operator may be rather intricate, even when they are self-adjoint operators. In this talk I plan to discuss some explicit cases when positive or zero eigenvalues occur, and also address the problem more generally, aiming to describe potentials which can give rise to zero eigenvalues for massive or massless (fractional) relativistic Schrödinger operators. If time permits, I intend to explain how random processes with jumps can be used to analyse such properties.

16:30 - 18:00 Discussion time