Program, SMS årsmöte, fredagen 23 maj 2025

Mötet äger rum i Lärosal 4, plan 2, hus 1, Albano, Stockholms universitet.

09.00–09.40	Olof Sisask *(Wallenbergpristagare 2023)* From combinatorics to algebra, via harmonic analysis
09.40–10.00	Kaffepaus
10.00–10.50	Sandra Di Rocco *Presentation av vetenskapliga resultat av årets Wallenbergpristagare: Kathlén Kohn*
10.50–11.40	Kurt Johansson *Presentation av vetenskapliga resultat av årets Wallenbergpristagare: Gaultier Lambert*
11.40–11.45	Utdelning av Wallenbergpriset
11.45–13.00	Lunch
13.00–14.00	Per Enflo *SMS Distinguished Lecture: Construction of Invariant Subspaces for Operators on Hilbert Space*

14.00–14.20	Kaffepaus
14.20–14.55	Mizanur Rahaman *Zero-error communication under iterated quantum channels*
15.00–15.35	Oliver Lindblad Petersen TBA
15.35–15.50	Paus
15.50–16.25	Simon Leo Rydin Myerson *Bounds for spectral projectors on the three dimensional torus*
16.30–17.05	Sascha Troscheit *Dimension theory and fine geometry of metric spaces*
17.05	Årsmöte. Dagordning finns i separat dokument.
18.30	middag på campus Albano, Stockholms universitet Anmäl senast den 15 maj till Lyudmyla Turowska per e-post turowska@chalmers.se om du vill deltaga i middagen och eventuella allergier.

Per Enflo (Emeritus University Professor of Mathematics, Kent State University and Universidad Complutense de Madrid), *SMS Distinguished Lecture.*

Construction of Invariant Subspaces for Operators on Hilbert Space.

I will present a method to construct invariant subspaces - non-cyclic vectors - for a general operator on Hilbert space. It represents a new direction of a method of "extremal vectors", first presented in Ansari-Enflo [1]. One looks for an analytic function l(T) of T, of minimal norm, which moves a vector y near to a given vector x. The construction produces for most operators T a non-cyclic vector, by gradual approximation by almost non-cyclic vectors. But for certain weighted shifts, almost non-cyclic vectors will not always converge to a non-cyclic vector. The construction recognizes this, and when the construction does not work, it will show, that T has some shift-like properties. And for those T, one uses the information obtained to produce non-cyclic vectors. The method also leads to problems and conjectures in analysis, which may be of interest in themselves.

Reference:

1. S. Ansari, P. Enflo, "Extremal vectors and invariant subspaces", Transactions of Am. Math. Soc. Vol. 350 no.2, 1998, pp.539-558

Oliver Lindblad Petersen (Stockholm University)

Mizanur Rahaman (Chalmers and University of Gothenburg)

Zero-error communication under iterated quantum channels

Motivated by Shannon's theory of zero-error communication, we study the quantum channel version (a non-commutative version) of the zero- error capacity problem. More specically, we investigate how do the various information capacities behave over time, that is, under repeated applications of a quantum channel. We show that in the limit of infinite time, the capacities are characterized by efficiently computable properties of the peripheral eigenspace of the quantum channel. This talk is based on two joint works, one (https://arxiv.org/abs/2402.18703) with Nilanjana Datta (University of Cambridge) and Satvik Singh (University of Cambridge), and

the other (https://arxiv.org/abs/2408.00116) is with Omar Fawzi (ENS de Lyon) and Mostafa Taheri (ENS de Lyon). No prior knowledge of quantum theory will be assumed.

Simon Leo Rydin Myerson (Chalmers and University of Gothenburg)

Bounds for spectral projectors on the three dimensional torus

It is natural to ask what information about a function can be deduced from properties of its Fourier series. One version of this question concerns spectral projection estimates: if a function on a compact manifold without boundary has spectrum in a narrow window, how large can its L^p norms be? With a window of constant size this is a classical result of Sogge. At the opposite extreme, in the small-window limit, we are left with L^p norms of eigenfunctions of the Laplacian. I discuss the case of spectral projectors on the three-dimensional torus. We use methods from number theory: the geometry of numbers, the circle method and exponential sum bounds. A height splitting argument complements these methods to give sharp results. This is joint work with Pierre Germain and Daniel Pezzi.

Olof Sisask (Stockholm University)

From combinatorics to algebra, via harmonic analysis

It is not hard to see that a finite non-empty subset A of an abelian group is a coset of a subgroup if and only if $|A+A| = |A|$, where $A+A$ is the set of all sums $a+b$ of two elements a, b in A. The harder implication here converts combinatorial information (counting sums) into strong algebraic information (the presence of a subgroup). What if we weakened the combinatorial information; say we only knew that $|A+A| < 100|A|$ – must A then still possess some sort of algebraic structure? It somewhat remarkably turns out that the answer is yes, with groundbreaking results proved by Freiman in the group of integers in the 1960s. We shall review several results of this nature, where seemingly weak combinatorial information can be converted into strong algebraic information, with the common thread that harmonic analysis plays a key role in the proofs.

Sascha Troscheit (Uppsala University)

Dimension theory and fine geometry of metric spaces

Dimension theory studies scaling properties of metric spaces through various notions of dimension. These dimension quantify geometric properties such as "coverings" or "perfect-ness". Of recent interest has been the family of Assouad-type dimensions that quantify local extremal scalings and are connected to the doubling property. I will give a tour of the last decade of research in this area and will explain the connection between the Assouad dimension, local blow-ups, and their link to embeddability of random and dynamical structures.