

Program, SMS årsmöte, fredagen 14 juni 2024

Mötet äger rum i salen 2001, Ångström, Uppsala universitet

- 13.00–13.40 Wushi Goldring
(*Wallenbergpristagare 2022*) Propagating the algebraicity of automorphic representations via functoriality
- 13.45–14.25 Martin Raum
(*Wallenbergpristagare 2022*) Integer Partitions and their Relation to Modular Forms
- 14.25–14.45 Kaffepaus
- 14.45–15.25 Lilian Matthiesen
(*Wallenbergpristagare 2023*) Distributional properties of smooth numbers: Smooth numbers are orthogonal to nilsequences
- 15.35 Årsmöte. Dagordning finns i separat dokument.
- 17.30 middag på Restaurang Messob (Sturegatan 4A)
Anmäl senast den 10 juni till Lyudmyla Turowska per e-post turowska@chalmers.se om du vill delta i middagen.

Wushi Goldring

Title: Propagating the algebraicity of automorphic representations via functoriality

Abstract: My talk concerns the algebraic properties of automorphic representations. These infinite-dimensional representations of reductive groups over number fields are defined using harmonic analysis. For every prime p , they admit p -adic analogues of Laplacian eigenvalues called Hecke eigenvalues. One of the main mysteries of the Langlands Program is that some automorphic representations have algebraic Hecke eigenvalues while others have transcendental ones. For some, the algebraicity follows from the geometry of Shimura varieties and/or locally symmetric spaces, while for others there are conjectures predicting either algebraicity or transcendence. But there are also instances where it is unclear whether to expect algebraic or transcendental eigenvalues. I will discuss when Langlands Functoriality, another central theme of the Langlands Program, can be used to reduce the algebraicity for a representation π of a group G to that of some other representation π' of some other group G' for which algebraicity is known for geometric reasons. Via difficult dictionaries, this translates into much more elementary problems in group theory. In the negative direction, we give several group-theoretic obstructions to the existence of π' . In particular, this gives a conceptual explanation for why π' doesn't exist when π arises from non-holomorphic analogues of modular forms called Maass forms. In the positive direction, we exhibit new cases of algebraicity of Hecke eigenvalues for automorphic representations for which no direct link to geometry is known. For some of these, we also associate the Galois representations predicted by the Langlands correspondence.

Martin Raum

Title: Integer Partitions and their Relation to Modular Forms

Abstract: We take a brief tour of some modular forms, one particular topic that modular forms have strongly impacted, and how their relation has developed over the decades. Starting with a natural counting problem, that is with combinatorics, we will transition through a timeline where modular forms help solving major open questions but also shape the questions being ask. Eventually, we return to the counting problem, and reexamine which

questions remain open from a combinatorial perspective - and how modular forms can help to answer them.

Lilian Matthiesen

Title: Distributional properties of smooth numbers: Smooth numbers are orthogonal to nilsequences

Abstract: An integer is called y -smooth if all of its prime factors are of size at most y . The y -smooth numbers below x form a subset of the integers below x which is, in general, sparse but is known to enjoy good equidistribution properties in progressions and short intervals. Distributional properties of y -smooth numbers found striking applications in, for instance, integer factorisation algorithms or in work of Vaughan and Wooley on improving bounds in Waring's problem. In this talk I will discuss joint work with Mengdi Wang which considers some finer aspects of the distribution of y -smooth numbers. More precisely, we show for a very large range of the parameter y that y -smooth numbers are (in a certain sense) uncorrelated with 'nilsequences'. Through work of Green, Tao and Ziegler, our result is closely related to the Diophantine problem of studying solutions to certain systems of linear equations in the set of y -smooth numbers.