

Annual Talks
School of Mathematics
February 17 – 18, 2026

Lecture Schedule

Lecture Timings	Tuesday (17 February)	Wednesday (18 February)
10:00 - 11:00	Srimathy Srinivasan	Amitava Bhattacharya
11:00 -11:30	TEA	
11:30 -12:00	Sudipta Majumder	Manodeep Raha
12:00 - 01:30	LUNCH (Almond Grove)	
02:00 - 02:30	Sandeep S	Sekh Kiran Ajj
02:45 - 03:15	Ritwik Chakraborty	Sourav Das
03:15 - 04:00	TEA	
04:00 - 05:00	R. Parimala	Sabyasachi Mukherjee

Venue: All the above lectures will be held in lecture room (AG - 69)

Annual Talks 2026

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Schedule and Abstracts of Talks

**School of Mathematics
Tata Institute of Fundamental Research**

Title of Talks

Srimathy Srinivasan	<i>On Milnor K-theory in the imperfect residue case and applications to period-index problems</i>
Sudipta Majumder	<i>Reduction of Galois representations of slope 2</i>
Sandeep S	<i>An Equivariant Version of Gabber's Presentation Lemma</i>
Ritwik Chakraborty	<i>Counting products of commutators and products of squares in hyperbolic groups</i>
R. Parimala	<i>Quadratic forms over function fields</i>
Amitava Bhattacharya	<i>System of interacting particles in a convex body.</i>
Manodeep Raha	<i>On topological aspects of Shatz-Tate local duality</i>
Sekh Kiran Ajj	<i>Hyperbolicity of HNN Extensions by Endomorphisms</i>
Sourav Das	<i>Effective multiple equidistribution for expanding translates in the space of affine unimodular lattices and a central limit theorem</i>
Sabyasachi Mukherjee	<i>Algebraic correspondences: where Teichmüller spaces meet Mandelbrot sets</i>

Abstracts

Tuesday, 17 February 2026 (10:00-11:00)

Speaker : Srimathy Srinivasan
Title : **On Milnor K -theory in the imperfect residue case and applications to period-index problems**

Given a $(0, p)$ -mixed characteristic complete discrete valued field \mathcal{K} we define a class of finite field extensions called *pseudo-perfect* extensions such that the natural restriction map on the mod- p Milnor K -groups is trivial for all $p \neq 2$. This implies that pseudo-perfect extensions split every element in $H^i(\mathcal{K}, \mu_p^{\otimes i-1})$ yielding period-index bounds for Brauer classes as well as higher cohomology classes of \mathcal{K} . As a corollary, we prove a conjecture of Bhaskhar-Haase that the Brauer p -dimension of \mathcal{K} is upper bounded by $n + 1$ where n is the p -rank of the residue field. We then use patching techniques of Harbater, Hartmann and Krashen to show that the Brauer p -dimension of semi-global fields of residual characteristic p is at most $n + 2$ yielding a bound that is sharper than previously known in the work of Parimala-Suresh.

Tuesday, 17 February 2026 (11:30-12:00)

Speaker : Sudipta Majumder
Title : **Reduction of Galois representations of slope 2**

We will discuss the problem of mod p reduction of p -adic local Galois representations of slope 2 for a given prime $p > 3$. For $k \in \mathbb{Z}$ and $a_p \in \mathfrak{m}_{\overline{\mathbb{Q}}_p}$, the reduction mod p of two-dimensional crystalline representations V_{k, a_p} of the local Galois group $\text{Gal}(\overline{\mathbb{Q}}_p/\mathbb{Q}_p)$ can be computed using the compatibility of the p -adic and mod p Local Langlands correspondences. In this talk, we will give a complete description of the reduction \overline{V}_{k, a_p} for certain congruence classes of $k \bmod (p - 1)$. This is joint work with Professor Eknath Ghate.

Tuesday, 17 February 2026 (14:00-14:30)

Speaker : Sandeep S
Title : **An Equivariant Version of Gabber's Presentation Lemma**

In 2025, Bachmann proved a C_2 -equivariant version of Gabber's geometric presentation lemma. In this talk, I will present an extension of this result to the case of a general finite abelian group under suitable hypotheses. This work was done jointly with A. Sawant.

Tuesday, 17 February 2026 (14:45-15:15)

Speaker : Ritwik Chakraborty
Title : Counting products of commutators and products of squares in hyperbolic groups

Let G be a non-elementary hyperbolic group and fix a word metric. A group element in G is said to have orientable genus n if it can be written as the product of n commutators and no fewer. Similarly, a group element in G is said to have non-orientable genus n if it can be written as the product of n squares and no fewer. In this talk, we obtain asymptotic growth for both the number of group elements and the number of conjugacy classes in G , with length at most L , and fixed genus (orientable or non-orientable) n . This partially generalizes the work of Park (2019), and Erlandsson-Souto (2023) and is joint work with Biswajit Nag, and Inhyeok Choi.

Tuesday, 17 February 2026 (16:00-17:00)

Speaker : R. Parimala
Title : Quadratic forms over function fields

It is a classical theorem due to Hasse-Minkowski that every quadratic form in at least five variables over a totally imaginary number field represents zero non-trivially (isotropic). It is a long standing question whether every quadratic form in sufficiently many variables over function fields of curves over totally imaginary number fields represents zero nontrivially. Reformulated, one asks if the u -invariant of function fields of curves over totally imaginary number fields is finite. This question is open. We describe a method of approach to this question while also discussing positive results for function fields of p -adic curves.

Wednesday, 18 February 2026 (10:00-11:00)

Speaker : Amitava Bhattacharya
Title : System of interacting particles in a convex body.

We will see how local rules and independent decision making results in attaining invariant states or phase transition.

This class of problems lie in the intersection of interacting particle systems (voter models) and statistical physics.

Wednesday, 18 February 2026 (11:30-12:00)

Speaker : Manodeep Raha
Title : On topological aspects of Shatz-Tate local duality

Let k be a non-archimedean local field and G_k its absolute Galois group. Tate proved a duality theorem for Galois cohomology of finite G_k -modules (ICM 1962). A naive extension of this result to the case where k has positive characteristic fails. To address this, Shatz replaced finite G_k -modules by finite commutative group schemes over k and Galois cohomology by flat cohomology. He further introduced a topology of flat cohomology groups using Čech cohomology and established a duality theorem in the sense of Pontrjagin duality of locally compact abelian groups (Ann. Math. 1964).

However, this topology suffers from several drawbacks. These issues were subsequently addressed by Băc and Thăng (J. Algebra 2014) and Česnavičius (Forum Math. Sigma 2015). we present an alternative approach to resolving these problems. This is joint work with C. S. Rajan.

Wednesday, 18 February 2026 (14:00-14:30)

Speaker : Sekh Kiran Ajij
Title : Hyperbolicity of HNN Extensions by Endomorphisms

Bestvina–Feighn proved that semidirect products of a word-hyperbolic group G with \mathbb{Z} induced by hyperbolic automorphisms are word-hyperbolic, while Brinkmann showed that atoroidal automorphisms of free groups are hyperbolic. Later work of Patrick Reynolds and Mutanguha showed that the ascending HNN extension of a free group F_n with a non-surjective, irreducible endomorphism ϕ is hyperbolic under the assumption that $F_n \rtimes_{\phi} \mathbb{Z}$ does not contain a subgroup isomorphic to $BS(1, d)$ for any $d \geq 1$. We call such endomorphisms hyperbolic endomorphisms. In this talk, we discuss hyperbolicity of ascending HNN extensions taken with respect to multiple hyperbolic endomorphisms. The main idea is a specialization of Mosher’s three-out-of-four stretch lemma.

Wednesday, 18 February 2026 (14:45-15:15)

Speaker : Sourav Das
Title : Effective multiple equidistribution for expanding translates in the space of affine unimodular lattices and a central limit theorem

Building on recent work of Wooyeon Kim (Duke Math. J., 2024), we prove effective multiple equidistribution for expanding translates in the space of affine unimodular lattices. As an application, we establish a central limit theorem for inhomogeneous Diophantine approximation with a fixed shift satisfying a natural Diophantine condition. The proof relies on ideas of Björklund and Gorodnik. This is joint work with Gaurav Aggarwal and Anish Ghosh.

Wednesday, 18 February 2026 (16:00-17:00)

Speaker : Sabyasachi Mukherjee
Title : Algebraic correspondences: where Teichmüller spaces meet Mandelbrot sets

Two central themes in conformal dynamics are the iteration of rational maps and the action of Kleinian groups on the Riemann sphere. Although these theories developed along largely independent paths, they exhibit striking conceptual parallels and often display similar forms of chaotic behavior. As early as the 1920s, Fatou envisioned that these two classes of dynamical systems could be studied within a unified framework of iterated algebraic correspondences.

We provide concrete evidence for Fatou's vision by constructing algebraic correspondences that arise as combinations of complex polynomials and Fuchsian groups, allowing features of both types of dynamics to coexist in a single dynamical plane. At the level of parameter spaces, this naturally leads to products of Teichmüller spaces and Mandelbrot sets embedded in suitable Hurwitz spaces. We also discuss the existence of equivariant homeomorphisms between the chaotic sets associated with rational maps and Kleinian groups. Finally, we outline the main analytic and algebraic ideas underlying this program, highlight several applications to other areas of mathematics, and conclude with a collection of open questions.