



Workshop on Group Theory and Around Harish-Chandra Research Institute

(A CI of Homi Bhabha National Institute)

Chhatnag Road, Jhansi, Prayagraj, INDIA

14 - 20 December 2023



We are glad to inform you that a group theory activity "Workshop on Group Theory and Around" is planned to take place in HRI Prayagraj during Dec 14-20, 2023. We'll have two courses, one each on combinatorial group theory and representation theory of groups.

Scroll down for the list of participants, resource persons, and Schedule.

Details of the courses

A. Combinatorial Group Theory

1. Tushar Kanta Naik (NISER Bhubaneswar)

Title: Basics of Combinatorial Group Theory and automorphisms of Coxeter groups

Contents: Word combinatorics; Basic techniques, Free groups; Presentation of a group; Nielsen transformations; Free product of groups; Ping-pong lemma; Tietze transformations; Automorphisms of Coxeter groups.

2. Pranab Sardar (IISER Mohali)
Title: A quick introduction to Bass-Serre theory and further topics
Contents: Amalgamated free products; HNN extensions; Group actions on trees; A survey on group actions on non-positively curved complexes.
3. Roman Mikhailov (Saint Petersburg State University)
Title: Relation modules and related things
Contents: Generators and relators of groups; Relation modules; Relations among relations; Relation gap problem; Second homotopy module of group presentation; Group homology and introduction to fr-language.
4. Sandip Singh (IIT Bombay)
Title: Hypergeometric groups and their thinness
Abstract: A hypergeometric group is a subgroup of $GL(n, \mathbb{C})$ generated by the companion matrices of two monic co-prime polynomials of degree n . It arises as the monodromy group of a hypergeometric differential equation, and if the defining polynomials are also self-reciprocal and form a primitive pair, then its Zariski closure inside $GL(n, \mathbb{C})$ is either a symplectic or an orthogonal group. In this talk, we will discuss the arithmeticity, and thinness (using the ping-pong lemma) of the hypergeometric groups whose defining polynomials also have integer coefficients.

B. Representation Theory

1. Anupam Singh (IISER Pune)
Title: Review of representations of finite groups
Contents: A quick revision of the standard material on finite group (ordinary) representation theory; Basics of character theory; A survey on representation dimension of finite groups.
2. Pooja Singla (IIT Kanpur):
Title: Introduction to finite Coxeter groups and their representations
Contents: Finite Coxeter groups (examples: the dihedral groups, the symmetries of regular polyhedra and the symmetric groups); Basic definitions; Description of various properties; Classification of all irreducible Coxeter systems; Available methods to describe complex irreducible representations of Coxeter groups.
3. Shripad Garge (IIT Bombay)
Title: Gelfand-Graev representations
Abstract: Let G be a finite reductive group defined over a finite field \mathbb{F}_q , take $GL_n(\mathbb{F}_q)$ for example, and let U be a Sylow p -subgroup of G where p divides q . If ψ is a non-degenerate character of U , then its induced representation to G is multiplicity-free. We will learn all the terms used in this abstract in these lectures and try to sketch a proof of the main result.
4. Gurmeet K. Bakshi
Title: A story concerning the birth of group representations

Abstract: This lecture aims to recount the story related to the birth of the representation theory of finite groups. We shall discuss how Dedekind proposed to Frobenius the problem of factoring a certain homogeneous polynomial arising from a determinant (called the "group determinant") associated with a finite group G . In the latter part of the lecture, we will discuss the contributions of William Burnside, and how he enters the scene.

List of participants
Workshop on Group Theory and Around

| Sl. No. | Name | Affiliation |
|---------|-------------------------|------------------------------------|
| 1 | Ajim Uddin Ansari | CMP Degree College Prayagraj |
| 2 | Amit Kumar | IIIT Allahabad |
| 3 | Amrendra Singh | HRI Prayagraj |
| 4 | Anitha Valliappan | IISER Thiruvananthapuram |
| 5 | Ankita Parashar | IIT Delhi |
| 6 | Anupam Singh | Allahabad University |
| 7 | Arijit Mahato | NISER Bhubaneswar |
| 8 | Arnab Kundu | HRI Prayagraj |
| 9 | Ashok Kumar Pandey | Ewing Christian College, Prayagraj |
| 10 | Ayon Roy | IISER Pune |
| 11 | Ayush Udeep | NISER Bhubaneswar |
| 12 | Binod Kumar Sahoo | NISER Bhubaneswar |
| 13 | Brajesh Kumar Sharma | Allahabad University |
| 14 | Harish Kishnani | IISER Mohali |
| 15 | Jyoti Garg | Punjab University, Chandigarh |
| 16 | Kavita Samant | Shiv Nadar Institution of Eminence |
| 17 | Khyati Sharma | Shiv Nadar Institution of Eminence |
| 18 | Komma Patali | HRI Prayagraj |
| 19 | Krishnendu Gongopadhyay | IISER Mohali |
| 20 | Kuntal Chakraborty | HRI Prayagraj |
| 21 | Lokenath Kundu | SRM University AP |
| 22 | Mousumi Ghosh | IIIT Guwahati |
| 23 | Namrata Arvind | IMSc Chennai |
| 24 | Neeraj Kumar Dhanwani | IISER Mohali |
| 25 | Neha Malik | CMI, Chennai |
| 26 | Nishant Rathee | IISER Mohali |
| 27 | Pankaj Kapari | IISER Bhopal |
| 28 | Prachi Saini | IISER Pune |

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| 29 | Pradeep Bisht | HRI Prayagraj |
| 30 | Pragya Belwal | IISER Mohali |
| 31 | Prashun Kumar | Dr. B.R. Ambedkar University, Delhi |
| 32 | Praveen Manju | IIT Delhi |
| 33 | Pravin Kumar | IISER Mohali |
| 34 | Rahul Kaushik | IISER Pune |
| 35 | Ram Karan Choudhary | IIT Bhubaneswar |
| 36 | Ravi Tomar | IISER Bhopal |
| 37 | Renu Joshi | IISER Bhopal |
| 38 | Rizwan Ali | Punjabi University, Patiala |
| 39 | Rohit Garg | NISER |
| 40 | Rohitesh Pradhan | Central University of South Bihar |
| 41 | Ruddarraju Amrutha | BITS Pilani Hyderabad |
| 42 | Sahanawaj Sabnam | NISER Bhubaneswar |
| 43 | Saheli Panja | NISER Bhubaneswar |
| 44 | Saikat Panja | HRI Prayagraj |
| 45 | Sathasivam K | IISER Tvm |
| 46 | Shashank Vikram Singh | IIT Bombay |
| 47 | Shilpa Rani | SRM University AP |
| 48 | Shrinit Singh | Shiv Nadar University |
| 49 | Shubhankar | University of Western Ontario, Canada |
| 50 | Shushma Rani | HRI Prayagraj |
| 51 | Sonakshee Arora | IIT Jammu |
| 52 | Subrata Barman | IISER Mohali |
| 53 | Surendra Mishra | Govt. Degree College, Dehri Kangra, HP |
| 54 | Surya Prakash | CMP Degree College, Prayagraj |
| 55 | Susanta Mondal | HRI Prayagraj |
| 56 | Tejbir Lohan | IISER Mohali |
| 57 | Tony Nixon Mavely | IISER Tvm |
| 58 | Umesh Shankar | IIT Bombay |

| Resource Persons + Organiser | | |
|------------------------------|-------------------|-----------------------------------|
| Sl. No. | Name | Affiliation |
| 0 | Manoj Kumar | HRI Prayagraj (Organiser) |
| 1 | Tushar Kanta Naik | NISER Bhubaneswar |
| 2 | Pranab Sardar | IISER Mohali |
| 3 | Roman Mikhailov | Saint Petersburg State University |
| 4 | Sandip Singh | IIT Bombay |
| 5 | Anupam Singh | IISER Pune |
| 6 | Pooja Singla | IIT Kanpur |
| 7 | Shripad Garge | IIT Bombay |
| 8 | Anuradha Garge | Mumbai University |
| 9 | Sunil Prajapati | IIT Bhubaneswar |
| 10 | Hassain M | HRI Prayagraj |
| 11 | Gurmeet Bakshi | Panjab University |
| 12 | Vipul Kakkar | Central University Rajasthan |

Lecture Schedule

Workshop on Group Theory and Around

| | 14.12.2023 | 15.12.2023 | 16.12.2023 | 17.12.2023 | 18.12.2023 | 19.12.2023 | 20.12.2023 |
|-------------|------------|------------|------------|------------|------------|------------|------------|
| 930 - 1030 | AKS | AKS | AKS | | PrSa | PrSa | PrSa |
| 1030 - 1100 | TEA | TEA | TEA | S | TEA | TEA | TEA |
| 1100 - 1200 | TKN | TKN | TKN | U | SG | SG | SG |
| 1200 - 1300 | PS | PS | PS | N | SS | RM | RM |
| 1300 - 1430 | LUNCH | LUNCH | LUNCH | D | LUNCH | LUNCH | LUNCH |
| 1430 - 1545 | TUT RepT | TUT RepT | TUT RepT | A | TUT RepT | TUT RepT | TUT RepT |
| 1545 - 1615 | TEA | TEA | TEA | Y | TEA | TEA | TEA |
| 1615 - 1730 | GKB | TUT CGT | TUT CGT | | TUT CGT | TUT CGT | TUT CGT |

AKS - Anupam K. Singh
 TKN - Tushar K. Naik
 PS - Pooja Singla
 GKB - Gurmeet Kaur Bakshi
 PrSa - Pranab Sardar
 SG - Shripad Garge
 SS - Sandip Singh
 RM - Roman Mikhailov

How to apply (Closed)

In case you wish to participate, please write back to grouptheory21@gmail.com with a copy to myadav@hri.res.in with the following data:

Name:

Designation (with seniority if you are a PhD student):

Affiliation:

Gender:

Area of research work:

Whether you need travel support:

Please note that we have limited funds to support travel. So, if you have your own funds, use the same so that needy participants can be helped. Lodging and boarding will be provided by HRI.

The last date for receiving participation requests is **Oct 08, 2023**.

Confirmation of participation will be sent by **Oct 13, 2023**.

Keep visiting Group Theory Sangam web-page for upcoming and recently held group theory activities. Here is the link:

<https://sites.google.com/view/grouptheoryindia/home>