

# YOUNG HARMONIC ANALYSTS DISCUSSION MEETING

FUNDED BY INSTITUTE OF EMINENCE (IOE) SCHEME AND DEPARTMENT OF MATHEMATICS, IIT Bombay

Venue: Ramanujan Hall, Department of Mathematics

Schedule of talks:

	26.01.2023	27.01.2023	28.01.2023
10-11AM		Muna Naik	Muna Naik
11:30-1 PM		Surjeet Singh Choudhary	Sayan Bagchi
2:45-3:45PM	Riju Basak	Sanjoy Pusti	Suparna Sen
4:30-6:00PM	Jotsaroop Kaur	Pradeep Boggarapu	Open discussion

## YOUNG HARMONIC ANALYSTS DISCUSSION MEETING

FUNDED BY INSTITUTE OF EMINENCE (IOE) SCHEME AND DEPARTMENT OF MATHEMATICS,  
IITB

Speaker: Riju Basak, IISER Mohali

Title: Pointwise convergence of the solution to the Schrödinger equation.

Abstract: It is well known that the solution of the Schrödinger equation

$$i\frac{\partial}{\partial t}u = \Delta u, \quad t > 0, \quad u(x, 0) = f(x), \quad (0.1)$$

is given by

$$u(x, t) = \int_{\mathbb{R}^n} e^{ix \cdot \xi} e^{it|\xi|^2} \widehat{f}(\xi) d\xi.$$

In 1980, Carleson asked an important question, when does the almost everywhere convergence property

$$\lim_{t \rightarrow 0} u(x, t) = f(x) \quad a.e.$$

holds for  $f$  in the Sobolev space  $H^s(\mathbb{R}^n)$  for suitable  $s$ ?

In this talk, I shall discuss the pointwise convergence problem related to the Schrödinger equation.

Speaker: Jotsaroop Kaur, IISER Mohali

Title: Sharp estimates for a.e. convergence of Schrödinger equation below the critical index in dimension 1.

Abstract: We will discuss the state of the art of the results regarding maximal estimates for solution of Schrödinger equation for fractional laplacian below the critical. Mostly the talk will be based on the paper titled On pointwise convergence of Schrödinger means by Andreas Seeger and Evangelos Dimou.

Speaker: Muna Naik, HRI

Title: Large time behaviour of heat propagator in hyperbolic spaces.

Abstract: In our talks, we will try to explore large-time behavior of heat propagator in hyperbolic spaces to illustrate the differences with that of Euclidean space.

Speaker: Surjeet Singh Choudhary, IISER Bhopal

Title: On Bochner-Riesz Square function and its bilinear analogue

Abstract: For  $\alpha > 0$ , the Bochner-Riesz operator of order  $\alpha$  in  $\mathbb{R}^n$  is defined as

$$\mathcal{B}_R^\alpha(f)(x) = \int_{\mathbb{R}^n} \left(1 - \frac{|\xi|^2}{R^2}\right)_+^\alpha \hat{f}(\xi) e^{2\pi i x \cdot \xi} d\xi.$$

The Stein's square function associated with Bochner-Riesz operator is defined as

$$\mathcal{G}^\alpha(f)(x) = \left( \int_0^\infty \left| \frac{\partial}{\partial R} \mathcal{B}_R^{\alpha+1}(f, g)(x) \right|^2 R dR \right)^{\frac{1}{2}}.$$

In this talk, First we will discuss the  $L^p$  boundedness of  $\mathcal{G}^\alpha$ . Then, we will define its bilinear analogue and prove some  $L^p \times L^q \rightarrow L^r$  boundedness results. This is based on a joint work with Jotsaroop Kaur, Saurabh Shrivastava and Kalachand Shuin.

Speaker: Sanjoy Pusti, IIT Bombay

Title: Asymptotic behaviour of solutions of heat equation.

Abstract: In this talk we shall discuss about asymptotic behaviour of solutions of heat equations on  $\mathbb{R}^n$ . More precisely, we shall prove that the solution of the heat equation is asymptotically mass times the fundamental solution by Vazques. Then we shall discuss its analogue on symmetric spaces of noncompact type by Anker, Papageorgiou and Zhang.

Speaker: Pradeep Boggarapu; BITS Goa

Title: Restriction theorems for the Fourier-Dunkl transform

Abstract. In this talk, we define the Fourier-Dunkl transform on  $\mathbb{R}^n \times \mathbb{R}^d$ , which generalizes the Fourier transform. We prove Strichartz's restriction theorem for the Fourier-Dunkl transform for certain surfaces, namely, a cone-hyper-surface, paraboloid, sphere, and hyperboloid and its generalisation to the family of orthonormal functions. As an application of this restriction theorem, we derive the Strichartz inequality associated with Schrödinger's propagator in the case of the Dunkl Laplacian and Klein-Gordon operators.

Speaker: Sayan Bagchi, IISER Kolkata

Title: On  $L^2$ -boundedness of pseudo-multipliers associated to the Grushin operator

Abstract: In this talk we define analogues of pseudo-differential operators associated to the joint functional calculus for the Grushin operator using their spectral resolution, and study Calderón–Vaillancourt-type theorems for these operators.

Speaker: Suparna Sen, University of Calcutta

Title: On an uncertainty principle due to Beurling

Abstract: Uncertainty principles in general state that both a function and its Fourier transform cannot decay “too fast”. One such result due to Beurling says that if the Fourier transform has a certain decay, the corresponding function cannot even vanish on a set of positive measure in the real line. It is difficult to generalise this result to higher dimensions. I will discuss about some positive results in this direction.