Microlocal Day #5

Imperial College London, UK

16 January 2015 (Friday)

Organisers

Julio Delgado
Veronique Fischer
Michael Ruzhansky

(Imperial College London)

Conference Venue: **Room 130 (12-2pm) then Room 140 (2-5pm)**, Huxley Building, Imperial College London

Address :   Department of Mathematics, Imperial College London, 180 Queen's Gate, London SW7 2AZ, United Kingdom

The Microlocal Day is an occasional event devoted to intensive series of lectures or talks on different aspects of the microlocal analysis and related topics. The program includes research lectures as well as survey lectures aimed at researchers and PhD students interested in the subject. All are welcome to attend.

Previous events: Microlocal Day #1, Microlocal Day #2, Microlocal Day #3, Microlocal Day #4.

Speakers

- **Jonathan Ben-Artzi** (Imperial College London, *UK*)
- **Naoto Kumano-go** (Kogakuin University, *Japan*)
- **Carlos Andres Rodriguez** (Universidad de los Andes, *Colombia*)
- **Salvador Rodriguez Lopez** (Imperial College London, *UK*)

Schedule

Friday, 16 January, 12am—5pm, [Imperial College London](#)

Room **130**

- **12:00-12:45 Naoto Kumano-go** (Kogakuin University, *Japan*) *Phase space Feynman path integrals as analysis on path space*

Room **140** (note change of room)

- **14:00-14:45 Jonathan Ben-Artzi** (Imperial College London, *UK*) *The spectral measure of vector fields and uniform ergodic theorems*
- **15:00-15:45 Carlos Andres Rodriguez** (Universidad de los Andes, *Colombia*) *Zeta functions for pseudo differential operators on compact Lie groups*
  Coffee break
- **16:15-17:00 Salvador Rodriguez Lopez** (Imperial College London, *UK*) *Some endpoint estimates for bilinear paraproducts and applications*

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For further information please contact

Michael Ruzhansky at `this e-mail address`

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SUGGESTION OF HOTELS IN THE AREA (EARL'S COURT STATION, 15 MINS WALK TO IMPERIAL COLLEGE)

[Merlyn Court Hotel](#)
[Maranton House Hotel](#)
[Barkston Gardens](#)
[City Hotel Kensington](#)
For other hotels see [here](#)

HOW TO GET TO THE [DEPARTMENT OF MATHEMATICS](#), IMPERIAL COLLEGE LONDON

Travel to the tube station **Gloucester Road** (District, Circle, and Piccadilly Lines).
When you exit the station, turn left along Gloucester Road, crossing Cromwell Road 50 meters from the exit.
After 4-5 minutes walk along Gloucester Road, turn right to Queen's Gate Terrace.
This is a short road leading directly to the entrance of the Huxley Building, at 180 Queen's Gate. We are on floor 6.

Abstracts

Jonathan Ben-Artzi (Imperial College London, *UK*) *The spectral measure of vector fields and uniform ergodic theorems*

Von Neumann's original proof of the ergodic theorem for one-parameter families of unitary operators

relies on a delicate analysis of the spectral measure of the associated flow operator and the observation that over long times only functions that are invariant under the flow make a contribution to the ergodic integral. In this talk I shall show that for a specific class of generators - namely vector fields - the spectral measure is rather simple to understand. For some nicely behaved flows this allows us to obtain a uniform ergodic theorem, while for other flows we show that the spectral measure can be purely singularly continuous. The analysis is performed in both Sobolev and weighted-Sobolev spaces. These results are closely related to recent results on the 2D Euler equations, and have potential applications for other conservative flows, such as those governed by the Vlasov equation.

Naoto Kumano-go (Kogakuin University, *Japan*) *Phase space Feynman path integrals as analysis on path space*

We give two general classes of functionals for which the phase space Feynman path integrals have a mathematically rigorous meaning. More precisely, for any functional belonging to each class, the time slicing approximation of the phase space path integral, converges uniformly on compact subsets with respect to the starting point of momentum paths and the endpoint of position paths. Each class is closed under addition, multiplication, translation, real linear transformation and functional differentiation. Therefore, we can produce many functionals which are phase space path integrable. Furthermore, though we need to pay attention for use, the interchange of the order with the integrals with respect to time, the interchange of the order with some limits, the semiclassical approximation of Hamiltonian type, the natural property under translation, the integration by parts with respect to functional differentiation, and the natural property under orthogonal transformation are valid in the phase space path integrals.

Carlos Andres Rodriguez (Universidad de los Andes, *Colombia*) *Zeta functions for pseudo differential operators on compact Lie groups*

In this talk we will analyse the main aspects of the representations theory and the spectral theory corresponding to the self-adjoint elliptic pseudo-differential operators. A definition of complex powers for elliptic operators will be used to define zeta functions, and examples on the torus and SU(2) will be given.

Salvador Rodriguez Lopez (Imperial College London, *UK*) *Some endpoint estimates for bilinear paraproducts and applications*

In this talk we will present some endpoint estimates for bilinear paraproducts of the form
$$
\Pi(f,g)(x)= \int_0^\infty Q_t f(x)\, P_tg(x)\, m(t)\frac{\mathrm{d}t}{t},
$$
where P_t and Q_t represent frequency localisation operators near the ball $|{\xi}|\lesssim 1/t$ and the annulus $|{\xi}|\thickapprox 1/t$, respectively. More precisely, we present some new boundedness estimates for bilinear paraproducts operators on local BMO spaces. We will motivate this study by giving some applications to the investigations on the boundedness of bilinear Fourier integral operators and bilinear Coifman-Meyer multipliers.

Previously organised: [Microlocal Day #1](#), [#2](#), [#3](#), [#4](#)