

Short talks. El Escorial 2016.

Akman, Murat (Instituto de Ciencias Matemáticas, CSIC-UAM-UC3M-UCM, Madrid, Spain):
Rectifiability, interior approximation, and absolute continuity of Harmonic measure.

Abstract:

In this talk, we study the rectifiability of a closed set $E \subset \mathbb{R}^{n+1}$ having locally finite n -dimensional Hausdorff measure H^n and satisfying a condition weaker than the lower Ahlfors-David regularity. We show that almost all of E can be covered by a countable union of boundaries of bounded Lipschitz domains contained in the complement of E . By considering $\Omega = \mathbb{R}^{n+1} \setminus E$ and additionally assuming that Ω is a connected domain and satisfies an infinitesimal interior thickness condition then we prove that $H^n|_{\partial\Omega}$ is absolutely continuous with respect to harmonic measure for Ω .

This is a joint work with S. Bortz, S. Hofmann, and J. M. Martell.

Aldaz, Jesús Munárriz (Universidad Autónoma de Madrid and ICMAT):
Local comparability of measures and maximal operators.

Abstract: We describe the consequences for the boundedness properties of averaging and maximal averaging operators, of the following local comparability condition for measures: Intersecting balls of the same radius have comparable sizes. Since in geometrically doubling spaces this property yields the same results as doubling, we study under which circumstances it is equivalent to the latter condition, and when it is more general. We also study the concrete case of the standard gaussian measure, where this property fails, but nevertheless averaging operators are uniformly bounded, with respect to the radius, in L^1 . However, such bounds grow exponentially fast with the dimension

Baaske, Franka (Friedrich Schiller University of Jena, Germany):
Generalized heat and Navier-Stokes equations in supercritical function spaces.

Abstract:

We deal with a generalized heat equation

$$\frac{\partial}{\partial t}u(x, t) + (-\Delta_x)^\alpha u(x, t) = \sum_{j=1}^n \frac{\partial}{\partial x_j} u^2(x, t), \quad \text{in } \mathbb{R}^n \times (0, T), \quad (1)$$

$$u(\cdot, 0) = u_0(x), \quad \text{in } \mathbb{R}^n, \quad (2)$$

where $0 < T \leq \infty$, $2 \leq n \in \mathbb{N}$, $\alpha \in \mathbb{N}$ and $u(x, t)$ is a scalar function. The case $\alpha = 1$ corresponds to the classical heat equation.

In a first step, we convert (1), (2) in the corresponding integral equation based on the Duhamel formula. Then we ask for solutions u belonging to some spaces $L_{2\alpha v}((0, T), \frac{a}{2\alpha}, A_{p,q}^s(\mathbb{R}^n)) \cap C([0, T], A_{p,q}^\sigma(\mathbb{R}^n))$, that is for so called strong solutions with

$$\|u\|_{L_{2\alpha v}((0, T), \frac{a}{2\alpha}, A_{p,q}^s(\mathbb{R}^n))} = \left(\int_0^T t^{av} \|u(\cdot, t)\|_{A_{p,q}^s(\mathbb{R}^n)}^{2\alpha v} dt \right)^{1/2\alpha v} < \infty,$$

with $1 \leq p, q \leq \infty$. Here $A \in \{B, F\}$ denotes either a Besov or Triebel-Lizorkin space. We assume first that $s > \frac{n}{p}$, that is spaces $A_{p,q}^s(\mathbb{R}^n)$ are multiplication algebras. Then we lower this assumption to $\frac{n}{p} - 2\alpha + 1 < s < \frac{n}{p}$. The initial data u_0 belong to some spaces $A_{p,q}^\sigma(\mathbb{R}^n)$ with $s > \sigma > \frac{n}{p} - 2\alpha + 1$. Thus we cover all supercritical spaces in this context. Finally, we apply the gained results to the generalized Navier-Stokes equations using (1), (2) as their scalar model case obtained by means of the Leray projector.

Barbieri, Davide (Universidad Autónoma de Madrid, Spain):

Noncommutative shift-invariant spaces.

Abstract: The structure of a Hilbert space that is invariant under a unitary representations of a discrete group can be fully described in terms of a notion of Hilbert modules endowed with an inner product taking values in a space of unbounded operators.

A theory of reproducing systems, namely frames and bases, in such modular structures can be developed, and the resulting general framework includes as special cases many fundamental results of shift-invariant spaces.

In particular, general characterizations of Riesz and frame sequences associated to group representations can be given in terms of noncommutative bracket maps and fiberization isomorphisms.

This is a work in collaboration with E. Hernández, J. Parcet, V. Paternostro.

Beltran, David (University of Birmingham, UK):

Weighted inequalities for oscillatory integrals.

Abstract:

We present L^2 -weighted inequalities for broad classes of highly-singular Fourier multipliers on \mathbb{R}^d satisfying regularity hypotheses adapted to scales finer than dyadic. The weights in the inequality are related via geometrically-defined maximal operators, involving fractional averages associated with certain approach or escape regions.

To obtain such inequalities we introduce novel variants of the classical Littlewood–Paley–Stein g -functions that decouple and recouple frequency decompositions at such finer scales, leading to *pointwise* estimates for the multipliers under study, in the spirit of Stein’s proof for Hörmander’s multiplier theorem.

Our framework applies to solution operators for dispersive PDE, such as the time-dependent free Schrödinger equation, and other highly oscillatory convolution operators that fall well beyond the scope of the Calderón–Zygmund theory. This is joint work with Jon Bennett.

Benea, Cristina (CNRS -Université de Nantes, France):

On Rubio de Francia’s Theorems for arbitrary Fourier projections.

Abstract: Rubio de Francia proved in 1985 that disjointness in frequency is sufficient for establishing a one-dimensional orthogonality principle. That is,

$$\left\| \left(\sum_k \left| \int_{\mathbb{R}} \hat{f}(\xi) \mathbf{1}_{[a_k, b_k]}(\xi) e^{2\pi i x \xi} d\xi \right|^\nu \right)^{1/\nu} \right\|_p \leq C \|f\|_p, \quad (3)$$

whenever the intervals $[a_k, b_k]$ are mutually disjoint, $\nu > 2$ and $p > \nu'$ or $\nu = 2$ and $p \geq 2$.

There are two results that we want to present. The first one is a geometrical proof of an ℓ^1 -valued Rubio de Francia theorem for bilinear Mihlin multipliers which are supported in the region $a_k < \xi < \eta < b_k$, where again the intervals $[a_k, b_k]$ are mutually disjoint. This was the first example of an ℓ^1 -valued bilinear multiplier.

The second result is a bilinear Rubio de Francia theorem for arbitrary squares. Given an arbitrary collection of mutually disjoint squares, we prove that the ℓ^r -valued RF operator associated to them is bounded in the “local $L^{r'}$ ” range. Here r needs to be ≥ 2 , but so far we only have the result for $r > 2$.

Chen, Li (Instituto de Ciencias Matemáticas, Spain):
Conical square functions for degenerate elliptic operators.

Abstract: We talk about different conical square functions associated with the heat and the Poisson semigroups generated by a degenerate elliptic operator with degeneracy of an A_2 weight w . By applying techniques including change of angles and Carleson measure condition, we establish estimates for our conical square functions on $L^p(dw)$ and $L^p(vdw)$ with $v \in A_\infty(dw)$. Under additional conditions on the weight w , we also show that they are bounded on $L^p(dx)$. This is a joint work with José María Martell and Cruz Prisuelos-Arribas.

Cho, Chuhee (Korea University, Republic of Korea):
Improved restriction estimate for hyperbolic surfaces in \mathbb{R}^3 .

Abstract: Recently, L. Guth improved the restriction estimate for the surfaces with strictly positive Gaussian curvature in \mathbb{R}^3 . In this talk we consider the surfaces with strictly negative Gaussian curvature and generalize his restriction estimate to the surfaces.

Conde-Alonso, José Manuel (Universitat Autònoma de Barcelona, Spain):
A dyadic RBMO space.

Abstract: We will revisit nonhomogeneous Calderón-Zygmund theory from the point of view of martingales. The construction of a highly nonregular filtration on \mathbb{R}^d allows us to define a dyadic version of RBMO that interpolates with L_p as a Banach space while it still gives Calderón-Zygmund endpoint estimates. Also, we show that we can apply Lerner's oscillation formula to our filtration and obtain a pointwise bound for Calderón-Zygmund operators in terms of only one dyadic sparse operator, both in the doubling and the non doubling setting.

Cunanan, Jayson (Shinshu University, Japan):
Embeddings and trace theorems on Wiener amalgam spaces.

Abstract: We discuss inclusion relations between Wiener amalgam spaces and L^p -Sobolev space. We also discuss the trace operator $f \mapsto f(\cdot, 0)$ acting on (standard) Wiener amalgam spaces and its anisotropic versions. The optimality of these results are also established. This talk is based on collaborated works with M. Kobayashi, M. Sugimoto and Y. Tsutsui.

Damián González, Wendolín (University of Helsinki, Finland):
New bounds for bilinear Calderón-Zygmund operators and applications.

Abstract: In this talk we will discuss some recent advances on the control of Dini-continuous Calderón-Zygmund operators in the bilinear setting. We will also present new mixed weighted bounds for a general family of bilinear dyadic positive operators. These bounds have many new applications including mixed bounds for Calderón-Zygmund operators and their commutators with BMO functions, square functions and Fourier multipliers in the multiple scenario.

Joint work with M. Hormozi (University of Gothenburg and Chalmers University of Technology) and K. Li (University of Helsinki).

Di Plinio, Francesco (Brown U/University of Virginia, USA):

Dominating the bilinear Hilbert transform by positive sparse forms.

Abstract: This is joint work with Amalia Culiuc (Brown/GATech) and Yumeng Ou (Brown/MIT). We establish a uniform domination of the family of trilinear multiplier forms with singularity over a one-dimensional subspace by a single positive sparse form involving L^p -averages of the input functions. This family of multipliers include the adjoint forms to the bilinear Hilbert transforms. Our result is sharp and entails as a corollary a completely novel and rich multilinear weighted theory. In particular, we obtain $L^{q_1}(v_1) \times L^{q_2}(v_2)$ -boundedness of the bilinear Hilbert transform when the weights v_j belong to the class $A_{\frac{q+1}{2}} \cap RH_2$. Our proof relies on a stopping time construction based on newly developed localized outer- L^p embedding theorems for the wave packet transform.

Dziubański, Jacek (Uniwersytet Wrocławski, Poland):

On Hardy spaces for semigroups with Gaussian bounds.

Abstract: Let $T_t = e^{-tL}$ be a semigroup of linear operators acting on $L^2(X, d\mu)$, where (X, d) is a metric space equipped with a doubling measure μ . We assume that L is a nonnegative self-adjoint operator and the semigroup T_t has an integral kernel $T_t(x, y)$ which satisfies the upper and lower Gaussian bounds, that is,

$$\frac{C_1}{\mu(B(x, \sqrt{t}))} e^{-c_1 d(x, y)^2/t} \leq T_t(x, y) \leq \frac{C_1}{\mu(B(x, \sqrt{t}))} e^{-c_2 d(x, y)^2/t}.$$

We say that f belongs to H_L^1 if $\|f\|_{H_L^1} = \|\sup_{t>0} |T_t f(x)|\|_{L^1(d\mu(x))} < \infty$. We shall prove that there is a function $w(x)$, $0 < c \leq w(x) \leq C$, such that H_L^1 admits an atomic decomposition with atoms satisfying the support condition $\text{supp } a \subset B$, the size condition $\|a\|_{L^\infty} \leq \mu(B)^{-1}$, and the cancellation condition $\int a(x)w(x)d\mu(x) = 0$.

This is a joint work with Marcin Preisner.

Espinoza-Villalva, Carolina (Universidad de Sonora, México):

Functions with bounded central rectangular mean oscillation.

Abstract: In this talk we define a rectangular version of the space $\dot{A}^p(\mathbb{R}^2)$ studied by García-Cuerva, Chen and Lau and construct its dual. We also define the atomic Hardy space associated to this space and identify its dual with the space $\mathcal{CMO}^{p'}(\mathbb{R}^2)$ of functions with bounded central rectangular mean oscillation. Finally, we obtain continuity in $L^p(\mathbb{R}^2)$ for the commutator of the rectangular Hardy operator and $\mathcal{CMO}^p(\mathbb{R}^2)$ functions.

Feneuil, Joseph (University of Minnesota, USA):

Algebra properties for Besov spaces on Lie groups.

Abstract: In 1988, Kato and Ponce proved, for any $\alpha > 0$ and any $p \in (1, +\infty)$, an algebra property for $\dot{W}^{\alpha, p}(\mathbb{R}^n) \cap L^\infty(\mathbb{R}^n)$, that is

$$\|\Delta^{\alpha/2}[fg]\|_{L^p} \leq C \left(\|\Delta^{\alpha/2} f\|_{L^p} \|g\|_{L^\infty} + \|g\|_{L^\infty} \|\Delta^{\alpha/2} f\|_{L^p} \right).$$

Later, this property has been extended to the case of Lie groups and Riemannian manifolds. In 2012, Gallagher and Sire established a similar algebra property for the Besov space: if G is a unimodular Lie group,

$$\|fg\|_{B_\alpha^{p, q}} \leq C \left(\|f\|_{B_\alpha^{p, q}} \|g\|_{L^\infty} + \|g\|_{L^\infty} \|f\|_{B_\alpha^{p, q}} \right). \quad (4)$$

Yet, the result of Gallagher and Sire holds under some assumptions on G , α , p and q , such as the polynomial growth of the ball or $p, q \neq \{1, \infty\}$ when $\alpha > 1$.

We will see how, using paraproducts, we can weaken the assumptions needed for (4).

Flock, Taryn C. (University of Birmingham, England):

A sharp X-ray norm Strichartz inequality for the Schrodinger equation.

Abstract: We discuss an L^2 based multilinear Strichartz inequality for solutions to the free Schrodinger equation and its cases of equality. The inequality involves a weight which has appeared previously in multilinear determinant inequalities which in 2-d frames our inequality as an estimate on the X-ray transform of the solution squared. Despite the X-transform, Gaussian functions are extremizers. This is joint work with Jon Bennett, Neal Bez, Susana Gutierrez and Marina Iliopoulou.

Gallarati, Chiara (Delft University of Technology, The Netherlands):

Higher order parabolic equations with general boundary conditions and VMO assumptions.

Abstract: In this talk we prove mixed L^pL^q -estimates, with $p, q \in (1, \infty)$, for higher order parabolic PDEs on the half space R_+^{d+1} with general boundary conditions (Lopatinskii-Shapiro conditions). Here, we assume the elliptic operator A to have coefficients which are VMO both in the time variable and in the space variable. In the proof, we apply and extend the technique developed by Dong&Kim in [1] to produce mean oscillation estimates for equations on the half space with general boundary conditions. This is a joint work with Hongjie Dong.

[1] H. Dong and D. Kim. *On the L^p -solvability of higher order parabolic and elliptic systems with BMO coefficients.* Arch. Ration. Mech. Anal., 199(3):889941, 2011.

Gonçalves, Felipe (IMPA - Instituto de Matematica Pura e Aplicada, Brazil):

A Central Limit Theorem for Operators Given by a Gaussian Kernel.

Abstract: We prove an analogue of the Central Limit Theorem for operators. For every operator K defined on $\mathbb{C}[x]$ we construct a sequence of operators K_N defined on $\mathbb{C}[x_1, \dots, x_N]$ and show that, under certain orthogonality conditions, this sequence converges in a weak sense to a unique operator \mathcal{C} . We show that the family of limiting operators \mathcal{C} coincides with the family of operators given by a centered Gaussian Kernel. Inspired in the approximation method used by Beckner in [Inequalities in Fourier Analysis, Annals of Mathematics, 102 (1975), 159-182] to prove the sharp form of the Hausdorff-Young inequality, we show that Beckner's method is a special case of a general approximation method for operators. In particular, we characterize the Hermite semi-group as the limiting family of operators associated with any semi-group of operators.

González-Pérez, Adrián (Autonomous University of Madrid/ICMAT):

Transference of L_p -bounded operators for amenable crossed products.

Abstract: Earlier results of Neuwirth-Ricard and Caspers-de la Salle allow us to give automatic L_p -bounds for a Fourier multiplier T_m over the group algebra of an amenable group G when its associated Herz-Schur multiplier is completely bounded in the p -Schatten class S_p . Here, we will expose recent generalizations of such results from the context of amenable groups into that of amenable actions $G \curvearrowright X$. Namely, we will see that the crossed product extension $\text{Id} \rtimes T_m$ of the Fourier multiplier T_m is completely bounded in the L_p -spaces associated with $L_\infty(X) \rtimes G$ if its associated Herz-Schur multiplier is completely bounded in S_p . We also obtain L_p -bounds for operators of the form $S \rtimes \text{Id}$, where $S : L_p(X) \rightarrow L_p(X)$ is a completely bounded operator equivariant under the action $G \curvearrowright X$. Finally, applications to certain multiplier theorems will be discussed.

Hagelstein, Paul (Baylor University, USA):

Solyanik Estimates in Harmonic Analysis.

Abstract: Let \mathcal{B} be a collection of open sets in \mathbb{R}^n . Associated to \mathcal{B} is the geometric maximal operator $M_{\mathcal{B}}$ defined by

$$M_{\mathcal{B}}f(x) = \sup_{x \in R \in \mathcal{B}} \int_R |f|.$$

For $0 < \alpha < 1$, the associated *Tauberian constant* $C_{\mathcal{B}}(\alpha)$ is given by

$$C_{\mathcal{B}}(\alpha) = \sup_{E \subset \mathbb{R}^n: 0 < |E| < \infty} \frac{1}{|E|} |\{x \in \mathbb{R}^n : M_{\mathcal{B}}\chi_E(x) > \alpha\}|.$$

A maximal operator $M_{\mathcal{B}}$ such that $\lim_{\alpha \rightarrow 1^-} C_{\mathcal{B}}(\alpha) = 1$ is said to satisfy a *Solyanik estimate*. In this talk we will prove that the uncentered Hardy-Littlewood maximal operator satisfies a Solyanik estimate. Moreover, we will indicate applications of Solyanik estimates to smoothness properties of Tauberian constants and to weighted norm inequalities. We will also discuss several fascinating open problems regarding Solyanik estimates. This research is joint with Ioannis Parissis.

Ham, Seheon (Korea Institute for Advanced Study):

Averaged decay estimates for Fourier transforms of measures over curves with nonvanishing torsion.

Abstract: For a positive Borel measure with compact support, we consider L^2 averaged decay estimates of its Fourier transform. When the average is taken over the unit sphere, the decay estimates were studied extensively, in connection with the Falconer distance set problem, by Mattila, Sjölin, Bourgain, Wolff, Erdoğan. In this talk, we study the case of space curves with non-vanishing torsion. We extend the previous known results for the unit circle to higher dimensions. Also we discuss sharpness of the estimates. This is a joint work with Yutae Choi (Pohang University of Science and Technology) and Sanghyuk Lee (Seoul National University).

Hart, Jarod (University of Kansas):

A Proof of Weighted Hardy Space Estimates Using Invariance Properties of BMO.

Abstract: In this talk, we give necessary and sufficient conditions for singular integral operators to be bounded on weighted Hardy spaces. For a Calderón-Zygmund operator T satisfying appropriate cancellation conditions, we prove that T is bounded on H_w^p when $p_0 < p < \infty$ and $w \in A_{p/p_0}$, where $0 < p_0 < 1$ depends on the operator T . Interestingly, these results do not collapse to the known Lebesgue space theory for Calderón-Zygmund operators when $1 < p < \infty$. In fact, it is possible for T to be bounded on H_w^p for $w \in A_q$ when $1 < p < q < \infty$, in which case T may not be bounded on L_w^p . We will also discuss the approach used to prove these estimates, which uses a weight invariant property of BMO spaces. In effect, this proof technique avoids proving many weighted estimates directly for the operator. Instead, we prove estimates for the operator that do not involve weights, and then pass through a weight invariant property that is intrinsic to BMO in order to obtain weighted estimates for the operator. This is a joint work with Lucas Oliveira.

Honzík, Petr (Charles University, Czech Republic):

Rough bilinear singular integrals.

Abstract: We study the rough bilinear singular integral

$$T_{\Omega}(f, g)(x) = \text{p.v.} \int_{\mathbb{R}^n} \int_{\mathbb{R}^n} |(y, z)|^{-2n} \Omega((y, z)/|(y, z)|) f(x - y) g(x - z) dy dz,$$

when Ω is a function in $L^2(\mathbb{S}^{2n-1})$ with vanishing integral. We obtain boundedness for T_{Ω} from $L^2(\mathbb{R}^n) \times L^2(\mathbb{R}^n)$ to $L^1(\mathbb{R}^n)$. To obtain our results we introduce a new bilinear technique based on tensor-type wavelet decompositions. We also discuss some extensions of this result and some other applications of the wavelet decompositions to bilinear operators.

Kania-Blaszczyk, Maria (University of Silesia, Poland):
Quasi-geostrophic equation in \mathbb{R}^2 .

Abstract: Solvability of Cauchy's problem in \mathbb{R}^2 for subcritical quasi-geostrophic equation is discussed here in phase spaces $H^s(\mathbb{R}^2)$ with $s > 1$. The problem has the form:

$$\begin{aligned}\theta_t + u \cdot \nabla \theta + \kappa(-\Delta)^\alpha \theta &= f, \quad x \in \mathbb{R}^2, t > 0, \\ \theta(0, x) &= \theta_0(x), \quad x \in \mathbb{R}^2,\end{aligned}$$

where θ represents the potential temperature, $\kappa > 0$ is a diffusivity coefficient, $\alpha \in (\frac{1}{2}, 1]$ is a fractional exponent, and $u = (u_1, u_2)$ is the *velocity field* determined by θ through the relation: $u = (-R_2\theta, R_1\theta)$, where $R_i, i = 1, 2$ are the *Riesz transforms*. A solution to that equation in *critical case* ($\alpha = \frac{1}{2}$) is obtained next as a limit of the H^s -solutions to subcritical equations when the exponent α of $(-\Delta)^\alpha$ tends to $\frac{1}{2}^+$. We also discuss solvability of the critical problem with Dirichlet boundary condition in bounded domain $\Omega \subset \mathbb{R}^2$, when $\|\theta_0\|_{L^\infty(\Omega)}$ and $\|f\|_{L^\infty(\Omega)}$ are small.

[1] T. Dlotko, M.B. Kania and Chunyou Sun, Quasi-geostrophic equation in \mathbb{R}^2 , J. Differential Equations 259, 2015, 531-561;

[2] J. Wu, *The quasi-geostrophic equation and its two regularizations*, Comm. Partial Differ. Equ. 27 (2002), 1161-1181.

Karlovych, Oleksiy (Universidade Nova de Lisboa, Portugal):
When does the norm of a Fourier multiplier dominate its L^∞ -norm?

Abstract: It is well known that the L^∞ -norm of a Fourier multiplier on $L^p(\mathbb{R}^n)$, $1 \leq p \leq \infty$ is less than or equal to its norm. The standard proof of this fact extends with almost no change to weighted L^p spaces provided the weight w is such that $w(x) = w(-x)$ for almost all $x \in \mathbb{R}^n$. It is natural to ask whether the norm of a Fourier multiplier on a weighted L^p space still dominates its L^∞ -norm if the weight does not satisfy the above condition. If w satisfies the Muckenhoupt A_p condition, then the L^∞ -norm of a Fourier multiplier on $L^p(\mathbb{R}, w)$, $1 < p < \infty$ is less than or equal to its norm times a constant that depends only on p and w . This result first appeared in 1998 in a paper by E. Berkson and T.A. Gillespie where it was attributed to J. Bourgain. We prove that the above estimate holds with the constant equal to 1 for function spaces over \mathbb{R}^n under considerably weaker restrictions. We also show that our result is in a sense optimal and that there exist weighted L^p spaces with many unbounded Fourier multipliers. The talk is based on a joint work with Eugene Shargorodsky, King's College London, UK.

Kriegler, Christoph (University Blaise-Pascal, Clermont-Ferrand 2, France):
Spectral multipliers in UMD lattices.

Abstract: In this talk, I will present a method how to obtain spectral multiplier theorems of Hörmander-Mihlin type. That is, given a (negative) semigroup generator A on some Banach space X and $f : [0, \infty) \rightarrow \mathbb{C}$, $f(A)$ is bounded for f satisfying

$$\|f\|_{\mathcal{H}_q^\alpha} = \left(\sup_{R>0} \frac{1}{R} \int_R^{2R} \left| t^\alpha \frac{d^\alpha}{dt^\alpha} f(t) \right|^q dt \right)^{\frac{1}{q}} + \|f\|_{L^\infty(\mathbb{R}_+)} < \infty.$$

Particular interest will be given for $X = L^p(\Omega; Y)$ with Y a UMD Banach lattice and A of the form $A = A_0 \otimes I_Y$. It is shown that Gaussian estimates for the semigroup e^{-tA} and self-adjointness suffice for a Hörmander spectral multiplier theorem on $L^p(\Omega; Y)$, for many domains Ω . We will also show some applications, in particular to maximal estimates.

Joint works with Lutz Weis (University Karlsruhe, Germany) and Luc Deléaval (University Marne-la-Vallée, France).

Lucà, Renato (ICMAT, Madrid, Spain):
Pointwise convergence of the Schrödinger equation.

Abstract: We give a new necessary condition for the Sobolev regularity which is necessary for the solutions of the Schrödinger equation to converge pointwise a.e. to their initial data. The result has been proved in collaboration with Keith Rogers.

Madrid Padilla, José Ramón. (Instituto Nacional de Matematica Pura e Aplicada, Brazil.):
On Derivative Bounds for Maximal Functions.

Abstract: We will talk about the regularity properties of maximal operators acting on BV-functions and $W^{1,1}$ -functions. In this talk, we will be presenting recent results about new bounds for the derivative of the fractional maximal function, both in the continuous and in the discrete settings. Moreover, we will present sharp inequalities for the variation of the discrete maximal operator.

Maldonado, Diego (Kansas State University, USA):
Sobolev-type estimates for solutions to the linearized Monge-Ampère equation

Abstract: We will start by introducing a doubling quasi-metric space $(\mathbb{R}^n, \delta_\varphi, \mu_\varphi)$ associated to a convex solution of the Monge-Ampère equation $\det D^2\varphi = \mu_\varphi$. Then, we will describe its natural notion of first-order derivatives along with related Sobolev and Poincaré inequalities. Within this first-order calculus we will prove certain Sobolev-type estimates for Green's functions associated to the operator $L_\varphi(u) := \mu_\varphi \text{trace}(D^2\varphi^{-1}D^2u)$ as well as for solutions to $L_\varphi(u) = f$. Here L_φ is the Monge-Ampère operator linearized at φ , a typically degenerate and/or singular elliptic operator.

Martini, Alessio (University of Birmingham, United Kingdom):
Spectral multipliers for sub-Laplacians: topological versus homogeneous dimension.

Abstract: Let \mathcal{L} be a homogeneous sub-Laplacian on a stratified Lie group G . By a classical theorem of Mihlin–Hörmander type due to Christ and to Mauceri and Meda, an operator of the form $F(\mathcal{L})$ is of weak type $(1, 1)$ and bounded on L^p ($1 < p < \infty$) whenever the spectral multiplier $F : \mathbb{R} \rightarrow \mathbb{C}$ satisfies a smoothness condition of order $s > Q/2$, where Q is the homogeneous dimension of G .

It is known that the threshold $Q/2$ in the smoothness condition is sharp in the case G is 1-step (i.e., abelian). For higher step groups, the determination of the sharp threshold is still a largely open problem.

In joint work with D. Müller ([arXiv:1508.01687](https://arxiv.org/abs/1508.01687), to appear in *Geom. Funct. Anal.*) we prove that, when G is 2-step, the threshold $Q/2$ is never sharp. More precisely, the sharp threshold is always strictly less than $Q/2$, but not less than $d/2$, where d is the topological dimension of G .

Mirek, Mariusz (Universität Bonn, Germany):
Maximal and variational estimates for discrete operators of Radon type.

Abstract: We will be concerned with estimates of r -variations for discrete operators of Radon type and their applications in pointwise ergodic theory. Let $\mathcal{P} = (\mathcal{P}_1, \dots, \mathcal{P}_d) : \mathbb{Z}^k \rightarrow \mathbb{Z}^d$ be a polynomial mapping where each component $\mathcal{P}_j : \mathbb{Z}^k \rightarrow \mathbb{Z}$ is an integer-valued polynomial of k variables. We define, for a finitely supported function $f : \mathbb{Z}^d \rightarrow \mathbb{C}$, the Radon averages

$$M_N^{\mathcal{P}} f(x) = |\mathbb{B}_N|^{-1} \sum_{y \in \mathbb{B}_N} f(x - \mathcal{P}(y))$$

where $\mathbb{B}_N = B_N \cap \mathbb{Z}^k$ for $N \in \mathbb{N}$ and $B_t = \{x \in \mathbb{R}^k : |x| \leq t\}$ for any $t > 0$.

We will be also interested in discrete truncated singular integrals. Assume that $K \in \mathcal{C}^1(\mathbb{R}^k \setminus \{0\})$ is a Calderón–Zygmund kernel satisfying

- the differential inequality $|y|^k |K(y)| + |y|^{k+1} |\nabla K(y)| \leq 1$ for all $y \in \mathbb{R}^k \setminus \{0\}$;
- the cancellation condition $\int_{B_t \setminus B_s} K(y) dy = 0$ for all $t > s > 0$.

We define, for a finitely supported function $f : \mathbb{Z}^d \rightarrow \mathbb{C}$, the truncated singular Radon transforms

$$T_N^{\mathcal{P}} f(x) = \sum_{y \in \mathbb{B}_N \setminus \{0\}} f(x - \mathcal{P}(y)) K(y).$$

Recall that for any $r \geq 1$ the r -variational seminorm V_r of a sequence $(a_n(x) : n \in \mathbb{N})$ of complex-valued functions is defined by

$$V_r(a_n(x) : n \in \mathbb{N}) = \sup_{J \in \mathbb{N}} \sup_{k_0 < \dots < k_J} \left(\sum_{j=0}^J |a_{k_{j+1}}(x) - a_{k_j}(x)|^r \right)^{1/r}.$$

We will show that for every $p > 1$ and $r > 2$ there is $C_{p,r} > 0$ such that for all $f \in \ell^p(\mathbb{Z}^d)$ we have

$$\|V_r(M_N^{\mathcal{P}} f : N \in \mathbb{N})\|_{\ell^p} + \|V_r(T_N^{\mathcal{P}} f : N \in \mathbb{N})\|_{\ell^p} \leq C_{p,r} \|f\|_{\ell^p}.$$

Moreover, $C_{p,r} \leq C_p \frac{r}{r-2}$ and the constant $C_p > 0$ is independent of the coefficients of the polynomial mapping \mathcal{P} .

This is a joint work with Elias M. Stein and Bartosz Trojan.

Mosquera, Carolina Alejandra (Universidad de Buenos Aires, IMAS-CONICET, Argentina):
An approximation problem in multiplicatively invariant spaces.

Abstract: Let \mathcal{H} be Hilbert space and (Ω, μ) a σ -finite measure space. Multiplicatively invariant (MI) spaces are closed subspaces of $L^2(\Omega, \mathcal{H})$ that are invariant under point-wise multiplication by functions in a fixed subset of $L^\infty(\Omega)$. Given a finite set of data $\mathcal{F} \subseteq L^2(\Omega, \mathcal{H})$, in this talk we prove the existence and construct an MI space M that best fits \mathcal{F} , in the least squares sense. MI spaces are related to shift invariant (SI) spaces via a fiberization map, which allows us to solve an approximation problem for SI spaces in the context of locally compact abelian groups. On the other hand, we introduce the notion of decomposable MI spaces (MI spaces that can be decomposed into an orthogonal sum of MI subspaces) and solve the approximation problem for the class of these spaces. Since SI spaces having extra invariance are in one-to-one relation to decomposable MI spaces, we also solve our approximation problem for this class of SI spaces. Finally we prove that translation invariant spaces are in correspondence with totally decomposable MI spaces.

The results are based on a joint work with Carlos Cabrelli and Victoria Paternostro.

Naibo, Virginia (Kansas State University, USA):
Kato-Ponce inequalities on weighted and variable Lebesgue spaces.

Abstract: We will present fractional Leibniz rules and related commutator estimates in the settings of weighted and variable Lebesgue spaces. We will show uniform weighted estimates for sequences of square-function-type operators and a bilinear extrapolation theorem as the main tools in the proofs of such fractional Leibniz rules. Also, we will comment on applications of the extrapolation theorem to the boundedness on variable Lebesgue spaces of certain bilinear multiplier operators and singular integrals. This is joint work with David Cruz-Uribe.

Nimalan, Senthil Raani (IISER Bhopal, India):
Hardy type inequalities and fractal measures in \mathbb{R}^n .

Abstract: One of the basic questions in harmonic analysis is to study the decay properties of the Fourier transform of measures or distributions supported on thin sets (sets of Lebesgue measure zero) in \mathbb{R}^n . Behavior of the Fourier transform of measures supported in lower dimensional manifolds in \mathbb{R}^n under appropriate curvature conditions have been studied. In this talk we are going to discuss about the behavior of Fourier transform of measures supported in fractal sets.

Suppose μ is the restriction of α -Hausdorff measure to the compact set E which is quasi-regular, that is, $ar^\alpha \leq \mu(B_r(x))$ for all $0 < r \leq 1$ and $f \in L^2(d\mu)$. In 1990, R. S. Strichartz proved that there exists constant C independent of f such that

$$\|f\|_{L^2(d\mu)} \leq C \limsup_{L \rightarrow \infty} \frac{1}{L^{n-\alpha}} \int_{|\xi| \leq L} |\widehat{fd\mu}(\xi)|^2 d\xi.$$

In a different direction, S. Hudson and M. Leckband in 1992 proved a Hardy-type inequality for the measures supported in fractals in \mathbb{R} :

$$\int_E \frac{|f(x)|}{\mu(E_x)} d\mu(x) \leq C \liminf_{L \rightarrow \infty} \frac{1}{L^{1-\alpha}} \int_{-L}^L |\widehat{fd\mu}(\xi)| d\xi,$$

where $E \subset \mathbb{R}$ is an α -regular set ($\alpha < 1$) and $E_x = E \cap (-\infty, x]$.

Inspired by these results, in this talk we discuss an analogue of Hardy type inequality for measures supported in fractals in \mathbb{R}^n , $n > 1$ and L^p -asymptotics of the Fourier transform of fractal measures μ supported on a set E of finite packing measure.

Nowak, Adam (Polish Academy of Sciences, Poland):

Maximal operators of exotic Laguerre and other semigroups associated with classical orthogonal expansions.

Abstract: This is joint work with Peter Sjögren and Tomasz Z. Szarek.

Classical settings of discrete and continuous orthogonal expansions, like Laguerre, Bessel and Jacobi, are associated with second order differential operators playing the roles of Laplacians. The latter depend on certain parameters of type that are restricted commonly to a half-line, or a product of half-lines if higher dimensions are considered.

Following some known results, we deal with Laplacians in the above mentioned contexts with no restrictions on the type parameters and bring to attention naturally associated orthogonal systems that in fact involve the classical ones, but are different. This reveals new frameworks related to classical orthogonal expansions and thus new potentially rich research area, at least from harmonic analysis perspective.

To provide support to the last claim we focus on maximal operators of multi-dimensional Laguerre, Bessel and Jacobi semigroups, with unrestricted type parameters, and prove that they satisfy weak type $(1, 1)$ estimates with respect to appropriate measures. Generally, these measures are not locally finite, which makes a contrast with the classical situations and generates new difficulties.

Osgowski, Adam (University of Warsaw, Poland):

Weighted inequalities for Haar multipliers.

Abstract: Let $(h_n)_{n \geq 0}$ be the Haar system on $[0, 1]$ and, for a sequence $\varepsilon = (\varepsilon_n)_{n \geq 0}$ of real numbers, define the associated Haar multiplier T_ε by

$$T_\varepsilon \left(\sum_{k=0}^n a_k h_k \right) = \sum_{k=0}^n \varepsilon_k a_k h_k,$$

where $n \geq 0$ is an arbitrary integer and $a_0, a_1, a_2, \dots, a_n$ is an arbitrary sequence of real numbers. The purpose of the talk is to present tight estimates for T_ε in the weighted L^p -spaces, under various structural properties of the weights involved. The proofs will rest on Bellman function method, a powerful technique used widely in analysis and probability, which enables to deduce the validity of a given estimate from the existence of a certain special function, enjoying appropriate size and concavity conditions.

Pérez Hernández, Antonio (University of Murcia, Spain):
Optimal comparison of p -norms of Dirichlet polynomials.

Abstract: For $1 \leq p < \infty$, the Hardy space of Dirichlet series \mathcal{H}_p is formally defined as the completion of the space of all Dirichlet polynomials $D(s) = \sum_{n \leq N} a_n n^{-s}$ endowed with the norm

$$\|D\|_{\mathcal{H}_p} := \limsup_{T \rightarrow \infty} \left(\frac{1}{2T} \int_{-T}^T |D(it)|^p dt \right)^{1/p}.$$

There is a canonical (isometric) isomorphism between \mathcal{H}_p and the classical Hardy space $H_p(\mathbb{T}^{\mathbb{N}})$. This identification enables the interplay of harmonic and complex analysis and number theory to obtain results like the following: Given $1 \leq p < q < \infty$

$$\sup \frac{\|D\|_{\mathcal{H}_q}}{\|D\|_{\mathcal{H}_p}} = \exp \left(\frac{\log x}{\log \log x} \left(\log \sqrt{\frac{q}{p}} + O \left(\frac{\log \log \log x}{\log \log x} \right) \right) \right),$$

where the supremum is taken over all non-zero Dirichlet polynomials of the form $D(s) = \sum_{n \leq x} a_n n^{-s}$. In this talk, we will sketch the proof of this result.

Rivera Ríos, Israel P. (University of Sevilla, Spain):
Weighted endpoint estimates for commutators.

Abstract: In this talk we will show recent advances in borderline weighted estimates for the Coifman-Rochberg and Weiss commutator. Given $b \in BMO$ and a Calderón-Zygmund operator T we define the commutator $[b, T]$ as

$$[b, T]f(x) = b(x)Tf(x) - T(bf)(x).$$

In [2] it was shown that for any weight w (i.e. non-negative locally integrable function)

$$w_{[b, T]f}(\lambda) \lesssim c_\varepsilon \int_{\mathbb{R}^n} \frac{|f(x)|}{\lambda} \log \left(e + \frac{|f(x)|}{\lambda} \right) M_{L(\log L)^{1+\varepsilon}} w(x) dx \quad \varepsilon > 0$$

where $w_{[b, T]f}(\lambda) = w(\{x \in \mathbb{R}^n : |[b, T]f(x)| > \lambda\})$ and the constant c_ε blows up whenever $\varepsilon \rightarrow 0$.

In this talk we will show that a quantitative control of c_ε can be obtained. We will also present an improvement on the maximal operator on the right hand side of the inequality. Those results also lead to improve the dependence on the A_1 constant obtained in [1].

This talk is based on results of joint works with A. Lerner, S. Ombrosi and C. Pérez.

1. Ortiz-Caraballo, C. Quadratic A_1 bounds for commutators of singular integrals with BMO functions. Indiana Univ. Math. J., 60(6):2107–2129, 2011.
2. C. Pérez and G. Pradolini Sharp weighted endpoint estimates for commutators of singular integral operators. Michigan Math. J., 49:23-37, 2001.
3. C. Pérez and Rivera Ríos, I. P. Borderline weighted estimates for commutators of singular integrals. To appear in Israel J. Math. Preprint available at <http://arxiv.org/abs/1507.08568>.

Rodríguez-Mesa, Lourdes (Universidad de La Laguna):

Discrete harmonic analysis in the ultraspherical expansions setting.

Abstract: In this talk we describe some results concerning with the harmonic analysis related to certain difference operator associated with ultraspherical orthogonal functions. In particular, we show weighted ℓ^p -boundedness properties for our discrete maximal operators and Littlewood-Paley g -functions (defined by Poisson and heat semigroups), and also for operators of transplantation type. In addition we present a discrete vector-valued local Calderón-Zygmund theorem which is essential in our study.

Roncal, Luz (Universidad de La Rioja, Spain):

Hardy-type inequalities for fractional powers of operators in the Heisenberg and Dunkl contexts.

Abstract:

We prove Hardy-type inequalities for the conformally invariant fractional powers of several operators, namely, the sublaplacian on the Heisenberg group and the Dunkl–Hermite operator. In order to get these inequalities, we generalize an argument developed by R. L. Frank, E. H. Lieb and R. Seiringer in the Euclidean setting. Such technique, which we show to be adaptable to an abstract setting, is based on two facts: first, to get an integral representation for the corresponding fractional operator, and second, to write a proper ground state representation.

Our Hardy inequalities are proven in the cases in which the weight involved is either non-homogeneous or homogeneous. In the first case, the constant arising turns out to be optimal. As a consequence of the Hardy inequalities we also obtain versions of Heisenberg uncertainty inequality for the considered fractional operators.

This is joint work with Ó. Ciaurri (Universidad de La Rioja, Spain) and S. Thangavelu (Indian Institute of Science of Bangalore, India).

Roos, Joris (University of Bonn, Germany):

On a Carleson operator along monomial curves in the plane.

Abstract: We prove partial L^p bounds for a polynomial Carleson operator along monomial curves (t, t^m) in the plane with a phase polynomial consisting of a single monomial. These bounds are partial in the sense that we only consider linearizing functions depending on one variable. Moreover, we can only deal with certain combinations of curves and phases. For some of these cases we use a vector-valued variant of the Carleson-Hunt theorem as a black box. As an ingredient of the proofs we use refined variants of Stein and Wainger’s method for phases consisting of one and two fractional monomials. Joint work with Shaoming Guo, Lillian Pierce and Po-Lam Yung.

Rüland, Angkana (University of Oxford, England):

The (Variable Coefficient) Thin Obstacle Problem: A Carleman Approach.

Abstract: In this talk I discuss a robust, new approach of proving (almost) optimal regularity for the (variable coefficient) thin obstacle problem. The central tool here consists of a Carleman inequality. This allows to control the vanishing order of solutions to the problem and to deduce compactness of blow-up solutions also in the presence of metrics with low regularity. This is joint work with Herbert Koch and Wenhui Shi.

Saari, Olli (Aalto University, Finland):

Parabolic BMO and the forward-in-time maximal operator.

Abstract: We consider parabolic BMO originating from the regularity theory of parabolic partial differential equations. It includes logarithms of positive solutions to certain parabolic PDEs, and its characteristic difference to the classical BMO is the possibility of arbitrary speed of growth in the time direction. We review some recent progress on the subject. We discuss forward-in-time maximal operator, its boundedness on parabolic BMO, and a weight class that ties these two objects together. Compared to the classical A_p weights and their theory, this more general context shows both similarities and differences.

Sjögren, Peter (University of Gothenburg, Sweden):

Weak type (1,1) for some operators related to the Laplacian with drift in real hyperbolic space.

Abstract: Our setting is the n -dimensional hyperbolic space, where the Laplacian is given a drift in the "vertical" (or radial) direction. We consider the Riesz transforms of order 1 and 2, and also the Littlewood-Paley-Stein functions for the heat semigroup and the Poisson semigroup. These operators are known to be bounded on L^p , $1 < p < \infty$, for the relevant measure. We show that all the Riesz transforms and most of the Littlewood-Paley-Stein operators are also of weak type (1,1). In the exceptional cases, we disprove the weak type (1,1).

This is joint work with Hong-Quan Li, Shanghai.

Song, Myung-Sin (Southern Illinois University Edwardsville, USA):

Infinite Dimensional Measure Spaces and Frame Analysis.

Abstract: In my talk we discuss certain infinite-dimensional probability measures in connection with frame analysis. Earlier work on frame-measures has so far focused on the case of finite-dimensional frames. We point out that there are good reasons for a sharp distinction between stochastic analysis involving frames in finite vs infinite dimensions. For the case of infinite-dimensional Hilbert space \mathcal{H} , we study three cases of measures. We first show that, for \mathcal{H} infinite dimensional, one must resort to infinite dimensional measure spaces which properly contain \mathcal{H} . The three cases we consider are: (i) Gaussian frame measures, (ii) Markov path-space measures, and (iii) determinantal measures.

Sousa, Mateus (Instituto Nacional de Matemática Pura e Aplicada, Brazil):

Variation of maximal operators of convolution type.

Abstract: We study the action of several maximal operators of convolution type, associated to elliptic and parabolic equations, on BV functions and Sobolev functions in the euclidean space \mathbb{R}^d , the sphere \mathbb{S}^d and the torus \mathbb{T}^d , and establish a variation-diminishing behavior for these operators. The crucial regularity property that these maximal functions share is that they are subharmonic in the corresponding detachment sets. Joint work with E. Carneiro and R. Finder. (<http://arxiv.org/abs/1512.02715>)

Szarek, Tomasz Z. (Polish Academy of Sciences, Poland):

Maximal operator of the classical multi-dimensional Laguerre semigroup.

Abstract: The aim of this talk is to present a new proof of weak type (1,1) estimate for the maximal operator based on the heat semigroup in the multi-dimensional Laguerre polynomial setting. In the one-dimensional case this was proved by Muckenhoupt (TAMS, '69) by a rather elementary analysis. Then, in the multi-dimensional situation it was first shown by Dinger (Rev. Mat. Ibero., '92) and more recently by Sasso (Math. Scand., '05) with some restriction on a type parameter appearing in this context. However, these proofs are lengthy and very technical.

Our method of proving the weak type (1,1) estimate is inspired by the strategy implemented by García-Cuerva, Mauceri, Meda, Sjögren and Torrea (J. London Math. Soc., '03) in the Hermite (Ornstein-Uhlenbeck) context, which is actually strongly connected with a special case of the Laguerre situation. This approach seems to be much simpler and more transparent compared with the above mentioned earlier proofs existing in the literature.

The talk is based on a joint work with Adam Nowak and Peter Sjögren.

Tapiola, Olli (University of Helsinki, Finland):

Quantitative weighted estimates for rough homogeneous singular integrals.

Abstract: I will discuss a recent extension of the A_2 theorem and how it can be used to prove quantitative weighted bounds for singular integral operators T_Ω ,

$$T_\Omega f(x) = \text{p.v.} \int_{\mathbb{R}^d} \frac{\Omega(x/|x|)}{|x|^d} f(x-y) dy,$$

where $\Omega \in L^\infty(\mathbb{S}^{d-1})$ and $\int_{\mathbb{S}^{d-1}} \Omega d\sigma = 0$. This is joint work with Tuomas Hytönen (University of Helsinki) and Luz Roncal (Universidad de La Rioja).

Tejero, Jorge (ICMAT, Spain):

Reconstruction and stability for piecewise smooth potentials in the plane.

Abstract: We will introduce the inverse problem of recovering an unknown potential in two dimensions from its Dirichlet-to-Neumann (DtN) map and from the scattering data at fixed energy. Adapting Bukhgeim's method, which relies on stationary phase approximation, we will first show that potentials with jump discontinuities supported on a bounded planar domain can be recovered almost everywhere from the DtN map. Combining with known formulas, this enables the recovery from the scattering amplitude. We will then provide a priori stability estimates for reconstruction from the DtN map as well as from the scattering amplitude given an approximate knowledge of the location of the discontinuities.

Urbina, Wilfredo (Roosevelt University, USA):

On Abel summability of Jacobi polynomials series, the Watson Kernel and applications.

Abstract: In this talk we return to the study of the Watson kernel for the Abel summability of Jacobi polynomial series. These estimates have been studied for over more than 40 years. The main innovations are in the techniques used to get the estimates that allow us to handle the cases $0 < \alpha$ as well as $-1 < \alpha < 0$, with essentially the same methods. To that effect we use an integral superposition of Natanson kernels, and the A.P. Calderón-Kurtz, B. Muckenhoupt A_p -weight theory. We consider also a generalization of a theorem due to Zygmund in the context of Borel measures. We will discuss in detail the Calderón-Zygmund decomposition for non-atomic Borel measures in \mathbb{R} . We prove that the Jacobi measure is doubling and following the work of L. Cafarelli in his doctoral dissertation, we study the A_p weight theory in the context of Abel summability of Jacobi expansions. We consider power weights of the form $(1-x)^{\bar{\alpha}}$, $(1+x)^{\bar{\beta}}$, $-1 < \bar{\alpha} < 0$, $-1 < \bar{\beta} < 0$. Finally, as an application of the weight theory we obtain L^p estimates for the maximal operator of Abel summability of Jacobi function expansions for suitable values of p . (Joint work with Calixto Calderón)

Vera, Daniel (Instituto Tecnológico Autónomo de México, México):

Shearlets and pseudo-differential operators.

Abstract: Shearlets on the cone are a multi-scale and multi-directional discrete system that have near-optimal representation of the so-called cartoon-like functions. They form Parseval frames, have better geometrical sensitivity than traditional wavelets and an implementable framework. Recently, it has been proved that some smoothness spaces can be associated to discrete systems of shearlets. Moreover, there exist embeddings between the classical isotropic dyadic spaces and the shearlet generated spaces. We prove boundedness of pseudo-differential operators (PDOs) with non regular symbols on the shear anisotropic inhomogeneous Besov spaces and on the shear anisotropic inhomogeneous Triebel-Lizorkin spaces (which are up to now the only Triebel-Lizorkin-type spaces generated by either shearlets or curvelets and more generally by any parabolic molecule, as far as we know). The type of PDOs that we study includes the classical Hörmander definition with x -dependent parameter δ for a range limited by the anisotropy associated to the class. One of the advantages is that the anisotropy of the shearlet spaces is not adapted to that of the PDO.

Wróbel, Błażej (University of Bonn & University of Wrocław):

Marcinkiewicz type multipliers on products of rank one noncompact symmetric spaces.

Abstract: Let $\mathbb{X}_1, \mathbb{X}_2$ be a pair of noncompact symmetric spaces of real rank one and denote $\mathbb{X} := \mathbb{X}_1 \times \mathbb{X}_2$. We prove a sharp Marcinkiewicz type multiplier theorem for the spherical Fourier transform on \mathbb{X} . This complements earlier results for a single noncompact symmetric space. In a sense our result is significantly stronger than a Hörmander-type multiplier theorem on \mathbb{X} regarded as a noncompact symmetric space of real rank two. One of the main ingredients of our approach is a transference principle for left invariant operators on semidirect products of groups, which generalises previous results by A. Ionescu. The talk is based on joint work with Stefano Meda.

Zillinger, Christian (University of Bonn, Germany):

On linear inviscid damping, boundary effects and blow-up.

Abstract: Recently there has been much interest in damping phenomena for kinetic equations following the seminal works of Mouhot-Villani on Landau damping and of Bedrossian-Masmoudi on inviscid damping around Couette flow.

In this talk, I present a proof of linear inviscid damping with optimal decay rates for a general class of monotone shear flows in the framework of Sobolev regularity. Here, a particular focus will be on the setting of domains with impermeable walls, where boundary effects asymptotically result in the formation of singularities.