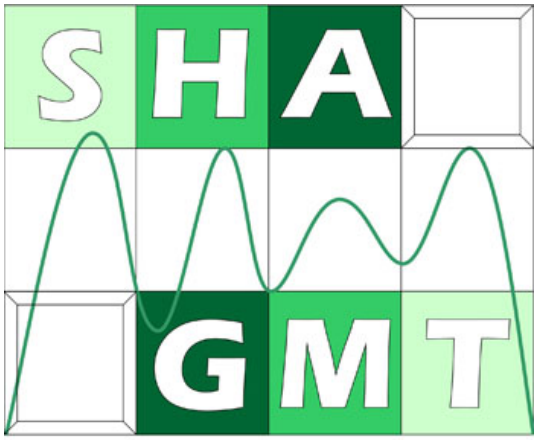

Symposium in Harmonic Analysis and Geometric Measure Theory

Ribeirão Preto, August 20-22, 2018

Book of Abstracts

Contents

1. The symposium: people and venue

Welcome. The Department of Computation and Mathematics of the Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto of the Universidade de São Paulo (USP/FFCLRP/DCM) and the Department of Mathematics of the Université Paris-Sud (UPS/LMO) welcome you to the:

Symposium in Harmonic Analysis and Geometric Measure Theory

which takes place in Ribeirão Preto, in the state of São Paulo, Brazil, on August 20-22, 2018.

Organizing committee.

Marcelo Ebert (USP/FFCLRP/DCM)
Laurent Moonens (UPS/LMO and Fapesp Visitor at USP/FFCLRP/DCM)
Tiago Picon (USP/FFCLRP/DCM)

Scientific committee.

Emanuel Carneiro (IMPA, Brazil)
Thierry De Pauw (Université Paris 7 - Denis Diderot, France)
Gustavo Hoepfner (UFSCar, Brazil)
Emmanuel Russ (Université Grenoble-Alpes, France)

Address.

Symposium in Harmonic Analysis and Geometric Measure Theory
Departamento de Computação e Matemática
Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto
Universidade de São Paulo
Av. Bandeirantes, 3900
CEP: 14040-901 - Ribeirão Preto - SP
Phone: +55 (16) 3315-0429
e-mail: shagmt@math.u-psud.fr (valid until September, 30, 2018)
website: dcm.ffclrp.usp.br/shagmt

2. Maps

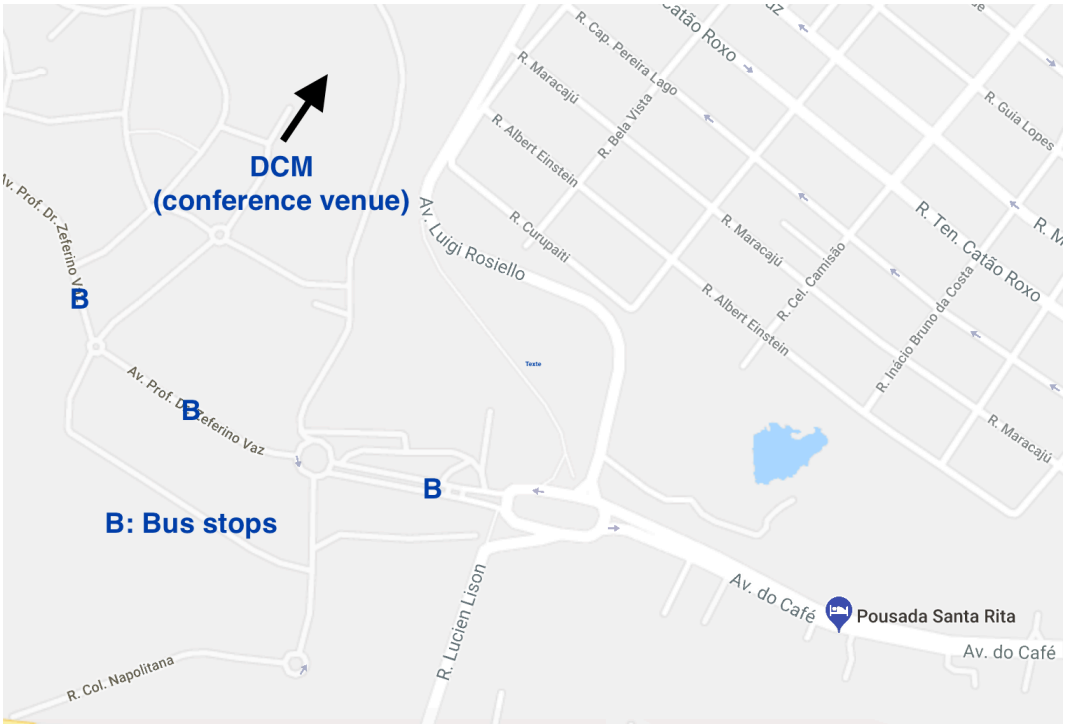

Figure 1. Map indicating the locations of DCM, Pousada Santa Rita (hotel conference) and some bus stops on campus

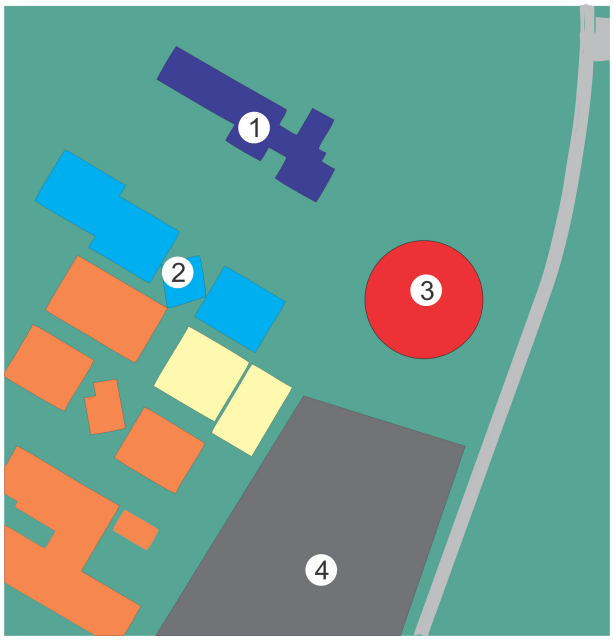

FIGURE 2. 1: Department of Computation and Mathematics (DCM), 2: Didactic Building, 3: *Cantina do Valter* (coffee breaks will be here, and lunch for those who like — please wear your badge during coffee breaks and lunches at the *Cantina*), 4: Chemistry parking

3. General Information

Conference site. The meeting will take place at Auditorium of the DCM. Coffee breaks will happen at *Cantina do Valter*, just next to the DCM building.

Registration. The registrations will be made on *Monday, August 20*, from 9h to 10h in the lobby of DCM.

We will provide you with a badge at registration (please wear it when being in the *Cantina* for coffee breaks and lunches). Please note that registration fee (including conference material) is fixed as follows:

free registration for Master and PhD students;
100 BRL for post-docs and tenured scholars.

Coffee breaks are included in the registration fee.

Conference dinner is *not* included in the registration fee but will be charged at registration as well for those who would like to participate. It has a fixed price of **150 BRL per person**, including all-you-can-eat Brazilian "barbecue" food as well as many usual drinks (caipirinha, draft and local beers, soft drinks, juices). It will be held at "Estância Churrascaria" (see below for more details).

Financial support. The financial support payment is planned to be made at registration.

Social events.

- *Monday, August 19, 18:00-20:00:* drink at "Invicta" bar, Av. do Café, 1365 (10 minutes walking distance from Pousada Santa Rita).
- *Tuesday, August 21, 20:00-23:00:* conference dinner at "Estância Churrascaria", Av. Presidente Vargas, 1100, Alto da Boa Vista, Ribeirão Preto.

Please note that the conference dinner costs **150 BRL per person**, including most drinks, and that it can be paid at registration for those who would like to participate (see above, section "registration", for more details).

Wifi access. The network "Eduroam" is accessible throughout the USP Campus. You may also access Internet using the university wifi "USP-NET", following a few steps:

1. Enable wireless on your device.
2. Join the USP-NET wireless network.
3. Open a browser and attempt to visit a website (for example your home page).
4. Click on the button in the page to proceed.
5. You will be redirected to a login page. Enter the login and password which you received at registration.
6. You may freely browse the internet after logging in. You may occasionally need to re-authenticate using the above procedure.

Meals and refreshments. There is a very nice canteen available next to the DCM ("*Cantina do Valter*"). Coffee breaks will be held there. Participants are also encouraged to have lunch at this place — the price of this self-service restaurant is around 40 BRL per kilogram. Please, wear your badge during coffee breaks and lunches at *Cantina do Valter*.

There are also several restaurants and bars in the city. Some of them are:

- **Pinguim Bar and Restaurant** (regional beer and restaurant house)
  Address: Av. Dr. Francisco Junqueira, 3280 - Campos Elísios, Ribeirão Preto - SP, 14015-170
  Contact Number: (16) 3610-8258
  Website: http://www.pinguimochopp.com.br/
- **Bar do Epicurista** (Epicurista's restaurant, very good typical food from North-East Brazil)
  Address: Av. Independência, 3.242, Ribeirão Preto
  Contact Number: (16) 3632-4616
  Website: http://www.epicurista.com.br/
- **Coco Bambu** ("chic" restaurant, quite pricy, specialized in fish and shrimps, localized in Iguatemi's shopping)
  Address: Av. Luiz Eduardo Toledo Prado, 900 - Vila do Golfe, Ribeirão Preto - SP, 14027-250
  Contact Number: (16) 3904-3737
  Website: http://cocobambu.com/u/coco-bambu-ribeirao-preto/
- **Cervejaria "Invicta"** (beer bar localized on av. do Café, walking distance from Pousada Santa Rita)
  Address: Avenida do Café, 1365, Ribeirão Preto, SP
  Contact Number: (16) 3102-4066
  Website: http://www.cervejariainvicta.com.br/
- **Pamonharia Do Ronaldo da Feira** (very small place walking distance from Pousada Santa Rita on av. do Café one of the best places in town to experiment *pamonhas* (a corn based meal, either salted or sweet), *curau* (corn dessert cream), or corn juice; owners are very friendly and the place, even if simple, is really worth trying)
  Address: Avenida do Café, 524, Ribeirão Preto, SP
  Contact Number: (16) 3234-5835
  Website: https://www.facebook.com/Pamonharia-Do-Ronaldo-da-Feira-460969524239369/

- **Churrascaria Estância** (steak house)
  Address: Av. Presidente Vargas, 1100, Alto da Boa Vista, Ribeirão Preto
  Contact Number: (16) 3911-9513
  Website: http://www.estanciaribeirao.com.br/

The Conference Dinner will be held at the Churrascaria Estância. An (informal) welcome drink will be held at "Invicta" on Monday August 20, 18-20h.

Health emergencies. In case of accidents or health emergencies call 192 (SAMU).

Currency Exchanges. In case you need to exchange your money, we recommend the following agencies:

CONEXION CÂMBIO
Address: Av. Pres. Vargas, 1.265 - Ed. Trio Office
20° andar sala 2001
CEP: 14020-260 Jardim São Luiz.
Contact Numbers: +55 (16) 3623-3444 and +55 (16) 3623-4041
Website: http://www.conexioncambio.com.br/
Closes at 5pm

CONFIDENCE CÂMBIO
Address: located in "Ribeirão Shopping", Av. Coronel Fernando Ferreira Leite, 1540, Loja 195, Jardim California, Ribeirão Preto, São Paulo
Website: https://www.confidencecambio.com.br/
10:00-20:00 on weekdays, 10:00-18:00 on Saturday

Taxis. In case you need to use a taxi, we recommend the following agencies:

- **Coopertaxi**
  Contact number: (16) 3323-7000
- **Aliança Rádio Táxi**
  Contact number: (16) 3911-3000

Uber and 99 also work nicely in Ribeirão Preto — through their respective apps available on all major download platforms.

Public transportation. The public transportation in Ribeirão Preto is handled by "RITMO", a consortium of bus companies with an integrated tarification system. Each ride costs 3,95 BRL.

The electronic system used to pay your ride functions with a magnetic card called "NOSSO". For tourists and visitors, the card "NOSSO EXPRESSO" can be purchased on board for 6 BRL, and can then be reloaded (either via the app "CittaMobi", with all major credit cards, with a surcharge of 2,50 BRL, or at the self-service kiosks and regular desks located at various places in town, *e.g.* at the city center's bus station, in some shopping malls). There is no free transfer with the "NOSSO EXPRESSO" card: each segment will be charged 3,95 BRL.

One-way tickets can be purchased at the sales desk "Nosso" R. São Sebastião, 911 - Centro, Ribeirão Preto - SP, 14015-040, very close to the Cathedral São Sebastião. They have to be handled to the driver after validation, before going through the gantry.

Two bus lines connect the USP campus to the city center (and to Pousada Santa Rita): line numbers U-499 (Circular 4, stopping at Pousada Santa Rita and on the side of the main bus station in the city

center) and N-370 (Jardim Recreio, stopping at Pousada Santa Rita and in front of the Cathedral) can be caught either at the USP campus entrance on Av. do Café, or close to the campus post office (Correios), 7-8 minutes walking from DCM.

To get from city center (or Pousada Santa Rita) to USP campus, you can catch lines numbered N-307 (leaving in front of the Cathedral in downtown, or very close to Pousada Santa Rita on the opposite side of Av. do Café); to get from Pousada Santa Rita to USP campus, you can also catch line U-399 (Circular 3) at the same bus stop.

Count that buses run every 30-40 minutes. Their actualized stopping times can be found via the app "CittaMobi" on your cell phone.

Bus line number D-602 connects every hour the bus stop in front of the Cathedral in downtown, to Leite Lopes Airport. Buses roughly leaves the city center around every h25-30, and takes about 25 minutes to get to the airport.

Overall, the city's bus system is quite reliable. Avoid sitting in the back, except if you like roller-coasters...

Tourism. We recommend some nice places to visit during your stay in Ribeirão Preto.

- **Parks**
  1. **Curupira Park (Park Prefeito Luiz Roberto Jábali)**
     Address: Av. Costabile Romano, 337, Ribeirão Preto-SP
  2. **Municipal Park Raia (Municipal Park Dr. Luiz Carlos Raia)**
     Address: Rua Severino Amaro dos Santos, Ribeirão Preto-SP
  3. **Bosque and Zoo Fábio Barreto**
     Address: Rua Liberdade s/n, Ribeirão Preto, Estado de São Paulo
     Contact Number: (16) 3636-2545 / 3636-2283
     Website: http://www.ribeiraopreto.sp.gov.br/turismo/zoologico/i71principal.php
  4. **Parque das Artes** (park located just next to Ribeirão Shopping)
     Address: R. Joaquim Simões Gomes, 420 - Nova Aliança, Ribeirão Preto - SP, 14024-000
- **Theater Pedro II**
  Address: Street Álvares Cabral, 370, Ribeirão Preto-SP
  Contact Number: (16) 3977 8111
  Website: http://www.theatropedro2.com.br/

Smoking. Smoking is prohibited in any of the DCM buildings.

4. List of participants

Renan Adolpho (Ribeirão Preto, Brazil)
Gabriel Araújo (São Paulo, Brazil)
Luis Eduardo Osorio Acevedo (São Paulo, Brazil)
Victor Sandrin Biliatto (São Carlos, Brazil)
Emanuel Carneiro (Rio ee Janeiro, Brazil)
Alex Pereira da Silva (São Carlos, Brazil)
Antonio Victor da Silva Junior (São Paulo, Brazil)
Marcelo Fernandes de Almeida (Aracajú, Brazil)
Pablo De Nápoli (Buenos Aires, Argentina)
Carolinne Stefane de Souza (São Carlos, Brazil)

Galia Dafni (Montréal, Canada)
Udayan Darji (Louisville, USA)
Marcelo Ebert (Ribeirão Preto, Brazil)
Victor Hugo Falcão Francheto (São Carlos, Brazil)
Gustavo Hoepfner (São Carlos, Brazil)
Raphael Hoshijima (São Carlos, Brazil)
Max Reinhold Jahnke (São Paulo, Brazil)
Rafael Augusto dos Santos Kapp (São Carlos, Brazil)
Isadora Leite (Ribeirão Preto, Brasil)
Catarina Machado (Ribeirão Preto, Brazil)
Jorge Marques (Coimbra, Portugal)
Irina Mitrea (Philadelphia, USA)
Laurent Moonens (Orsay, France)
Stefano Nardulli (Santo André, Brazil)
Tiago Henrique Picon (Ribeirão Preto, Brazil)
Luis Ragognette (São Carlos, Brazil)
Andrew Raich (Fayetteville, USA)
Reinaldo Resende (São Paulo, Brazil)
Rafael Rosales (Ribeirão Preto, Brazil)
Mateus Sousa (Buenos Aires, Argentina)
Pedro Tavares Lopes (São Paulo, Brazil)
Claudio Vasconcelos Filho (São Carlos, Brazil)

5. Program

Monday, August 20.

9h-10h	Registration
10h-10h10	Opening
10h10-11h	Irina Mitrea
11h10-12h	Andrew Raich
12h-14h	Lunch
14h-14h50	Pedro Tavares Lopes
15h-15h50	Stefano Nardulli
16h-16h40	Coffee break
16h40-17h30	Udayan Darji
18h-20h	Drink at “invicta bar” (see above)

Tuesday, August 21.

9h-9h50	Emanuel Carneiro
10h-10h30	Coffee break
10h30-11h20	Galia Dafni
11h30-11h55	Marcelo de Almeida
12h-14h	Lunch
14h-14h50	Mateus Sousa
15h-15h25	Gabriel Araújo
15h30-15h55	Luis Ragognette
16h-16h10	Official picture
16h10-16h50	Coffee Break
16h50-17h30	Poster session
19h30-22h30	Conference dinner at "Estância Churrascaria"

Wednesday, August 22.

9h-9h50	Pablo De Nápoli
10h-10h30	Coffee break
10h30-11h20	Laurent Moonens
11h30-11h40	Closing

6. Abstracts (listed by alphabetical order)

Luis Eduardo Osorio Acevedo (São Paulo, Brazil). Tuesday, August 21, 16h50-17h30 (poster session)

Small volumes implies small diameters, via an intrinsic monotonicity formula in Riemannian manifolds

We want to present another purely intrinsic proof that for small volumes isoperimetric regions are of small diameter in manifolds with some type of bounded geometry based on a monotonicity formula for varifolds of bounded generalized mean curvature which allows us to use an argument inspired from the correspondent extrinsic proof of [1] and combining it with our cut and paste argument to give finally the principal result of this poster. The monotonicity formula that we use here is an adaptation of Theorem 2.1 and Proposition 2.2 of [2] to our intrinsic Riemannian context via Hessian comparison theorems for the distance function. At our knowledge this is the first time that such an intrinsic approach appears in the literature, although being a very natural one. The applications of this methods are wide and opens the doors for extending in a rigorous way to a Riemannian ambient manifold the geometric measure theory known in $\mathbb{R}^n$, without using the Nash's isometric embedding theorem. This is a joint work with Stefano Nardulli (UFABC-CMCC).

References

[1] Frank Morgan and David L. Johnson. Some sharp isoperimetric theorems for Riemannian manifolds. *Indiana Univ. Math. J.*, 49(2):1017-1041, 2000.

[2] Camillo De Lellis. Allard's interior regularity theorem: an invitation to stationary varifolds. http://www.math.uzh.ch/fileadmin/user/delellis/publikation/allard_35.pdf, 2012.

Gabriel Araújo (São Paulo, Brazil). Tuesday, August 21, 15h-15h25

Real-analytic solvability for differential complexes associated to locally integrable structures

Inspired by the work of Suzuki (1972) on the concept of real-analytic solvability for first-order analytic linear partial differential operators we extend his results for the differential complexes associated to analytic locally integrable structures of corank one. We prove that such notion of solvability is related to the smooth solvability condition introduced by Treves (1983). In our arguments the natural extension to closed forms of the well-known Baouendi-Treves approximation formula, the so-called "Approximate Poincaré Lemma" plays a key role. Joint work with Paulo D. Cordaro.

Emanuel Carneiro (Rio de Janeiro, Brazil). Tuesday, August 21, 9h-9h50

Fourier optimization and prime gaps

Fourier optimization problems appear naturally within several different fields of mathematics, particularly in analysis and number theory. These are problems in which one imposes certain conditions on a function and its Fourier transform, and then wants to optimize a certain quantity. A recent example is given in the proof of the optimal sphere packing in dimensions 8 and 24. In this talk I want to show how certain optimization problems of this sort appear naturally in connection to the question of bounding the maximal gap between consecutive primes, under the Riemann hypothesis. In particular, we improve the best known bounds for this problem, that dates back to the works of Cramér in the 1920's. This is a joint work with M. Milinovich (Univ. of Mississippi) and K. Soundararajan (Stanford Univ.)

Antonio Victor da Silva Junior (São Paulo, Brazil). Tuesday, August 21, 16h50-17h30 (poster session)

Approximate solutions of vector fields and an application to Denjoy-Carleman regularity of solutions of a nonlinear PDE

In this paper we study microlocal regularity of a $\mathcal{C}^2$ solution u of the equation

$$u_t = f(x,t,u,u_x),$$

where $f(x,t,\zeta_0,\zeta)$ is ultradifferentiable in the variables $(x,t)\in\mathbb{R}^N\times\mathbb{R}$ and holomorphic in the variables $(\zeta_0,\zeta)\in\mathbb{C}\times\mathbb{C}^N$. We proved that if $\mathcal{C}^{\mathcal{M}}$ is a regular Denjoy-Carleman class (including the quasianalytic case) then:

$$\mathrm{WF}_{\mathcal{M}}(u)\subset \mathrm{Char}(L^u),$$

where $\mathrm{WF}_{\mathcal{M}}(u)$ is the Denjoy-Carleman wave-front set of u and $\mathrm{Char}(L^u)$ is the characteristic set of the linearized operator L^u:

$$L^u = \frac{\partial}{\partial t} - \sum_{j=1}^{N} \frac{\partial f}{\partial \zeta_j}(x,t,u,u_x)\frac{\partial}{\partial x_j}.$$

This is a joint work with N. Braun Rodrigues.

Marcelo Fernandes de Almeida (Aracajú, Brazil). Tuesday, August 21, 11h30-11h55

On the heat equation in half-space with nonlinearity and singular anisotropic potential on the boundary

This paper concerns with the heat equation in the half-space $\mathbb{R}^n_+$ with nonlinearity and singular potential on the boundary $\partial\mathbb{R}^n_+$. We develop a well-posedness theory (without using Kato and Hardy inequalities) that allows us to consider critical potentials with infinite many singularities and anisotropy. Motivated by potential profiles of interest, the analysis is performed in weak L^p-spaces in which we prove key linear estimates for some boundary operators arising from the Duhamel integral formulation in $\mathbb{R}^n_+$. Moreover, we investigate qualitative properties of solutions like self-similarity, positivity and symmetry around the axis $\overrightarrow{Ox_n}$.

Pablo De Nápoli (Buenos Aires, Argentina). Wednesday, August 22, 9h-9h50

Weighted Inequalities for the Fractional Laplacian and the Existence of Extremals

We obtain improved versions of Stein-Weiss [1] and Caffarelli-Kohn-Nirenberg inequalities [3], involving Besov norms of negative smoothness.

This kind of inequalities were originally obtained in the unweighted case in P. Gerard, Y. Meyer, and F. Oru in [4] by using Littlewood-Paley theory. Instead, we use a simpler technique inspired by an argument of D. Chamorro in [2] which uses only the Stein-Weiss inequality and the boundedness of the Hardy-Littlewood maximal function with A_p weights.

As an application of the former, we derive the existence of extremals of the Stein-Weiss inequality in certain cases, some of which are not contained in the celebrated theorem of E. Lieb [5].

This is a joint work with Irene Drelichman and Ariel Salort.

References

[1] E. Stein and G. Weiss, Fractional integrals on n-dimensional Euclidean space, *J. Math. Mech.* **7** (1958) 503–514.

[2] D. Chamorro, Inegalités de gagliardo nirenberg precisées sur le groupe de Heisenberg, PhD Thesis, 2006.

[3] L. Caffarelli, R. Kohn, and L. Nirenberg, First order interpolation inequalities with weights, *Compositio Math.* **53(3)** (1984) 259–275.

[4] P. Gerard, Y. Meyer, and F. Oru, Inégalités de Sobolev précisées, in *Séminaire sur les Équations aux Dérivées Partielles, 1996–1997*, École Polytech., Palaiseau (1997), Exp. No. IV, 11.

[5] E. Lieb, Sharp constants in the Hardy-Littlewood-Sobolev and related inequalities, *Ann. of Math. (2)* **118(2)** (1983) 101–116.

[6] P. De Nápoli, I. Drelichman and A. Salort. Weighted inequalities for the fractional Laplacian and the existence of extremals. To appear in *Communications in Contemporary Mathematics.*
`https://doi.org/10.1142/S0219199718500347`
`https://arxiv.org/abs/1705.00030`

Galia Dafni (Montréal, Canada). Tuesday, August 21, 10h30-11h20

Function spaces related to BMO

In their 1961 paper on functions of bounded mean oscillation, John and Nirenberg also considered functions satisfying a variant of this condition for $1 < p < \infty$, which they showed lie in weak L^p.

The space of functions satisfying this condition was subsequently named JN_p, and it contains L^p, but it was not known whether this inclusion was proper. In joint work with T. Hytönen, R. Korte and H. Yue, we demonstrate this by means of a counterexample, while at the same time showing that the two spaces coincide in the case of monotone functions in one dimension. Moreover, we prove a duality theorem for this space, analogous to the duality of BMO with the real Hardy space H^1.

Udayan Darji (Louisville, USA). Monday, August 20, 16h40-17h30

Hausdorff and packing dimension of fibers and graphs of prevalent continuous maps

The notions of shyness and prevalence generalize the property of being zero and full Haar measure to arbitrary (not necessarily locally compact) Polish groups. The main goal of this talk is to answer the following question: What can we say about the Hausdorff and packing dimension of the fibers of prevalent continuous maps? The results of this talk appeared in [1].

Reference

[1] Balka, Richárd; Darji, Udayan B.; Elekes, Márton, *Hausdorff and packing dimension of fibers and graphs of prevalent continuous maps*, Adv. Math. 293 (2016), 221-274.

Max Reinhold Jahnke. Tuesday, August 21, 16h50-17h30 (poster session)

Top-degree solvability in hypocomplex structures with applications to left-invariant hypocomplex structures on compact Lie groups

We use the theory of DFS spaces and tools related to Čech cohomology to establish a sufficient condition for top-degree solvability for the differential complex associated to a hypocomplex locally integrable structure. As an application, we show that the top-degree cohomology of left-invariant hypocomplex structures on a compact Lie group can be computed only by using left-invariant forms, thus reducing the computation to a purely algebraic one.

Pedro Tavares Lopes (São Paulo, Brazil). Monday, August 20, 14h-14h50

Spectral Invariance and Ellipticity of Pdos on manifolds with conical points and in $\mathbb{R}^n$

In this talk we describe recent results about the spectral invariance of boundary pseudodifferential operators on manifolds with conical singularities and some of its applications. As a by product, we show that Fredholm property of global Pdos in $\mathbb{R}^n$ acting on Besov and Triebel-Lizorkin spaces implies ellipticity of these operators.

Jorge Marques (Coimbra, Portugal). Tuesday, August 21, 16h50-17h30 (poster session)

On the well-posedness of Goursat problems in Gevrey classes

Some authors, Nishitani [5], Hasegawa [3], Carvalho e Silva [4], have investigated the C^∞ well-posedness of Goursat problems for linear PDE's with constant coefficients. I am interested in trying to find necessary and sufficient conditions for the generalized Goursat problem to be well-posed in the Gevrey classes Γ^s with $s > 1$.

References

[1] Gevrey, M.: Sur la nature analytique des solutions des équations aux dérivées partielles. *Ann. École Norm. Sup. Paris*, **35**, 129-190, 1918.

[2] Hadamard, J.: *Le problème de Cauchy et les équations aux dérivées partielles linéaires hyperboliques*. Hermann, Paris, 1932.

[3] Hasegawa, Y.: On the C^∞ Goursat problem for equations with constant coefficients. *J. Math. Kyoto Univ.*, **19**, 125-151, 1979.

[4] Marques, J., Carvalho e Silva, J.: Gevrey well posedness of Goursat-Darboux problems and asymptotic solutions. In Pinelas, S., Caraballo, T., Kloeden, P., Graef, J.R. (Eds.). *Differential and Difference Equations and Applications*. Springer Proceedings in Mathematics and Statistics, vol. 230, 2018.

[5] Nishitani, T.: On the C^∞ well-posedness for the Goursat problem with constant coefficients, *J. Math. Kyoto Univ.*, **20**, 179-190, 1980.

Irina Mitrea (Philadelphia, USA). Monday, August 20, 10h10-11h

Harmonic Analysis on Uniformly Rectifiable Sets and Applications

In this talk I will discuss recent developments at the interface between Harmonic Analysis and Geometric Measure Theory (Calderón-Zygmund theory on Uniformly Rectifiable sets, a sharp divergence theorem with non-tangential boundary traces, Fatou-type theorems, etc.) and present their impact on problems which make systematic use of singular integral operators.

Laurent Moonens (Orsay, France). Wednesday, August 22, 10h30-11h20

Differentiation along rectangles

Lebesgue's differentiation theorem states that, when f is a locally integrable function in Euclidean space, its average on the ball $B(x,r)$ centered at x with radius r, converges to $f(x)$ for almost every x, when r approaches zero. Many questions arise when the family of balls $\{B(x,r)\}$ is replaced by a *differentiation basis* $\mathcal{B} = \bigcup_x \mathcal{B}_x$ (where, for each x, $\mathcal{B}_x$ is, roughly speaking, a collection of sets shrinking to the point x). In this case, one looks for conditions on $\mathcal{B}$ such that the average of f on sets belonging to $\mathcal{B}_x$ are known to converge to $f(x)$ for a.e. x, when those sets shrink to the point x. Many interesting phenomena happen when sets in $\mathcal{B}$ have a *rectangular* shape (Lebesgue's theorem may or may not hold in this case, depending on the geometrical properties of sets in $\mathcal{B}$). In this talk, we shall review some of the history around this problem, as well as recent results obtained with E. D'Aniello and J. Rosenblatt.

Stefano Nardulli (Santo André, Brazil). Monday, August 20, 15h-15h50

Regularity of isoperimetric regions that are close to a smooth manifold

In this paper we prove a regularity theorem for isoperimetric regions T that are close in flat norm to an open bounded set B with smooth boundary in a smooth complete (possibly noncompact) n-dimensional Riemannian manifold (M^n, g) (the dimension n being arbitrary) with Ricci curvature bounded below and volume of balls uniformly bounded below with respect to its center by a positive constant. In fact we prove that under the above assumptions the boundary of T is smooth and is the normal graph of a function u whose Hölder norms are controlled by the volume of the symmetric difference $T \Delta B$. Moreover we allow the metric g to be variable and obtain a suitable regularity result for applications to the study of the isoperimetric profile.

Luis Ragognette (São Carlos, Brazil). Tuesday, August 21, 15h30-15h55

Baouendi-Treves Approximation formula for Gevrey ultradistributions

The Baouendi-Treves approximation Theorem is considered one of the most important results in the theory of locally integrable structures. Having in mind applications in the Gevrey category we proved the following version of this result: given a locally integrable structure defined in an open set U of $\mathbb{R}^N$ where we have defined a family of first integrals, then for every $p \in U$ there are $V \subset\subset W \subset U$ open neighborhoods of p such that any G^s solution of the locally integrable structure in W may be approximate in V by polynomials of the first integrals in the G^s-topology.

We also proved this result for ultradistribution solutions where the limit is to be considered with respect to the $\mathcal{D}'_s$-topology.

This is a joint work with G. Hoepfner and R. Medrado.

Andrew Raich (Fayetteville, USA). Monday, August 20, 11h10-12h

Global L^q Gevrey Functions and Applications

I will start with an innocuous question - When does the Fourier transform of a function have exponential decay? From there, I will build global L^q-Gevrey functions and present examples (in PDEs), counterexamples, limits of the Fourier transform, and alternative strategies that avoid the Fourier transform.

Mateus Sousa (Buenos Aires, Argentina). Tuesday, August 21, 14h-14h50

Recent progress in sharp Fourier restriction theory

In this talk we will discuss some recent developments related to extremal problems in Fourier restriction theory.

7. Sponsors

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