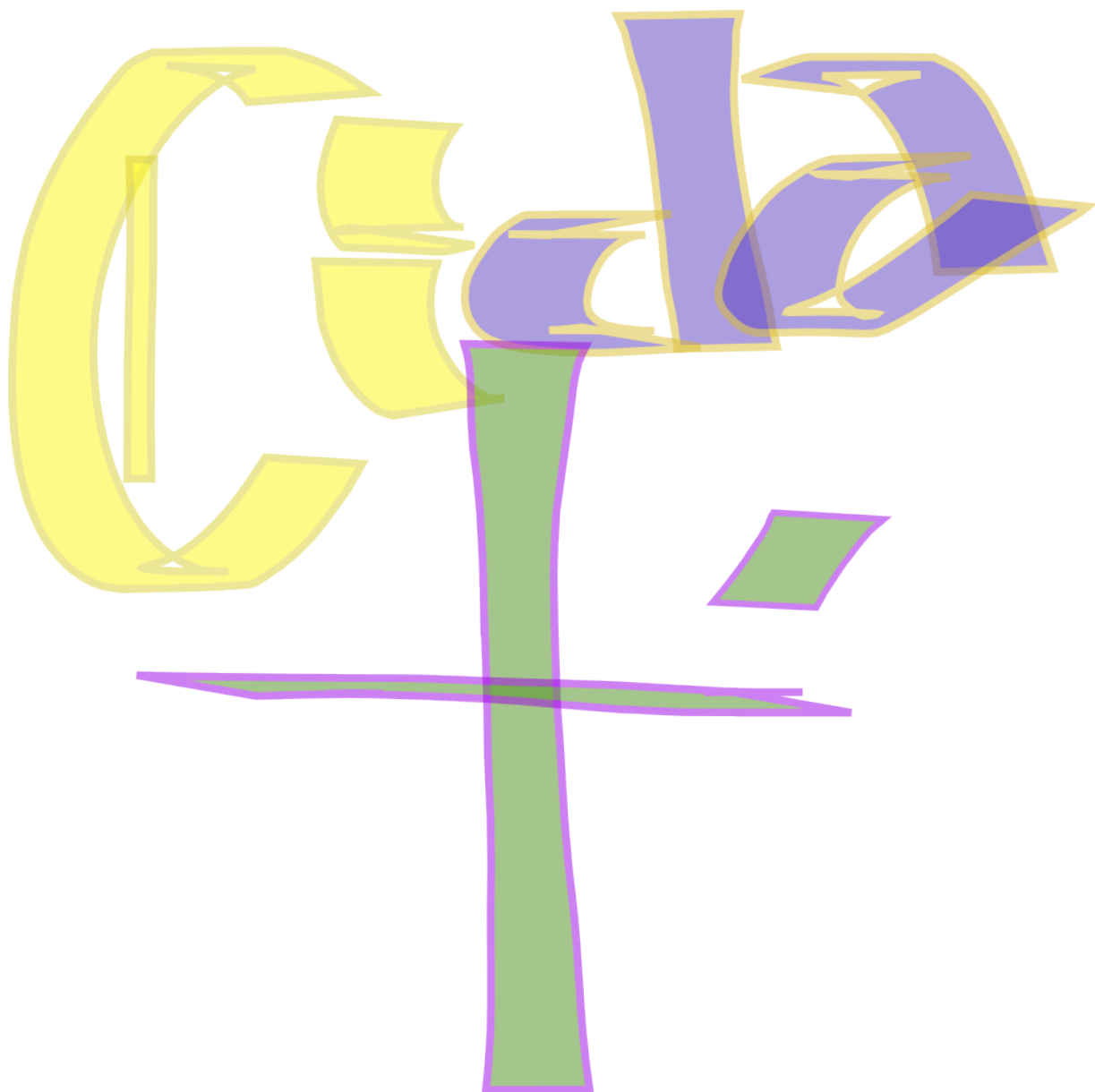


VI International Course of Mathematical Analysis in Andalucía

VI CIDAMA 2014

VI Curso Internacional de Análisis Matemático en Andalucía

Antequera, Málaga, España, 08-12 septiembre 2014




BOOK OF ABSTRACTS

TIMETABLE

Mon08Sep	Tue09Sep	Wed10Sep	Thu11Sep	Fri12Sep
9:00-12:15	9:00-9:55	9:00-9:55	9:00-9:55	
Arrival of participants	C1: J. Bastero	C1: J. Bastero	C1: J. Bastero	
	10:00-10:40	10:00-10:40	10:00-10:40	10:00-10:40
	Pl: G. Garrigós	Pl: K. Grosse-Erdmann	M-C: J.Á. Peláez	M-C: J.Á. Peláez
	10:45-11:15 Coffee Break	10:45-11:15 Coffee Break	10:45-11:15 Coffee Break	10:45-11:15 Coffee Break
	11:15-12:10	11:15-12:10	11:15-12:10	11:15-12:10
	C2: D. Cruz-Uribe	C2: D. Cruz-Uribe	C2: P. Lefèvre	C2: D. Cruz-Uribe
12:15 Welcoming	12:15-13:10	12:15-13:10	12:15-12:55	12:15 Closing
12:30-13:10			Pl: M. Mastylo	
Pl: J.L. Torrea	C3: P. Lefèvre	C3: P. Lefèvre		
13:30-15:30	13:30-15:30	13:30-15:30	13:30-15:30	
Lunch	Lunch	Lunch	Lunch	
16:00-16:40	16:00-16:25	16:00-16:25	16:00-18:00	16:00-21:00
Pl: M.C. Reguera	M. Lorente	M. Raja	Leisure Time	Leisure Time
	16:30-16:55	16:30-16:55		
16:45-17:25	N. Clavero	M.D. Acosta		
Pl: L. Español	17:00-17:25	17:00-17:20		
	E. Dalmasso	A.M. Cabrera		
	17:30-18:00 Coffee Break			
	18:00-18:25	18:00-18:25	18:00-20:30	
	W. Damián	P. Fernández	Touristic Visit Meeting Point: City Hall	
	18:30-18:55	18:30-18:55		
	D. Ariza	T. Signes		
	19:00-19:20			
	M.C. Listán			
				21:00-...
				Gala Dinner


VI CIDAMA 2014

After Cádiz-2002, Granada-2004, Huelva-2007, Cádiz-2009 (in memory of professor Antonio Aizpuru Tomás), and Almería-2011, Málaga takes the lead to celebrate the sixth edition of the *International Course of Mathematical Analysis in Andalucía* (CIDAMA, Cida+, ), <http://www.uma.es/6cidama2014/>, from September 8th to 12th 2014, in Antequera, Hotel Antequera Golf.


The Course counts with the following *Scientific Organization* from different universities in Andalucía:

 **Univ. Almería:** El Amin KAIDI LHACHMI, and Juan Carlos NAVARRO PASCUAL.

 **Univ. Cádiz:** Fernando LEÓN SAAVEDRA, and Francisco Javier PÉREZ FERNÁNDEZ


 **Univ. Granada:** Juan Francisco MENA JURADO, Rafael PAYÁ ALBERT, Ángel RODRÍGUEZ PALACIOS, and María Victoria VELASCO COLLADO.

 **Univ. Huelva:** Cándido PIÑEIRO GÓMEZ, and Ramón J. RODRÍGUEZ ÁLVAREZ.

 **Univ. Jaén:** Miguel MARANO CALZOLARI, José María QUESADA TERUEL, and Francisco ROCA RODRÍGUEZ.

 **Univ. Málaga:** Daniel GIRELA ÁLVAREZ, and Francisco Javier MARTÍN REYES.

 **Univ. Pablo Olavide:** Antonio VILAR NOTARIO.

 **Univ. Sevilla:** Tomás DOMÍNGUEZ BENAVIDES, Antonio FERNÁNDEZ CARRIÓN, Carlos PÉREZ MORENO, and Luis RODRÍGUEZ PIAZZA.

The *local organization* has been **coordinated by Francisco Javier MARTÍN REYES (Univ. Málaga)**, with the aid of Venancio ÁLVAREZ GONZÁLEZ (Univ. Málaga), Daniel GIRELA ÁLVAREZ (Univ. Málaga), Cristóbal GONZÁLEZ ENRÍQUEZ (Univ. Málaga), Antonio JIMÉNEZ MELADO (Univ. Málaga), María LORENTE DOMÍNGUEZ (Univ. Málaga), María Auxiliadora MÁRQUEZ FERNÁNDEZ (Univ. Málaga), Pedro ORTEGA SALVADOR (Univ. Málaga), Consuelo RAMÍREZ TORREBLANCA (Univ. Córdoba), and Alberto DE LA TORRE RODRÍGUEZ (Univ. Málaga).

The celebration of this Course has been possible thanks to the support given by many organizations and institutions. We express our gratitude to them: Universidad de Málaga - Campus de Excelencia internacional Andalucía Tech, Vicerrectorado de Investigación y Transferencia de la UMA, Departamento de Análisis Matemático de la UMA, Real Sociedad Matemática Española, Unicaja Banco, Ayuntamiento de Antequera, and, finally, PAIDI groups from la Junta de Andalucía through the universities of Almería, Cádiz, Granada, Huelva, Jaén, Málaga, Pablo Olavide, Sevilla.

The place chosen to celebrate the event has been the Hotel “Antequera Golf”. Antequera is a city in the province of Málaga, located almost at the geographical center of Andalucía, full of History and fine Monuments worthy to walk around and enjoy its many charming spots. Besides, it is easily accessible by car or train. September’s weather is usually quite nice in Antequera, although this year it seems that the temperatures are gone a little bit high.

Important dates have been set regarding registration to the VI CIDAMA. Registration was done online, by filling up a registration form at the web page of the Congress, www.uma.es/6cidama2014. The registration fee, before July 20th, 2014 was 150.00 EUR. After that, the fee increased to 200.00 EUR. The registration period ended on September 2nd 2014. The event has then gathered together about 50 participants:

- 1.- María Dolores ACOSTA VIGIL, dacosta@ugr.es, Universidad de Granada.
- 2.- Venancio ÁLVAREZ GONZÁLEZ, vag@uma.es, Universidad de Málaga.
- 3.- David ARIZA RUIZ, dariza@us.es, Universidad de Sevilla.
- 4.- Jesús BASTERO, bastero@unizar.es, Univ. Zaragoza, España.
- 5.- José Jorge BUENO CONTRERAS, jjbueno@us.es, Universidad de Sevilla.
- 6.- Ana María CABRERA SERRANO, anich7@correo.ugr.es, Universidad de Granada.
- 7.- María Jesús CARRO ROSSELL, carro@ub.edu, Universidad de Barcelona.
- 8.- Nadia CLAVERO, nadiaclavero@ub.edu, University of Barcelona.
- 9.- David CRUZ-URIBE, david.cruzuribe@trincoll.edu, Trinity College, Hartford, CT, USA.
- 10.- Estefanía Dafne DALMASSO, edalmasso@santafe-conicet.gov.ar, U. Nac. del Litoral - IMAL (CONICET-UNL).
- 11.- Wendolín DAMIÁN, wdamian@us.es, Universidad de Sevilla.
- 12.- Alberto DE LA TORRE, albertotorre@gmail.com, Universidad de Málaga.
- 13.- Tomás DOMÍNGUEZ BENAVIDES, tomasd@us.es, Universidad de Sevilla.
- 14.- Luis ESPAÑOL, luis.espanol@unirioja.es, Univ. La Rioja, España.
- 15.- Antonio FERNÁNDEZ CARRIÓN, afcarrion@etsi.us.es, Universidad de Sevilla.
- 16.- Pedro FERNÁNDEZ MARTÍNEZ, pedrofdz@um.es, UNIVERSIDAD DE MURCIA.
- 17.- Víctor GARCÍA GARCÍA, victor_g2_málaga@hotmail.com, Universidad de Málaga.

- 18.- Gustavo GARRIGÓS, gustavo.garrigos@um.es, Univ. Murcia, España.
- 19.- Daniel GIRELA ÁLVAREZ, girela@uma.es, Universidad de Málaga.
- 20.- Cristóbal GONZÁLEZ, cmge@uma.es, Univ. Málaga, España.
- 21.- Karl GROSSE-ERDMANN, kg.grosse-erdmann@umons.ac.be, Univ. Mons, Belgique.
- 22.- Antonio JIMÉNEZ MELADO, melado@uma.es, Universidad de Málaga.
- 23.- Elamin KAIDI LHACHMI, elamin@ual.es, UNIVERSIDAD DE ALMERIA.
- 24.- Pascal LEFÈVRE, pascal.lefevre@univ-artois.fr, Univ. Artois, Lens, France.
- 25.- María Del Carmen LISTÁN GARCÍA, mariadelcarmen.listan@uca.es, Universidad de Cádiz.
- 26.- Enrique LLORENS FUSTER, enrique.llorens@uv.es, Universidad de Valencia.
- 27.- María LORENTE DOMÍNGUEZ, m_lorente@uma.es, Universidad de Málaga.
- 28.- María Auxiliadora MÁRQUEZ FERNÁNDEZ, auxim@uma.es, Universidad de Málaga.
- 29.- Francisco Javier MARTÍN-REYES, martin_reyes@uma.es, Universidad de Málaga.
- 30.- Mieczysław MASTYŁO, mastylo@amu.edu.pl, Adam Mickiewicz University, Poland.
- 31.- Fernando MAYORAL MASA, mayoral@us.es, Universidad de Sevilla, Spain.
- 32.- Juan Francisco MENA JURADO, jfmena@ugr.es, Universidad de Granada.
- 33.- Noel MERCHÁN ÁLVAREZ, noel@uma.es, Universidad de Málaga.
- 34.- Juan Carlos NAVARRO PASCUAL, jcnav@ual.es, Universidad de Almería.
- 35.- Miguel Ángel NAVARRO PASCUAL, manav@ual.es, Universidad de Almería.
- 36.- Pedro ORTEGA SALVADOR, portega@uma.es, Universidad de Málaga.
- 37.- José Ángel PELÁEZ, japelaez@uma.es, Univ. Málaga, España.
- 38.- Carlos PÉREZ MORENO, carlosperez@us.es, Universidad de Sevilla.
- 39.- Matías RAJA, matias@um.es, Universidad de Murcia.
- 40.- Fernando RAMBLA BARRENO, fernando.rambla@uca.es, Universidad de Cádiz.
- 41.- Consuelo RAMÍREZ TORREBLANCA, malratoc@uco.es, Universidad de Córdoba.
- 42.- María Del Carmen REGUERA, m.reguera@bham.ac.uk, Univ. Birmingham, England.
- 43.- Israel Pablo RIVERA RÍOS, irivera@us.es, Universidad de Sevilla.
- 44.- Luis RODRÍGUEZ PIAZZA, piazza@us.es, Universidad de Sevilla.
- 45.- Teresa SIGNES, tmsignes@um.es, Universidad de Murcia.
- 46.- José Luis TORREA, joseluis.torrea@uam.es, Univ. Autónoma Madrid, España.
- 47.- M. Victoria VELASCO COLLADO, vvelasco@ugr.es, Universidad de Granada.
- 48.- Rafael VILLA CARO, villa@us.es, Universidad de Sevilla.

Scientific Program

Recall that they are three the main objectives of these International Courses:

- 1.- **Instruct** Andalusian researchers in the field of Mathematical Analysis through lectures, given by international experts, of most of the different, outstanding and up to date trends in the area.
- 2.- **Encourage** the cooperation among the different research groups in Mathematical Analysis in Andalusia.
- 3.- **Spread** in the international scientific community the contents generated by the Courses via appropriate publications.

In consequence, and after rescheduling certain parts of the program due to typical unexpected events, the VI CIDAMA 2014 consists of:

☞ **3 courses** of 3 hours each.

☞ **JESÚS BASTERO**, Univ. Zaragoza, España
Convex inequalities, isoperimetry and spectral gap
 SCHEDULED: TUE09SEP, WED10SEP, THU11SEP 9:00-9:55.

☞ **DAVID CRUZ-URIBE**, Trinity College, Hartford, CT, USA
Two weight norm inequalities for fractional integrals and commutators
 SCHEDULED: TUE09SEP, WED10SEP, FRI12SEP 11:15-12:10.

✉ **PASCAL LEFÈVRE**, Univ. Artois, Lens, France
Composition operators on Hardy spaces
 SCHEDULED: TUE09SEP, WED10SEP 12:15-13:10, THU11SEP 11:15-12:10.

✉ **1 Mini-Course** of one hour and a half.

✉ **JOSÉ ÁNGEL PELÁEZ**, Univ. Málaga, España
Decomposition norm theorem, L^p -behavior of reproducing kernels and two weight inequality for Bergman projection
 SCHEDULED: THU11SEP, FRI12SEP 10:00-10:40.

✉ **6 plenary conferences**, to reflect, in the most exhaustive way that can be, the different aspects and trend lines that are being developed now a days in the field of Mathematical Analysis.

✉ **LUIS ESPAÑOL**, Univ. La Rioja, España
Meanings of "algebra" and "analysis" between two Encyclopedias: from the Enlightenment to the Great War
 SCHEDULED: MON08SEP 16:45-17:25 (IN SPANISH).

✉ **GUSTAVO GARRIGÓS**, Univ. Murcia, España
A weak 2-weight problem for the Poisson-Hermite semigroup
 SCHEDULED: TUE09SEP 10:00-10:40.

✉ **KARL GROSSE-ERDMANN**, Univ. Mons, Belgique
On frequently hypercyclic operators
 SCHEDULED: WED10SEP 10:00-10:40.

✉ **MIECZYSLAW MASTYŁO**, Adam Mickiewicz University, Poland
Multilinear interpolation theorems with applications
 SCHEDULED: THU11SEP 12:15-12:55.

✉ **MARÍA DEL CARMEN REGUERA**, Univ. Birmingham, England
Sarason Conjecture on the Bergman space
 SCHEDULED: MON08SEP 16:00-16:40.

✉ **JOSÉ LUIS TORREA**, Univ. Autónoma Madrid, España
Semigroups, a tool to develop Harmonic Analysis associated to general Laplacians
 SCHEDULED: MON08SEP 12:30-13:10.

✉ **30 minutes Talks** so that the participants that so requested it may share publicly their recent works. The date to communicate the wish to present a Talk expired on July 20th 2014.

✉ **MARÍA DOLORES ACOSTA VIGIL**, Universidad de Granada
Bishop-Phelps-Bollobás property for operators
 SCHEDULED: TUE09SEP(B) 16:30-16:55.

✉ **DAVID ARIZA RUIZ**, Universidad de Sevilla
On the existence of solutions of differential equations using the coincidence theorems
 SCHEDULED: TUE09SEP(A) 18:30-18:55 (IN SPANISH).

✉ **ANA MARÍA CABRERA SERRANO**, Universidad de Granada
On extreme operators whose adjoints preserve extreme points
 SCHEDULED: TUE09SEP(B) 17:00-17:20 (IN SPANISH).

✉ **NADIA CLAVERO**, University of Barcelona
Sobolev type embeddings into mixed norm spaces
 SCHEDULED: TUE09SEP(A) 16:30-16:55.

✉ **ESTEFANÍA DAFNE DALMASSO**, Universidad Nacional del Litoral - IMAL (CONICET-UNL)
Generalized maximal functions and the control of related operators on weighted Musielak-Orlicz spaces.
 SCHEDULED: TUE09SEP(A) 17:00-17:25.

✉ **WENDOLÍN DAMIÁN**, Universidad de Sevilla
Compact bilinear commutators: the weighted case
 SCHEDULED: TUE09SEP(A) 18:00-18:25.

✉ **PEDRO FERNÁNDEZ MARTÍNEZ**, UNIVERSIDAD DE MURCIA
Interpolation of the couple $(L \log L, L_{exp})$ and other examples
 SCHEDULED: TUE09SEP(B) 18:00-18:25.

✉ **MARÍA DEL CARMEN LISTÁN GARCÍA**, Universidad de Cádiz
Rough convergence and Chebyshev centers in Banach spaces
 SCHEDULED: TUE09SEP(A) 19:00-19:20 (IN SPANISH).

✉ **MARÍA LORENTE DOMÍNGUEZ**, Universidad de Málaga
Weighted inequalities for one-sided operators
 SCHEDULED: TUE09SEP(A) 16:00-16:25 (IN SPANISH).

☞ **MATÍAS RAJA**, Universidad de Murcia

The optimal modulus of convexity of a super-reflexive Banach space

SCHEDULED: TUE09SEP(B) 16:00-16:25.

☞ **TERESA SIGNES**, Universidad de Murcia

Ultrasymmetric sequence spaces

SCHEDULED: TUE09SEP(B) 18:30-18:55.

☞ **Posters**, displayed and presented at an appropriate desk by anyone interested in doing so.

Abstracts of the 3 Courses

Convex inequalities, isoperimetry and spectral gap

JESÚS BASTERO, bastero@unizar.es,

Univ. Zaragoza, España

3 HOURS COURSE: TUE09SEP, WED10SEP, THU11SEP 9:00-9:55.

Abstract: One of the most important inequalities in modern convexity is Brunn-Minkowski inequality. Its functional analogue is Prekopa-Leindler inequality in R^n . We will see that, in a certain sense, we can consider it as a reverse of Hölder's inequality. We will study several consequences: the Brunn-Minkowski inequality for the Gaussian probability, the isoperimetric inequality in R^n and in S^{n-1} .

The isoperimetric inequality in the Euclidean space has the counterpart of Sobolev inequality in the functional framework. We will consider another kind of isoperimetric inequalities, which will be Cheeger's type isoperimetric inequalities for log-concave probabilities in R^n and their associated functional inequalities, which will be Poincaré type inequalities. Computing the corresponding spectral gap in Poincaré inequalities is the main problem in Kannan-Lovász-Simonovits conjecture, which will be explained.

Two weight norm inequalities for fractional integrals and commutators

DAVID CRUZ-URIBE, david.cruzuribe@trincoll.edu,

Trinity College, Hartford, CT, USA

3 HOURS COURSE: TUE09SEP, WED10SEP, FRI12SEP 11:15-12:10.

Abstract: In this course we will survey recent work on two weight norm inequalities for the fractional integral operator

$$I_\alpha f(x) = \int_{\mathbb{R}^n} \frac{f(y)}{|x-y|^{n-\alpha}} dy, \quad 0 < \alpha < n,$$

and its commutator with BMO functions,

$$[I_\alpha, b]f(x) = b(x)I_\alpha f(x) - I_\alpha(fb)(x).$$

We are interested in finding sufficient (and necessary and sufficient) conditions on pairs of weights (u, σ) for the weak and strong-type inequalities

$$I_\alpha(\cdot\sigma) : L^p(\sigma) \rightarrow L^{q,\infty}(u), \quad I_\alpha(\cdot\sigma) : L^p(\sigma) \rightarrow L^q(u), \quad 1 < p \leq q < \infty.$$

Recently, using the machinery developed to prove the A_2 conjecture, there has been a great deal of progress in this area. We will first survey the history of this problem, starting with the work of Sawyer on testing conditions for pairs of weights (u, σ) :

$$\sup_Q \sigma(Q)^{-1/p} \left(\int_Q I_\alpha(\sigma\chi_Q)(x)^q u(x) dx \right)^{1/q} < \infty,$$

where the supremum is taken over all cubes Q . We will then discuss the so-called $A_{p,q}$ bump conditions,

$$\sup_Q |Q|^{\alpha/n+1/q-1/p} \|u^{1/q}\|_{A,Q} \|\sigma^{1/p'}\|_{B,Q} < \infty,$$

where $\|\cdot\|_{A,Q}, \|\cdot\|_{B,Q}$ are normalized Orlicz norms. These conditions, which generalize the Muckenhoupt A_p weights, were introduced by Pérez in the 1990's and are closely related to the recently disproved Muckenhoupt-Wheeden conjectures.

Throughout our talks we will discuss the parallels with recent work on singular integrals.

Composition operators on Hardy spaces

PASCAL LEFÈVRE, pascal.lefevre@univ-artois.fr,

Univ. Artois, Lens, France

3 HOURS COURSE: TUE09SEP, WED10SEP 12:15-13:10, THU11SEP 11:15-12:10.

Abstract: The topic is composition operators $f \mapsto f \circ \varphi$, where the symbol $\varphi : \mathbb{D} \rightarrow \mathbb{D}$ is holomorphic. We shall give a (non-exhaustive) overview of -more or less recent- results when these operators are viewed on the classical Hardy spaces H^p . The story involves some classical tools of complex analysis, as Nevanlinna counting function and Carleson measures. We will illustrate this presentation with miscellaneous examples and questions. Concerning the most recent results, we shall pay attention to their possible membership to the class of absolutely summing operators.

Abstract of the Mini-Course

Decomposition norm theorem, L^p -behavior of reproducing kernels and two weight inequality for Bergman projection

JOSÉ ÁNGEL PELÁEZ, japelaez@uma.es,
Univ. Málaga, España

1½ HOURS COURSE: THU11SEP, FRI12SEP 10:00-10:40.

Abstract: Let \mathbb{D} be the complex unit disc and let A_ω^p denote the Bergman space in the unit disc induced by a radial weight ω with the doubling property $\sup_{0 \leq r < 1} \frac{\int_r^1 \omega(s) ds}{\int_{\frac{1+r}{2}}^1 \omega(s) ds} < \infty$. To begin with, we shall present a decomposition norm theorem for A_ω^p . This result will be used to obtain a description of the L^p -means and the L^p -behavior of B_ζ^ω , the reproducing kernels of A_ω^2 .

Later, we shall consider the Bergman projection from L_ω^2 to A_ω^2

$$P_\omega(f)(z) = \int_{\mathbb{D}} f(\zeta) B_\zeta^\omega(z) \omega(\zeta) dA(\zeta),$$

and study the two weight problem

$$\|P_\omega(f)\|_{L_\nu^p} \lesssim \|f\|_{L_\omega^p}, \quad f \in L_\omega^p.$$

Joint works with O. Constantin and J. Rättyä.

- [1] O. Constantin and J. Á. Peláez, *Boundedness of the Bergman projection on L^p spaces with exponential weights*, submitted, available at <http://arxiv.org/abs/1309.6071>.
- [2] J. Á. Peláez and J. Rättyä, *Weighted Bergman spaces induced by rapidly increasing weights*, Mem. Amer. Math. Soc. **227** (2014), no. 1066, available at <http://arxiv.org/abs/1210.3311>.
- [3] J. Á. Peláez and J. Rättyä, *Generalized Hilbert operators on weighted Bergman spaces*, Adv. Math. **240** (2013), 227–267.
- [4] J. Á. Peláez and J. Rättyä, *Two weights inequality for Bergman projection*, preprint.

Abstracts of the 6 Plenary Conferences

Meanings of "algebra" and "analysis" between two Encyclopedias: from the Enlightenment to the Great War

LUIS ESPAÑOL, luis.espanol@unirioja.es,
Univ. La Rioja, España

PLENARY CONFERENCE: MON08SEP 16:45-17:25 (IN SPANISH).

Abstract: The meanings given to the terms “algebra” and “analysis”, separately or jointly in expressions like “algebraic analysis” have changed over time, even simultaneously have been used with significant differentiating shades.

My presentation will focus on this issue during the period between the publication from 1751 of French Enlightenment’s encyclopedia, *L’Encyclopédie ou Dictionnaire raisonné des sciences, des arts et des métiers*, and the first phase of the publication from 1899, of the German mathematician encyclopedia, *Encyklopädie der Mathematischen Wissenschaften mit Einschluss ihrer Anwendungen*, driven by F. Klein. The latter was translated into French with slight additions, under the direction of J. Molk, from 1904 until the Great War interrupted the process in 1915, when the period covered in my presentation ends.

Along the same, I will discuss some use cases of “algebra” and “analysis” with different meanings, and the different use of “algebraic analysis” in research and teaching.

A weak 2-weight problem for the Poisson-Hermite semigroup

GUSTAVO GARRIGÓS, gustavo.garrigos@um.es,
Univ. Murcia, España

PLENARY CONFERENCE: TUE09SEP 10:00-10:40.

Abstract: Consider the Poisson equation $u_{tt} = \mathcal{L}u$ in \mathbf{R}_+^{d+1} , with $\mathcal{L} = -\Delta + |x|^2$ the Hermite operator. We look for very general conditions on the initial datum f , so that $u(t, x) = e^{-t\sqrt{-\mathcal{L}}} f(x)$ converges a.e. to $f(x)$.

When $w(x)$ is a weight in A_p , this is classically obtained from the $L^p(w)$ boundedness of the associated maximal operators

$$\mathcal{M}f(x) = \sup_{t>0} |u(t, x)|.$$

However, such convergence also holds with less restrictive conditions, such as boundedness from $L^p(w) \rightarrow L^p(v)$, for some other weight $v(x)$, of a local maximal operator $\mathcal{M}_a f = \sup_{0 < t < a} |u(t, x)|$ for some $a > 0$. This produces a larger class of weights than classical A_p theory.

In this work we solve this version of the 2-weight problem, and as a consequence characterize the weights $w(x)$ for which $u(t, x) \rightarrow f(x)$ a.e. for all $f \in L^p(w)$.

The proof requires sharp estimates on the decay of Hermite-Poisson kernels, together with classical factorization techniques of Rubio de Francia. Similar results are also valid in the Ornstein-Uhlenbeck setting. This is part of the joint work with Hartzstein, Signes, Torrea, Viviani.

On frequently hypercyclic operators

KARL GROSSE-ERDMANN, kg.grosse-erdmann@umons.ac.be,
Univ. Mons, Belgique

PLENARY CONFERENCE: WED10SEP 10:00-10:40.

Abstract: An operator T on a Fréchet space X is called frequently hypercyclic if there is a vector $x \in X$ (also called frequently hypercyclic) such that, for any non-empty open set $U \subset X$, the set $\{n \geq 0 : T^n x \in U\}$ has positive lower density. We will discuss recent work on such operators. In particular, in joint work with A. Bonilla, we give a sufficient condition for the existence of a frequently hypercyclic subspace, that is, a closed infinite-dimensional subspace in which every non-zero vector is frequently hypercyclic. And Q. Menet has recently exhibited frequently hypercyclic operators that have a hypercyclic subspace but no frequently hypercyclic subspace.

Multilinear interpolation theorems with applications

MIECZYŚLAW MASTYŁO, mastylo@amu.edu.pl,
Adam Mickiewicz University, Poland

PLENARY CONFERENCE: THU11SEP 12:15-12:55.

Abstract: We will discuss some recent results on abstract interpolation of linear as well as multilinear operators. In particular, we will present joint results with Loukas Grafakos on an abstract multilinear version of Stein's theorem for analytic families of multilinear operators defined on products of quasi-Banach spaces. We will show applications to the bilinear Hilbert transform and to the bilinear Bochner-Riesz operator.

Sarason Conjecture on the Bergman space

MARÍA DEL CARMEN REGUERA, m.reguera@bham.ac.uk,
Univ. Birmingham, England

PLENARY CONFERENCE: MON08SEP 16:00-16:40.

Abstract: In the early 90's, D. Sarason posed conjectures on the characterization of the boundedness of Toeplitz products on Hardy and Bergman spaces [3]. The Hardy space case attracted much attention because of its close relation to the famous two-weight problem for the Hilbert transform in Real Analysis, pointed out by Cruz-Uribe in [1]. Unfortunately, the Sarason conjecture for Toeplitz products on Hardy space was shown to be false by F. Nazarov [2] around 2000.

In this talk we will show that Sarason conjecture is also false in the Bergman space. Some aspects of the Bergman space setting are easier, because cancellation plays much less of a role in this setting, unfortunately the opposite happens when we look for a counterexample. We will also provide a characterization of the boundedness of Toeplitz products in the Bergman space in terms of testing conditions. This is a joint work with A. Aleman and S. Pott from Lund University.

[1] D. Cruz-Uribe, *The invertibility of the product of unbounded Toeplitz operators*, Int.Eq.Op.Th. **20** (1994), no. 2, 231–237.

[2] F. Nazarov, *A counterexample to Sarason's conjecture*, available at <http://www.math.msu.edu/~fedja/prepr.html>.

[3] D. Sarason, *Products of Toeplitz Operators*, Springer Lecture Notes in Mathematics, vol. 1573, 194.

Semigroups, a tool to develop Harmonic Analysis associated to general Laplacians

JOSÉ LUIS TORREA, joseluis.torrea@uam.es,
Univ. Autónoma Madrid, España

PLENARY CONFERENCE: MON08SEP 12:30-13:10.

Abstract: We shall discuss how to use semigroup theory in order to define the classical operators (Riesz transforms, square functions, Riesz potentials, ...) associated to a general Laplacian. Several examples will be given. We shall focus in the special case of the discrete Laplacian in the integers. In the talk, we shall follow the path sketched by E. Stein in his celebrated monograph (cf. [1]). (See also [2]).

[1] E. M. Stein, *Topics in harmonic analysis related to the Littlewood-Paley theory*, Annals of Mathematics Studies, No. 63, Princeton University Press, Princeton, N.J.; University of Tokyo Press, Tokyo, 1970. MR0252961 (40 #6176)

[2] O. Ciaurri, T. A. Gillespie, L. Roncal, J. L. Torrea, and J. L. Varona, *Harmonic Analysis associated with a discrete Laplacian*, available at <http://arxiv.org/abs/1401.2091>.

Abstracts of the Short Talks

Bishop-Phelps-Bollobás property for operators

MARÍA DOLORES ACOSTA VIGIL, dacosta@ugr.es,
Universidad de Granada

TALK: TUE09SEP(B) 16:30-16:55.

Abstract: Bishop-Phelps Theorem states the denseness of the subset of norm attaining functionals in the (topological) dual of a Banach space. Bollobás proved a quantitative version of this result, which has been useful for numerical ranges of operators. Roughly speaking, Bollobás proved that each pair of elements (x_0, x_0^*) in $S_X \times S_{X^*}$ such that $x_0^*(x_0)$ is close to 1 can be approximated by (x, x^*) in $S_X \times S_{X^*}$ satisfying $x^*(x) = 1$. Recently the study of extensions of this result for operators was initiated. Since then some papers providing results for classical Banach spaces appeared. We will present recent results valid in case that the domain space of the operators is $C_0(L)$.

On the existence of solutions of differential equations using the coincidence theorems

DAVID ARIZA RUIZ, dariza@us.es,
Universidad de Sevilla

TALK: TUE09SEP(A) 18:30-18:55 (IN SPANISH).

Abstract: In this talk we will study the existence of a coincidence point for two mappings defined on a nonempty set and taking values on a Banach space using the fixed point theory for nonexpansive mappings. Using this type of results, we will obtain the existence of solutions for some classes of differential equations.

On extreme operators whose adjoints preserve extreme points

ANA MARÍA CABRERA SERRANO, anich7@correo.ugr.es,
Universidad de Granada

TALK: TUE09SEP(B) 17:00-17:20 (IN SPANISH).

Abstract: We say that a Banach space X is nice whenever any extreme operator T from a Banach space Y to X is a nice operator, that is, T^* , the adjoint of T , preserves extreme points. We get several necessary conditions for being nice. The main result is the characterization of nice finite-dimensional Banach spaces.

Sobolev type embeddings into mixed norm spaces

NADIA CLAVERO, nadiaclovero@ub.edu,
University of Barcelona

TALK: TUE09SEP(A) 16:30-16:55.

Abstract: The Sobolev space $W^1 L^p(I^n)$, $1 \leq p \leq \infty$, consists of all functions in $L^p(I^n)$ whose first-order distributional derivatives also belong to $L^p(I^n)$. The classical Sobolev embedding theorem claims:

$$W^1 L^p(I^n) \hookrightarrow L^{pn/(n-p)}(I^n), \quad 1 \leq p < n.$$

Sobolev proved this embedding for $p > 1$, but his method, based on integral representations, did not work when $p = 1$. That case was settled affirmatively by Gagliardo and Nirenberg, who first observed:

$$(1) \quad W^1 L^1(I^n) \hookrightarrow \mathcal{R}(L^1, L^\infty),$$

where $\mathcal{R}(L^1, L^\infty)$ is a mixed norm space, and then, using an iterated form of Hölder's inequality, completed the proof. Our main goal in this work is to study the embedding (1) for more general rearrangement invariant (r.i.) spaces. In particular we concentrate on seeking the optimal domains and the optimal ranges for these embeddings between r.i. spaces and mixed norm spaces. As a consequence, we prove that the classical estimate for the standard Sobolev space $W^1 L^p$ by Poornima and Peetre ($1 \leq p < n$), and by Hansson, Brézis, Wainger and Maz'ya ($p = n$) can be improved considering mixed norms as targets spaces.

This work is part of my PhD thesis, supervised by Javier Soria (University of Barcelona).

Generalized maximal functions and the control of related operators on weighted Musielak-Orlicz spaces.

ESTEFANÍA DAFNE DALMASSO, edalmasso@santafe-conicet.gov.ar,
Universidad Nacional del Litoral - IMAL (CONICET-UNL)

TALK: TUE09SEP(A) 17:00-17:25.

Abstract: We characterize the class of weights related to the boundedness of maximal operators associated to Young functions of LlogL type in the context of variable Lebesgue spaces and we give sufficient conditions for more general Young functions. Fractional versions of these results are also obtained by means of a weighted Hedberg type inequality in the variable context. These results are new even in the classical Lebesgue spaces. We also deal with Wiener's type inequalities for the mentioned operators in the spirit of the corresponding result proved in [1] for the Hardy-Littlewood maximal operator. As applications of the strong type results for the maximal operators, we derive weighted boundedness properties for a large class of operators controlled by them, such as singular and fractional integrals with kernels satisfying certain Hörmander type condition and their commutators.

[1] D. Cruz-Uribe and A. Fiorenza, *LlogL results for the maximal operator in variable L^p spaces*, Trans. Amer. Math. Soc. **361** (2009), no. 5, 2631–2647, DOI 10.1090/S0002-9947-08-04608-4. MR2471932 (2010c:42030)

Compact bilinear commutators: the weighted case

WENDOLÍN DAMIÁN, wdamián@us.es,
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TALK: TUE09SEP(A) 18:00-18:25.

Abstract: In this talk we present the study of the compactness of commutators of bilinear Calderón-Zygmund operators and their iterates with CMO symbols determining the suitable classes of multiple weights in which this property holds. Joint work with Á. Bényi, K. Moen and R.H. Torres.

Interpolation of the couple $(L \log L, L_{exp})$ and other examples

PEDRO FERNÁNDEZ MARTÍNEZ, pedrofz@um.es,
UNIVERSIDAD DE MURCIA

TALK: TUE09SEP(B) 18:00-18:25.

Abstract: We will illustrate through examples the use of the reiteration theorems obtained in the joint papers with T. Signes [1], [2] and [3]. These results are proved for interpolation methods defined by means of slowly varying functions and symmetric spaces. We will derive interpolation formulas for the couple $(L \log L, L_{exp})$ and other examples.

- [1] P. Fernández-Martínez and T. Signes, *Real interpolation with symmetric spaces and slowly varying functions*, Q. J. Math. **63** (2012), no. 1, 133–164, DOI 10.1093/qmath/haq009. MR2889184
 - [2] P. Fernández-Martínez and T. Signes, *Limit cases of reiteration theorems*, Math. Nachr., to appear.
 - [3] P. Fernández-Martínez and T. Signes, *A limit case of ultrasymmetric spaces*, Arkiv der Matematik, to appear.
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Rough convergence and Chebyshev centers in Banach spaces

MARÍA DEL CARMEN LISTÁN GARCÍA, mariadelcarmen.listan@uca.es,
Universidad de Cádiz

TALK: TUE09SEP(A) 19:00-19:20 (IN SPANISH).

Abstract: By means of rough convergence, we study two geometric properties in Banach spaces and relate them to Chebyshev centers and some well-known classical properties, such as Kalton's M property or Garkavi's uniform rotundity in every direction.

Weighted inequalities for one-sided operators

MARÍA LORENTE DOMÍNGUEZ, m_lorente@uma.es,
Universidad de Málaga

TALK: TUE09SEP(A) 16:00-16:25 (IN SPANISH).

Abstract: We present some examples of one-sided operators and focus our attention on the problem of characterizing the weak and strong type inequalities with weights for the one-sided Hardy-Littlewood maximal operator, in \mathbb{R} and \mathbb{R}^n . In order to approach this problem we study several one-sided dyadic maximal operators.

The optimal modulus of convexity of a super-reflexive Banach space

MATÍAS RAJA, matias@um.es,
Universidad de Murcia

TALK: TUE09SEP(B) 16:00-16:25.

Abstract: A super-reflexive Banach space admits many uniformly convex equivalent norms. We prove that the set of all the moduli of convexity of this set of norms admits a supremum, in a quite natural function ordering. The classical result of Pisier about the uniformly convex renorming with modulus of power type follows easily from the properties of such a supremum.

Ultrasymmetric sequence spaces

TERESA SIGNES, tmsignes@um.es,
Universidad de Murcia

TALK: TUE09SEP(B) 18:30-18:55.

Abstract: In this talk we study ultrasymmetric sequence spaces in the case in which the fundamental function belongs to a limit class of concave functions. In the process we present a simple analytical description of these spaces and we establish new J - K identities as well as a reiteration theorem for limit interpolation methods.

We also study ultrasymmetric approximation spaces and we give some applications to limit Lorentz-Zygmund operator ideals.

This is a joint work with Pedro Fernández-Martínez (Universidad de Murcia).

- [1] P. Fernández-Martínez and T. Signes, *A limit case of ultrasymmetric sequence spaces*, preprint.
 - [2] E. Pustylnik, *Ultrasymmetric sequence spaces in approximation theory*, Collect. Math. **57** (2006), no. 3, 257–277. MR2264322 (2007j:46035)
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