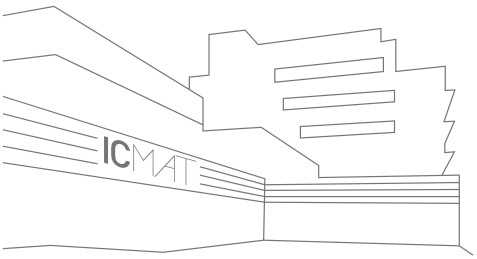
INSTITUTO DE CIENCIAS MATEMÁTICAS

Quarterly newsletter
Second quarter 2015



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EDITORIAL

Looking to Europe

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Susana Matas (ICMAT)

For the European Union, innovation, technological development and scientific knowledge these days represent the path to prosperity and quality of life for all its citizens. In order to guarantee the competitiveness of Europe on the world stage, budget consolidation and structural reforms are necessary but not sufficient. These measures must also go hand in hand with intelligent investment that helps to create employment and generate the scientific and technological progress required to address the most pressing challenges facing society, such as climate change, an aging population and the transition to a society capable of using resources with greater efficiency.

The support of the European Union for research and development activities has since 1984 included the so-called Framework Programs which have since their inception unfolded along three main lines: the ongoing increase in the assignation of funds; the extension of action to new scientific and technological fields, and the diversification of funding mechanisms up to the current portfolio, which includes projects, research networks, individual grants and special measures for SMEs, among others.

The impact of the Framework Programs is much greater than is generally acknowledged. In financial terms, the Framework Program constituted 5% of global EU funding during the period 2007-2013. In many countries such as Spain, Portugal or Greece, and even more in the 10 member states in Eastern Europe, the activity of many university research departments depends on this funding, since these programs contribute as much as national budgets to the overall funding of research.

On January 1st, 2014, the Horizon 2020 program got under way. This new Framework Program will provide the funding for research and innovation in the European Union in the 2014-2020 period and will amount to a total budget of €77 billion. The purpose of the program is to provide support for the implementation of Europe 2020 Strategy and the emblematic "Innovation Union" scheme, and will contribute directly to tackling the main challenges facing society; creating and maintaining industrial leadership in Europe as well as strengthening the excellence of the scientific base, which is essential for the long-term sustainability, prosperity and welfare of Europe.

Horizon 2020 consists of a series of features that make it ideal for promoting growth and for tackling new challenges. It brings together research and innovation by providing funding that ranges from the genesis of an idea to its emergence on the market. It gives backing to innovation as well as the activities involving the commercialization of results, thereby directly stimulating the economy, creating business opportunities in response to major social challenges, and providing promising young scientists with the chance to put forward their ideas and obtain funding.

Horizonte 2020 is both an opportunity and a challenge for all the Spanish actors (research centers, universities, public administration and business). It provides the perfect platform for all these entities to establish their innovation strategy, internationalize their research and innovatory activity and improve their funding jointly with other actors. The ICMAT has no hesitation in its commitment to the ambition reflected in this program, and to continue the along the path that it began with the previous Framework Program. The contribution of the Institute through its ERC and Marie-Curie projects is vital for opening up new work scenarios to provide fresh opportunities for young researchers of the future.

Horizon 2020 is a clarion call for researchers of the highest excellence, for the most brilliant minds and the most ground-breaking ideas that push forwards the frontiers of knowledge. In the 1960s and 1970s the endeavor was focused on industrial production. Today, the goal is the production of ideas. The global economic struggle is taking place around the generation, control and use of knowledge, and mathematical researchers of all disciplines have a vital role to play in this scenario.

Susana Matas, in charge of the ICMAT- Europe Office

INTERVIEW: Jean-Pierre Bourguignon, Mathematician and President of the European Research Council

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JEAN-PIERRE BOURGUIGNON

"The ERC is bringing something special to Europe and is already a mark of differentiation"

Ágata Timón. For a little over a year now, Jean-Pierre Bourguignon has been the first mathematician to preside over the European Research Council (ERC). Part of his career has been devoted to scientific policy and management, mainly as head (from 1994 to 2013) of one of the most prestigious mathematical institutions, the French *Institut des Hautes Études Scientifiques* (IHÉS). He has also been the chair of the French Mathematical Society (1990-1992) and of the European Mathematical Society (from 1995 to 1998). On the occasion of his visit to the ICMAT and the CSIC on February 27th, we present the interview we conducted with him a few months ago at the International Congress of Mathematicians (ICM) in Seoul.

"This could be the most dynamic period in the entire history of mathematics and people ought to know about it"

Question: What has your first year as the head of the ERC been like?

Answer: Being president of the ERC is for me a different job from everything I've done before; I have a broad overview of the mathematical community, but I don't know the rest of the scientific community quite so well. I've worked in management positions for quite a few years; I was director of the IHES, but now I have to get used to a bigger picture. Fortunately, the ERC is a good program and I have confidence in the highly qualified and dedicated people charged with implementing the program from the ERC agency. I think that our program is bringing something very special to Europe; in fact, outside of Europe they're trying to copy it because it's already a mark of differentiation. The projects stretch over five years and carry quite a lot of money, so they have to be bold and ambitious as well as providing a big boost for the careers of the researchers who secure them.

Q: What are your main challenges as president of the ERC?

A: When I took up this position I found myself in a rather peculiar situation, because a lot of things had already been decided. The budget is already fixed for the next seven years, which in one way is a great privilege. The agency is efficient; we have some 400 people working efficiently here and the reputation of the ERC is excellent, so I can concentrate really on medium- and long-term matters.

Q: Could you mention one of these concerns?

A: One is how to improve the balance between men and women. There's a lot of imbalance in the scientific community. There are far fewer women with grants and this reflects the general situation in the world of research. In general, women apply far less for grants and their rate of success in the first stage of evaluation tends to be low. This is strange, because in most evaluation processes for other grants women fail more than men in the second stage - the interviews. With the ERC grants the opposite happens; most women don't make it to the second stage, but if they do they are much more successful than the men. This might be the direct consequence of being "over-selected" in the first phase. We have to understand fully why this happens.

Q: Has the ERC taken any measures about this?

Yes, women can put back the age limit for up to 18 months when applying for an ERC grant if they've given birth to a child. Men have this right too, but they have to present an official form that testifies to this fact. Furthermore, we encourage people to present a standard format CV. It is known that, in general, women are less aggressive when they compile their CVs, so receiving the CVs in the same format facilitates the evaluation work, and 80% of applicants for ERC grants already use it. We're also conducting a study to enable us to have a further understanding of the selection process.

"One of the things I want to address at the ERC is gender equality. It's not easy, because until we have a good understanding of what's happening it's difficult to proceed"

Q: Apart from this, what other medium-term plans do you have?

A: The general criterion for evaluation at the ERC is based on quality. We don't seek a geographical or gender balance in the evaluations, but we do make an effort to understand the situation of the latest countries to join the European Union (EU), because their performance in the ERC calls isn't as good as other countries. However, when analyzing the number of grants in these countries it is also necessary to take into account other factors, such as population size, R+D investment and the number of researchers. For example, the total amount invested in R+D in all the countries that have recently joined the EU is less than the budget devoted to that purpose in Austria.

Researchers who receive little backing in their respective countries tend to go abroad to pursue their scientific careers. This constitutes a further threat for the development of scientific potential in some countries.

Q: ¿How do you view the participation of mathematicians in the ERC?

A: I think it's good. The mathematical community provides quite a lot of support in the evaluation process. There's a reasonable number of candidates applying for grants, but undoubtedly there could be more.

"If you add up all the ERC grants of the so-called EU-13 countries, the last ones to have joined the EU, they amount to fewer than those that Oxford and Cambridge have"

Q: What do you think this is due to?

A: The money that goes with the ERC grants can be quite high, but a great deal of responsibility is also required. I believe that some mathematicians don't apply for these grants because they believe that they don't need such high level backing. I encourage them to think twice about it, because they could ask for smaller amounts when they make their application. There are other disciplines in which the inclusion of a post-doctoral researcher in the team is vital for getting ahead. However, a mathematician can be a more independent researcher. In this sense, an ERC grant might not be an optimum choice, although of course a mathematician who manages to obtain one of these grants gives a big boost to his or her career.

Q: What's the role of mathematicians in the framework of Horizon 2020?

A: The spirit of the H2020 is to depart from the differentiation between disciplines. At the ERC, mathematics is one of the few disciplines that exist *per se*; the other panels are multidisciplinary. In general, the H2020 has been organized in such a way that the different branches of science can interact.

"I don't think that the networks will be included again in future framework programs. We mathematicians will have to find another way of doing things"

Q: How does this new structure affect mathematics?

A: One of the most highly valued tools used by European mathematicians for working together - the networks – disappear in the H2020. I have to admit that I, as a mathematician, have used these structures on many occasions throughout my career.

Q: Why have they been removed?

A: They're not expensive, but the EU is working flat out to reduce administrative costs, and in this sense it's better to distribute the money in large quantities by funding big projects rather than sub-divide it into many smaller ones. The average cost of the networks is about €100,000.

"The point of departure for businesses in the new economic model is in many cases mathematics"

Q: Nevertheless, it seems that mathematics will have an important role to play in the future economic development of the EU, which is what various studies carried out in The Netherlands and the United Kingdom show.

A: Yes, its role is fundamental, and I believe that professionals with a training in advanced mathematics will be more and more in demand. However, mathematicians are not often aware of this crucial fact. If you look at the key points in economic development over the last 20 years, you'll see things that nobody could have imagined, like Google; we use it all the time for free and it's a multimillion dollar company. Where does all this money come from? The economic model is completely new and different. In many cases mathematics provides the point of departure for these new businesses. I think that more and more economic activity will be connected to the information economy, which is mainly based on computer science, mathematics and a combination of both. It's not enough to have computers, we have to have ideas as well.

Q: Do you think that the mathematical community is responding to this? Are mathematicians being educated to develop this type of profile?

A: For some time the mathematical community wasn't aware of it, but now it's starting to change. This means that we need to train mathematicians differently, giving greater importance to fields that they've neglected, such as statistics or big data. Mathematicians have to be skilled in programming. But these are small changes; the most relevant mathematics comes from different sub-fields: algebra, probability, statistics, geometry, topology, informatics and modeling and we still don't know what knowledge will be vital for in development.

"Some of the best moments of my professional life have been spent working with people who have had little to do with mathematics, in particular with artists."

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From left to right: José Ramón Urquijo Goitia, CSIC vicepresident for Organization and Institutional Relations; Manuel de León, ICMAT director, Jean-Pierre Bourguignon and Emilio Lora-Tamayo, CSIC president.

Q: What do you think the next big application of mathematics will be?

A: That's hard to say; at the ICM2014 in Seoul, professor Emmanuel Candes (Stanford University) gave a fascinating plenary talk entitled "The Mathematics of Sparsity (and a few other things)". His intention was to show how with a small amount of information well-founded decisions can still be made. For example, when obtaining an image with magnetic resonance (MRI), the subject must remain still for two minutes. This can be complicated where children are concerned, and the result is a blurred image. The process of acquiring this information can't be speeded up, but if you can manage to get just one sample instead of the complete image you can then divide the time by eight. Two minutes divided by eight is fifteen seconds, which gives an acceptable interval of time for the child. The result on the basis of the sample is fantastic, although you have to check if it's mathematically correct, and for this you need very little information. And that's what Candes has done; it's what is known as "compressed sensing", a signal processing technique that enables a signal to be reconstructed from a series of data. It's a virtually new branch of mathematics that employs ideas from statistics, complex programming, optimization and algebraic geometry. It has great impact and the level of mathematics developed is very high. It's much more than a trivial application.

Q: Do you think that the mathematical community is making the importance of its advances for society known?

A: Most people have no idea that mathematics is a very live field, that new results are constantly being proved, new ideas and new concepts keep appearing... This could be the most dynamic period in the entire history of mathematics and people ought to know about it. I believe that part of my work as a mathematician is to make people aware of what's happening in my discipline, so I devote some of my efforts to that end. Some of the best moments of my professional life have been spent working with people who have had little to do with mathematics, in particular with artists.

Q: You've participated in many outreach projects; for example, in the making of the documentary "How I Came to Hate Maths" (original title in French: "Comment j'ai détesté les maths"), by French director Olivier Peyon. What was that experience like?

A: The first time the director came to see me he didn't have a very clear notion of what he wanted to do. He just had a vague idea, based on suggestions from friends, of making a documentary about mathematics. But after a lot of meetings I realized that he was really committed to the project and really wanted to make the film. So I told him that he ought to concentrate on mathematicians themselves rather than on mathematics in general, and visit the places where mathematicians worked as well. I suggested he go to the ICM in Hyderabad (India), where Cédric Villani was to receive a Fields Medal. This odyssey took him to Oberwolfach, to the MSRI in Berkeley and to New York, where he met Jim Simons. Peyron and his small crew traveled around together for three years and shot 170 hours of footage, which they edited down to one hour and forty minutes for the final film.

Q: What was the public response?

A: More than 80,000 people paid to see it at cinemas in France. The producers have managed to recoup their investment, and that's good. I try to promote the film all I can; in fact, that's why it was shown during the ICM at Seoul, and thanks also to the French embassy who paid for the subtitles in Korean.

Q: What was the critical reception?

A: Pretty good; many said that it was a chance to discover a world that was unknown to them, the world of mathematicians. Of course, not everybody liked it. One journalist said he didn't like it because he felt that it followed too many different directions without arriving at any conclusion. But that's what French documentaries are like; they show diversity, make you ask questions and don't seek to answer them...

Q: Also, when you were the head of the Institut des Hautes Études Scientifiques (IHÉS), the center published a book of photographs called "The Unravelers: Mathematical Snapshots". Where did that idea come from?

A: Well in fact that was something that happened without us looking for it. The photographer was at the IHÉS working on his own project. He began by taking hundreds of photos; he first spent some time photographing people at work until they got used to his presence and began behaving unselfconsciously, without paying to much attention to him. In that way he was able to capture more intimate moments of people hard at work. The result was wonderful. Then the idea came up to share these photographs to show how mathematicians worked and we devised a book with texts written by the mathematicians appearing in the photos. I thought all the texts would be more or less the same, but some were political and others more poetic. At the moment it's been translated into English, Chinese, Korean... and we're already on the second and third edition. It's been a great success; 21,000 copies have been sold worldwide. The combination of the talent of a great photographer and the mathematicians was almost random. And what really attracted the attention of people was the fact that it's possible to get an idea of the type of stimulating interaction that exists at a research center. You can see the expressions, the situations, the smart boards... The best photos were used for an exhibition that's toured the world. I was at the ICM in Hyderabad and there it was a hit. It was an incredible adventure for me and has had an enormous impact in France and in other places.

"We were able to see Patti Smith improvising a mathematical text; it was marvelous"

Q: You also worked with the Cartier Foundation on the exhibition "Mathematics: A Beautiful Elsewhere", which brought artists and mathematicians together to develop a joint work.

A: Yes, I was one of the curators; my work consisted of bringing artists and mathematicians together. I didn't know whether pairing them off worked, but many got on well together and some shared a mutual fascination. I think that the outcome was impressive. In one of the presentations, Patti Smith was singing a song based on a text by Misha Gromov and forgot some of the words, so she had to improvise. It was marvelous to see her improvising a mathematical text. The result made sense and of course nobody realized she was making it up.

Q: What's the role of scientific outreach in the ERC projects?

A: In the near future, I'd like to set the grant holders the challenge of organizing a talk at the end of their projects in which they present their results before an audience at whatever level they wish. It would also be interesting to record these talks for further use. This would serve to create an interesting database, and even though some of the talks might not be of the highest technical or communicative level, I think that many of them would satisfy that standard. We would make these recordings available on the ERC website. They'd provide some wonderful outreach material.

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From top to bottom and from left to right: Keith Rogers, Daniel Faraco, Diego Córdoba, Chema Martell, Daniel Peralta, Alberto Enciso y Javier Parcet, ICMAT ERC researchers. Jean-Pierre Bourguignon; Carmen Vela, Spanish Secretary of State for Research, Development and Innovation; Manuel de León, Emilio Lora-Tamayo and José Mª Sanz Martínez, UAM Rector.

REPORT: Ten European Research Council grants put the ICMAT top of the table in its area

Europe endorses ICMAT's excellence in mathematical research

Ignacio Fernández Bayo. One of the most widely recognized means of measuring scientific excellence in Europe is the number of grants awarded by the European Research Council (ERC), whether in the "Starting" category for young researchers or in the "Consolidator" category for senior scientists. The Institute of Mathematical Sciences (*Instituto de Ciencias Matemáticas* - ICMAT) has so far received eleven such grants, including all the Starting Grants extended to Spain in the field of mathematics. Counting the latest approved projects, the ICMAT is already the leading European institution in terms of these grants awarded in its field, placing it ahead of all other research centers or university departments on the continent, even those of Oxford and Cambridge Universities.

The calls for these grants are highly competitive, to the extent that this year alone submissions for 3,500 projects were received, of which only fewer than 10% proved to be successful. Only those cutting-edge research projects of the highest quality stand a chance of achieving success.

Starting Grants are provided in support of the best young scientists to enable them to set up their own research groups in European institutions. Calls for this type of grant are among the most highly contested, and this year only 328 such projects have been awarded in the whole of Europe, 20 of them in Spain, two of which are in the field of mathematics. One of these was obtained by Alberto Enciso, a Ramón y Cajal researcher at the ICMAT, while the other was awarded to Francisco Gancedo, a researcher at the University of Seville and PhD holder associated with the ICMAT.

Enciso's grant is the ninth to have been secured by the ICMAT, and has placed the center at the top of the European table as far as mathematics is concerned. As ICMAT director, Manuel de León, points out: "This high number of ERC projects is an unmistakable demonstration of the quality of our researchers and the excellence of the Institute on an international level." This ERC endorsement is by no means a matter of chance. As de León goes on to say: "The strategy we follow is to attract outstanding talents and then provide them with the best possible conditions to enable them to compete internationally. Furthermore, we have set up an ICMAT European Office to drive this process forward with the help of a highly experienced manager. We also place great emphasis on the organization of top-level scientific activities in order to create a stimulating environment, which provides the ideal breeding ground for talent. We aim to continue in this direction with the purpose of enabling all our researchers to develop their potential here to the full."

In addition to the recognition that this endorsement means for researchers and the center where they work, it also provides vital financial support to create or consolidate the work team led by the beneficiary of the grant; funding that is particularly important for the development of science in those countries most affected by national budget cuts, among which is Spain. This funding will help to bring international experts to the research center, as well as to appoint promising young mathematicians so they can carry out their projects and complete their training as experts in cutting-edge fields of mathematical research.

The ICMAT research projects that have so far obtained funding through the ERC program of Starting and Consolidator Grants are as follows:

2008

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Javier Fernández de Bobadilla

Javier Fernández de Bobadilla was born in Granada in 1973. He graduated in Mathematics at the Complutense University of Madrid (UCM) and obtained his doctorate at the University of Nimegen (The Netherlands) and the UCM. He has been with the ICMAT since its origin in 2007 and is the only researcher belonging to the Institute who can boast two ERC grants on his CV. The first was a Starting Grant for the project "Topological, Geometric and Analytical Study of Singularities", which he obtained in 2008, while the second was a Consolidator Grant awarded in 2014 for the project "New Methods and Interactions in Singularity Theory and Beyond".

His field of study is singularities in algebraic geometry and his main results to date are the resolution of the conjectures made by Massey and Zariski, and that of a conjecture put forward by John Nash, which he demonstrated in 2011 together with mathematician and ICMAT researcher María Pe Pereira.

2008

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Diego Córdoba

Diego Córdoba was born in Madrid in 1971. He graduated in Mathematics at the Autonomous University of Madrid and obtained his doctorate at Princeton University (USA). His research work is focused on partial differential equations and their relation with fluid mechanics, with applications such as the prediction of the behavior of a tornado, the breaking of a wave or the movement of a storm. He got a Ramón y Cajal contract and was a member of the Institute for Advanced Study at Princeton University, a researcher and professor at the Princeton Department of Mathematics, visiting professor at the University of Texas, and for three years (1998-2001) was an L. E. Dickson Instructor at the University of Chicago.

Córdoba obtained his ERC Starting Grant in 2008 for the project "Contour Dynamics and Singularities in Incompressible Flows". He is currently the main researcher in various projects belonging to the National Plan and has already supervised four PhD theses as well as having three more in progress. His research results have been published in international journals such as Annals of Mathematics, Communications in Mathematical Physics, Advances in Mathematics, PNAS and the AIMS journal, among others. He has also received several awards in recognition of his work: the 2005 SEMA Prize (*Sociedad Española de Matemática Aplicada*) for outstanding young researcher and the 2011 Community of Madrid Miguel Catalán Prize for researchers under 40 years of age.

2010

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Javier Parcet

Javier Parcet was born in Madrid in 1975. He graduated in mathematics and then completed his PhD at the Autonomous University of Madrid with a special recognition: the National University Studies Prize and the Doctoral Thesis Prize. He subsequently went on to do three post-doc stays at the Texas A&M University, the University of Illinois in Urbana-Champaign and the Centre de Recerca Matemática in Barcelona. In 2006 he joined the ICMAT where he is currently a full researcher. In 2005 he was contracted under the Ramón y Cajal scheme. In 2006 he was also awarded the José Luis Rubio de Francia Prize, and in 2010 he obtained his ERC grant for the project "Noncommutative Calderón-Zygmund Theory, Operator Space Geometry and Quantum Probability".

His main area of research is harmonic analysis in non-commutative spaces. The appearance of quantum mechanics in the early 20th century sparked the extension of these types of spaces to different mathematical theories. For that purpose he uses tools from other areas of mathematics such as probability, functional analysis and geometry. Among his most significant results are the proof, together with the mathematician Marius Junge, of two open problems posed by G. Pisier on geometry in non-commutative L_p spaces, and his results concerning Fourier multipliers and Calderón-Zygmund operators in von Neumann group algebras.

2011

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Keith Rogers

The Scottish mathematician Keith Rogers was born in 1977. He graduated in Mathematics at Edinburgh University and was also distinguished with a Napier Medal. He completed his Master at Cambridge University in 2000, when he received a further distinction: a Tripos in mathematics from Trinity College. He obtained his doctorate in 2004 at the University of New South Wales (Australia) before going on to complete stays in Pisa, Gothenburg and the Autonomous University of Madrid. He eventually joined the ICMAT on a Ramón y Cajal research contract, and four years later, in 2011, he obtained his ERC grant for the project "Restriction of the Fourier Transform with Applications to the Schrödinger and Wave Equations".

Rogers currently works on different problems involving mathematical analysis, many of which are related with harmonic analysis. One of the main problems in this field is the description of functions for which the Fourier process can be applied. His aim is to achieve progress in this field by linking the Fourier process to the Schrödinger equation that underlies quantum mechanics.

With regard to his results, such as that obtained with Javier Parcet on the fundamental theorem of calculus in three dimensions, or those achieved recently with Pedro Caro about how to obtain the image of a non-smooth object inside a body, have met with much international interest. He is the co-author of more than 30 research papers, some of which have been published in journals such as the *Journal of the European Mathematical Society,* the *Proceedings of the London Mathematical Society,* the *Journal für die reine und angewandte Mathematik* and the *Proceedings of the USA National Academy of Sciences.*

2012

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Daniel Faraco

Daniel Faraco was born in Madrid in 1974. He graduated in Mathematics from the Autonomous University of Madrid and then moved to Finland where he completed his doctorate at the University of Jyväskylä and the University of Helsinki. He later joined the Max-Plank Institute in Leipzig (Germany) on a post-doc grant before returning to Spain on a Ramón y Cajal contract at the Autonomous University of Madrid. Faraco has belonged to the ICMAT since 2007, and in 2010 he obtained his ERC grant for the project *"Geometric Function Theory, Inverse Problems and Fluid Dynamics"*.

Faraco's field of interest is applied mathematical analysis. In particular, he studies inverse problems, problems of mathematical analysis arising from different situations in mechanics and physics. His results contribute to the creation of the mathematical models required for the development of invisible materials, which are materials whose interior cannot be reconstructed using images. He combines different mathematical tools with the aim of examining the interior of the human body using non-invasive techniques, although the applications of his work could also be used for detecting tumors as well as oil deposits.

Faraco's vocation for teaching is obvious. In 2007 he joined the University of Santander as a associate professor of Mathematical Analysis and the University of Valencia as a full professor of Applied Mathematics. Since October 2008 he has been a full professor of Applied Mathematics at the UAM.

2013

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Daniel Peralta Salas

Daniel Peralta Salas was born in Madrid in 1978. He graduated in Physics at the Complutense University of Madrid (UCM) where he also completed his PhD in Physics-Mathematics as well as receiving an extraordinary award. In 2013 he obtained his ERC grant for the project *"Invariant Manifolds in Dynamical Systems and PDE"* on which he is currently engaged. The grant is worth 1,260,000 euros and is awarded for the development of new mathematical tools for studying the topological and geometric phenomena that appear in different areas of physics: electromagnetism, optics, fluid mechanics, quantum mechanics, etc.

Peralta's main areas of interest are dynamical systems and the geometric theory of differential equations. Together with Alberto Enciso, Peralta has recently appeared in the media for having solved a 100-year old conjecture put forward by Lord Kelvin in which they found a proof for the existence of knotted vortex tubes in the stationary Euler equation, a result that was published in the prestigious journal *Acta Mathematica* and which has been signaled as a landmark in the study of the geometry of fluids.

He has published more than 50 research papers and habitually participates in international conferences, workshops and seminars. Before joining the ICMAT he was an assistant professor at the UCM and obtained a Juan de la Cierva post-doctoral grant at the Carlos III University in Madrid. He has been a short-term research visitor to Mathematical Departments at the Universities of Warsaw, Lyon, McGill and ETH, the Warwick Institute of Mathematics and the Kavli Institute of Theoretical Physics.

2014

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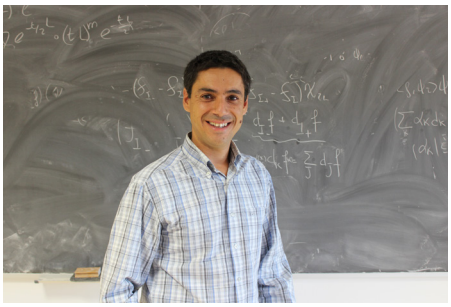

José María Martell

José María Martell was born in Madrid in 1973. He graduated in Mathematics and also completed his doctorate at the Autonomous University of Madrid. He carried out a post-doc stay at the University of Missouri-Columbia (USA) and since then has been a researcher at the following universities: the Autónoma de Madrid, the Missouri-Columbia (USA), the París Sud-CNRS, and the National of Australia. He became a Ramón y Cajal researcher in 2005 and is currently a full scientist at the ICMAT.

In 2014 he obtained an ERC Consolidator-Grant for the project *"Harmonic Analysis, Partial Differential Equations and Geometric Measure Theory"*, which deals with the study of mathematical problems at the interface of harmonic analysis, partial differential equations and the geometric measure theory. While the nature of his project is largely theoretical, he also seeks to study equations that model the phenomena of sound and heat diffusion in a rigorous manner. These types of problems appear in everyday situations such as when we wish to understand how sound is diffused in a library, or a bank where it is difficult to hear someone speaking softly. In simple terms, Martell's project seeks to understand the relation that exists between the good and bad properties of sound diffusion and the design of the enclosed space where such phenomena can be studied.

He has published articles in numerous scientific journals and has been cited on more than 600 occasions in journals, some of which are high-impact. He has also organized congresses and conferences that have attracted some of the leading specialists in his field.

2014

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Alberto Enciso

Alberto Enciso was born in Guadalajara in 1980. Like many ICMAT researchers, Enciso is a graduate in Physics from the Complutense University of Madrid (UCM), where in 2007 he also completed his doctorate in Mathematical Physics.

He was a Ramón y Cajal researcher. He is currently an ERC researcher at the ICMAT and has been awarded various prizes in addition to the ERC Starting Grant, which he obtained last year for the project "Geometric Problems in PDEs with Applications to Fluid Mechanics". In 2014 he also received the Príncipe de Girona Prize for Scientific Research, and in 2013 was chosen as the best Spanish applied mathematician by the *Sociedad Española de Matemática Aplicada* (SEMA), while in 2011 he was also distinguished as the best young Spanish mathematician by the *Real Sociedad Matemática Española*.

His research work is focused on the appearance of geometric and topological structures in partial differential equations in mathematical physics, for which he develops and employs tools at the boundary between analysis and geometry. He is the author of more than 50 research papers that have been published in international journals such as *Annals of Mathematics, Acta Mathematica and the Journal of Differential Geometry.* Alongside with Daniel Peralta, and after many years of work together, they have managed to solve the famous conjectures posed by Lord Kelvin in 1875 and by Arnold and Moffatt in the 1960s on knotted vortex lines in steady solutions, an achievement that has attracted much international attention.

2015

ICMAT

David Pérez-García

David Pérez-García was born in Guadalajara in 1977 and graduated in Mathematics at the Complutense University of Madrid, where he also completed his PhD. Shortly before defending his doctoral thesis, he moved as an assistant to the Universidad Rey Juan Carlos in Madrid. His research work in the first stage of his career dealt with functional analysis with applications to complex analysis. In 2005 he began a post-doctoral stay at the Thoeretical Division of the Max Planck Institute of Quantum Optics in Munich, where he switched topics to undertake work in mathematical physics. Since that time his research has been focused on computation in quantum information and its application to the study and characterization of quantum phases of matter. In 2006 he obtained a Ramón y Cajal fellowship, which enabled him to return to the Complutense University of Madrid, where since 2007 he has been an associate professor at the Department of Mathematical Analysis. He has also been with the ICMAT since 2013.

Pérez-García obtained his ERC Consolidator Grant in 2014 for the project "Spectral Gaps in Interacting Quantum Systems". Furthermore, he has also headed many regional, national and European research projects as well as supervising three doctoral theses. His results have been cited more than 2,750 times and have been published in journals such as Nature Communications, PNAS, Physical Review Letters and Communications in Mathematical Physics, among others. In 2012 he was awarded the Real Academia de Ciencias–Endesa Prize for Mathematics (young researcher category) and in 2104 he obtained the John von Neumann visiting professorship at the Technical University of Munich.

INTERVIEW: Shigefumi Mori

ICMAT

SHIGEFUMI MORI

"Accepting the presidency of the IMU is a way of giving back to the mathematical community all it has given me."

Lucía Durbán Carmona / Ágata A. Timón. Shigefumi Mori, a Japanese mathematician specializing in algebraic geometry and Fields Medal winner in 1990, is the first Asian president of the International Mathematical Union (IMU). His main challenge now is to organize the first International Congress of Mathematicians (ICM) to be held in Latin America, which will take place in Rio de Janeiro in 2018.

Question: This is the second time that you've formed part of the IMU Executive Committee, and this time as president. What differences do you find?

Answer: Yes, between 1999 and 2002 I was vice-president of the IMU, although the post didn't demand too much hard work. I've only recently been instated as president, but I'm aware that I have to organize many things. First of all, the next International Congress of Mathematicians (ICM), which requires a great deal of effort.

Q: What decided you to accept the presidency of the IMU?

A: The truth is that I had to take a lot of things into account. In fact, I'd enjoyed my spell as IMU vice-president very much, but accepting this post meant that when my term of president comes to an end I'd be nearly 70, and it could be the last job in my life. Although above all I think it's a way of giving back to the mathematical community all it has given me, and I'm very grateful for the opportunity.

Q: What are the main goals you've set yourself for your term in office?

A: There's no doubt that the greatest challenge lies in Rio de Janeiro. Organizing the next ICM with Brazilian colleagues is a priority of great importance.

"The challenge is to organize the next ICM with Brazilian colleagues"

Q: What direction is the ICM going in? Do you think that the next congress will help to support research in emerging countries?

A: If between now and 2018 something really new turns up, of course we'll take it into account. But at the moment we've not set out any particular direction for Rio; the idea is to continue with a management model we know that works. And yes, I think the next ICM will provide an impetus for research in emerging countries, although it's something that the mathematical community is already working on. If you take a look at the list of Fields Medal winners, you can see that in this sense diversity is already an important factor, and some 1,000 researchers from emerging countries were invited to the last ICM in South Korea..

By Konrad Jacobs

Q: You are the first Asian president of the IMU. What does this mean for your continent?

A: I don't think I've been elected because I'm Asian, but if this fact means that it will arouse interest in mathematics across the whole continent then I'll be very happy. What's more, I'm also the first Japanese person to hold this post, so I'll do everything possible to promote mathematics in my country.

"One of my most surprising results came to me by mistake"

Q: What do you think about training outside the USA and Europe? Researchers like the Brazilian Artur Ávila, who's also a Fields Medal winner, have chosen throughout their careers to stay in contact with the scientific systems of their respective countries of origin. Was that the same in your case?

A: I graduated in Japan but I travelled a lot in the USA and other countries. At the time I was doing research in work that later earned me my Fields Medal, my life consisted of constant comings and goings between Japan and the USA. So in this sense I'm a researcher who is half American and half Japanese. But yes, I decided to stay in Japan; I liked the way of life; I wanted to live in Japan and wanted my children to grow up there. I think I'm the only one to have done this. There are two Japanese winners of the Fields Medal who are published in the USA, so in this sense and as the first Japanese president of the IMU, I feel a certain responsiblity.

"Although I decided to live in Japan, I'm a researcher who is half American and half Japanese"

Q: How did you discover your vocation for mathematics?

A: At the age of 16 I went in for a competition and was fascinated with the type of problems that were being posed. It had nothing to do with the usual exams I was sitting, and it also gave me the opportunity to submit my answers after working on them on my own account and then get the feedback. I think it was then that I got hooked on "thinking and thinking again", which is what mathematics is for me.

Q: Could you tell us what your research work is focused on now?

A: It's focused on the use of algebra for defining geometries. People know about algebra and they know about geometry, but my work is a combination of both. A typical example is the equation: $x^2+y^2=1$, which describes any circle from its origin. So on the one hand we have an algebraic equation and on the other a circle, which is a geometric figure.

Q: What type of problems do you address?

A: First of all there's geometry, which means the study of shapes, and then the adjective "algebraic", which implies that figures are defined in an algebraic way, by means of equations. There are other ways of studying geometries, but the algebraic geometry is the most restrictive; it's based on polynomial equations. The figures we deal with are almost unreal, so at any given moment you have to employ imagination and creativity, and that's what I like most about this specialty.

Q: Among all the results you've obtained, which would you particularly mention?

A: I like my result on rational curves. The proof is relatively simple. I don't mean that everyone can understand it, although doctoral students working on algebraic geometry can. I particularly like it because the method I employed in the proof is surprising and came to me by mistake. I spent two years trying to prove a conjecture by Hartshorne and I couldn't do it. Then one day I tried to prove an intermediary result; I tackled a series of intermediary problems and tried to resolve them, but just when I thought I'd done it I found an error in the proof. And this is where I feel rather proud; instead of getting rid of the error I started to study it in great detail and realized that in fact I'd proved a very curious theorem. Under certain very abstract conditions I found rational curves. This was the main result, and once I realized this I was able to prove the whole problem within a week. The process was fascinating.

Q: ¿In what direction should mathematical research be heading?

A: Just lately it seems that a lot of stress is being laid on applied mathematics. While I understand that this is a field of great interest, I think that we should be striving towards the search for a good balance between pure and applied research. Furthermore, I think that greater effort should be made to promoting both pure and applied mathematics so they can be understood in other spheres.

QUESTIONNAIRE: David Ríos

ICMAT

DAVID RÍOS

David Ríos Insua was born in 1964. He graduated in Mathematics at the UCM and obtained his doctorate in Informatics at Leeds under the supervision of Simon French. He is currently the AXA-ICMAT Chair in Adversarial Risk Analysis and member of the Spanish Royal Academy of Sciences.

"Real world challenging problems are a source of new mathematics"

Q1: Why did you choose mathematics ahead of any other subject??

I guess there was some tradition of maths at home... and I was not bad at it in High School.

Q2: Besides mathematics, which activities do you like most?

Playing and learning with my daughters, traveling with family and friends (specially to Galicia), swimming, surfing, walking by the sea, listening to music I like (Ron Sexsmith, Elvis Costello, Ray Lamontagne, Ana Moura,...)

Q3: A movie, book or play you'd recommend?

A recent book: Berlin Vintage by Oscar Prieto.

Q4: What was your first encounter with mathematical research?

I had an Intro to Research grant for students in their final courses at CSIC, just when the math institutes had been dismantled (nothing to do with the current ICMAT). So I was given complete freedom and worked on multiobjective decision theory, which was kind of starting at that time. It was a lot of fun.

Q5: What did you like most about your early experiences with mathematical research?

An emotional roller coaster, with moments of great euphoria, but also with somewhat frustrating periods.

Q6: Which scientist has impressed you most during your career?

Jim Berger, Professor of Stats at Duke University. He's the most influential statistician alive and has a very open, easy-going and friendly character.

Q7: If you could have a one-hour blackboard discussion with an ancient mathematician, whom would you choose to meet and what would you discuss?

Probably with von Neumann about utility theory and games or Thomas Bayes about Bayes' theorem.

Q8: Do you have a particular theorem or formula you especially like?

Bayes' formula. For many it may seem mathematically trivial, but it shows us how evidence should be processed and affects so much of current technology and science.

Q9: What is your favourite mathematical book?

Savage's *The Foundation of Statistics*.

Q10: How would you describe/sketch your research interest in a few lines?

Motivated by real world complex problems, I try to develop better methods for processing evidence and supporting decision makers.

Q11: Which recent results in your field would you highlight?

The new ideas in adversarial risk analysis will bring new insights in conflict resolution problems and may pave the way to a better and safer world.

Q12: Which particular mathematical problem do you consider especially challenging?

I prefer to think about real world challenges: climate change mitigation, helping to build a safer world, designing a truly intelligent machine entail so many mathematical challenges...

Q13: Which subjects in mathematics outside your field would you like to learn more about?

Politics, Human behaviour, Emotions, Neurosciences, Robotics, Clouds, Waves,... so many.

Q14: In the future, where do you think the interaction between different branches of mathematics may be more fruitful?

A mixture of Bayesian Statistics, Machine Learning, Game theory and Optimization will be key in helping to solve many of the grand challenge problems facing us in the real world.

Q15: Do you have any message or advice you would like to share with young mathematicians?

Spend time dealing with real world challenging problems. They are a source of new mathematics.

Q16: What's the situation of European mathematics in the world at the moment? And what's the position of Spanish mathematics on the European continent?

In my fields of interest (Bayesian Statistics, Decision Analysis, Risk Analysis) the core groups are in the US. In my fields of interest, the Spanish level is reasonable when compared across Europe.

Q17: What's the importance of European funding for the development of your research?

It allows me to be in contact with challenging complex problems in which new mathematical tools are needed. And also to keep in touch with important companies.

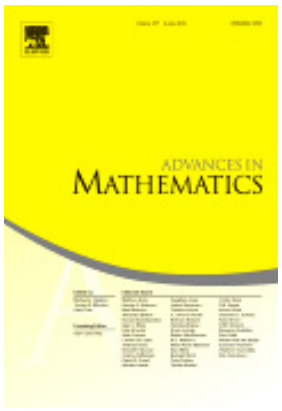
Q18: What advice would you give to someone who's going to apply for a European call?

Prepare the proposal with sufficient time, have your proposal read by a couple of really critical colleagues and don't despair if you succeed the first time. Resubmit as needed!!!

SCIENTIFIC REVIEW

Title: Channel capacities via p-summing norms
Authors: C. Palazuelos (ICMAT-UCM) M. Junge (University of Illinois at Urbana-Champaign)
Source: *Advances in Mathematics 272, 350-398*
Date of Publication: 2015

Channel capacities via p-summing norms



In the past few years operator algebra and functional analysis techniques have found very interesting applications in quantum information theory. For example, operator space techniques have been applied to the context of Bell inequalities; free probability has been shown as a very useful tool to study the classical capacity of a quantum channel, and noncommutative versions of Grothendieck's theorem have been used for efficient approximations for quantum values of quantum games.

An important part of the work corresponding to the *Marius Junge Laboratory* at ICMAT is focused on this interconnection between mathematics and quantum information. In this line, in the recent paper published in *Advances in Mathematics* the authors have revealed a connection between *the metric theory of tensor products* developed by Grothendieck and the study of channel capacities, a central topic in *Shannon's information theory.*

A *noisy channel* is defined as a positive linear map between the sender and the receiver, which preserves probability distributions. The *capacity of a channel* is defined as an asymptotic ratio of the number of transmitted bits to the number of the required uses of the channel to transmit those bits, when the error in the communication tends to zero. Although the main theorem in the paper is stated in a much more general context, it already reveals a beautiful relation between Shannon's information theory and absolutely p-summing maps when it is applied to classical channels. It states that the capacity of a channel can be obtained by differentiating the p-summing norm of the channel, when this is realized as a linear map between certain Banach spaces.

The theory of *absolutely p-summing* maps was introduced by Grothendieck and has been exhaustively studied by many mathematicians as one of the cornerstones of Banach space theory. Indeed, absolutely p-summing maps have been shown to be an extremely useful tool for studying geometrical properties of Banach spaces and their relation with probability theory and harmonic analysis. Pisier recently generalized the theory of absolutely p-summing maps to the context of operator spaces, a noncommutative version of Banach spaces, by means of the so-called *completely p-summing maps.*

Considering the previous relation between absolutely p-summing maps and the capacity of a classical channel, one might wonder if completely p-summing maps could play an analogous role in the quantum (so, noncommutative) version of Shannon's theory; that is, in quantum information theory. In this new context, quantum channels are considered, which are completely positive and trace preserving maps between matrix

algebras; it is then possible to study the capacity of this channel to transmit classical information (bits) as well as its capacity to transmit quantum information (qubits). Moreover, a surprising phenomenon appears in the quantum scenario that is called *quantum entanglement*. Roughly speaking, entanglement allows two systems to be correlated so that performing some operations in one of them can instantaneously modify the state of the other. It is therefore not surprising that the sender and the receiver of a channel can use an entangled state to increase the capacity. In this case, we talk about the capacity of the channel with *assisted entanglement*. The main result states that the classical capacity of a quantum channel with assisted entanglement can be obtained by differentiating the completely p-summing norm of the channel, when this is realized as a linear map between certain matrix algebras.

The work establishes a bridge between two theories, a priori completely disconnected, which are very active in the corresponding fields. This will allow us to use operator space techniques to study different questions in the context of quantum channels. Moreover, our current research is also exploring the converse direction; namely, how techniques from quantum channel theory can be applied to the theory of operator algebras and operator spaces.

About the authors

Carlos Palazuelos was born in Madrid (Spain) in 1979. He obtained a PhD in Mathematics at the Universidad Complutense de Madrid in 2009. He spent one year (2010) at the University of Illinois at Urbana-Champaign as a visiting assistant professor. In 2011 he joined the CSIC-ICMAT on a Juan de la Cierva contract. Since December 2013, he has been working on a Ramon y Cajal contract at the Universidad Complutense de Madrid-ICMAT.

The main topics of his research are functional analysis and quantum information theory. Most of his work is focused on the applications of the operator space theory (a noncommutative analogue to Banach space theory) to quantum information theory; in particular, to the theory of Bell inequalities, quantum entanglement and quantum channels. Part of this work is very closely related to certain problems in the field of operator algebras. Some of the works in this line can be found in journals like Communications in Mathematical Physics, Advances in Mathematics, Physical Review Letters and Computational Complexity. Another important line of Carlos' research work is noncommutative Harmonic Analysis. Specifically, some of the most recent works by Carlos are about hypercontractivity in von Neumann algebras.

Marius Junge was born in 1962 in Hannover, Germany. He defended his Ph.D. Thesis at Christian-Albrechts Universität at Kiel, under the supervision of Herman König. In 2007, Junge received a full professorship at the University of Illinois at Urbana-Champaign.

Marius Junge is known worldwide for his work in quantum probability, operator space theory, noncommutative harmonic analysis and more recently quantum information theory. Of special interest are his contributions on noncommutative maximal Doob's and ergodic theorems, the Grothendieck program for von Neumann algebras, the cb-embedding theory for noncommutative L_p spaces, and more recently on Fourier multipliers for group von Neumann algebras and violation of Bell inequalities.

The aim of the project is to include the quantum mechanical perspective in the context of harmonic analysis and information theory. We are interested in extending classical estimates for Fourier multipliers to group von Neumann algebras and other noncommutative scenarios. Among other topics, this includes Hörmander-Mihlin multiplier type theorems, Calderón-Zygmund and Littlewood-Paley methods, hypercontractivity and log-Sobolev inequalities, transference techniques... Furthermore, some of these problems lead us to new viewpoints in classical harmonic analysis. Regarding quantum information, we will be focussing on quantum channels, Bell inequalities and entanglement theory and quantum games via operator spaces.

PROFILE: Omar Lazar

ICMAT

On the hunt for new results for the Muskat problem

OMAR LAZAR

Omar Lazar was born in Paris in 1985. He graduated in Mathematics (2009) and did his doctorate (2013) at the Université de Paris-Est. He joined the ICMAT in October 2014 to work on his Marie-Curie fellowship post-doctoral project under the supervision of researcher Diego Córdoba. His research work is focused on the study of the Muskat problem as well as the dissipative surface quasi-geostrophic equation.

Lucía Durbán Carmona. Omar is one of those researchers of whom it could almost be said that he was born with the sign "Watch out! Mathematician!" stamped on his forehead. And there has to be some mathematical genetics in his family when his father is a mechanical engineer, and both his uncle and his only brother are also mathematicians. When asked about the origin of his vocation, Omar laughs and says that already at the age of six he amused himself by doing calculations with his parents, and a little later he was asking himself "if one day I would understand those lovely illustrations in the books on the shelves at home". They were drawings containing formulas that represented motion, and of course he eventually managed to understand them, because Omar had come into the world already cut out for mathematics; but what kind of mathematician? "The curious type," he says, "one of those who yearn to learn more, who enjoy discovering new things". So he became an academic, and now he is at the ICMAT working on his Marie-Curie fellowship post-doctoral project under the supervision of Diego Córdoba. Since he first went to university it was clear that he was destined for research, or as he expresses it in his mother tongue, it was "*une suite logique*".

"The Marie-Curie fellowship grant is a very comprehensive post-doc that covers both academic and administrative work"

This young researcher had already been at the Institute before, when he spent six months working with Diego Córdoba, but this time things are different. He has a grant for two years enabling him to solve problems arising from the theory of nonlinear partial differential equations. And not only that, because among other things a Marie-Curie fellowship grant also involves organizing and participating in conferences as well as inviting and being invited to collaborate with other researchers. "It's a great opportunity," he explains. "It's a very comprehensive post-doc that covers both academic and administrative tasks". Nevertheless, his main goal is to prove new global existence results for the Muskat problem, an equation that models the interface between two fluids with different characteristics. It is Omar's intention to build on the new formulation of the Muskat problem, which has already been proved, in order to demonstrate new results.

Omar's intention is to build on the new formulation of the Muskat problem, which has already proved, in order to demonstrate new results

But he has also set himself the challenge of gaining deeper knowledge of the unknown dissipative surface quasi-geostrophic equation, which is not such a novelty for him. In fact, it formed part of his doctoral thesis in which he proved new global existence theorems and local weak solutions in the critical case, and which was published in the journal *Communication in Mathematical Physics*. He has also studied the unidimensional model of this equation, the Córdoba, Córdoba and Fontelos model, in which he has already managed to prove the existence of solutions when the data are taken in weighted Lebesgue and Sobolev spaces.

It appears that fluid mechanics is and will continue to be at the forefront of Omar's work, and his interest in partial differential equations may have come from a book on analysis by Jean Dieudonné entitled "Infinitesimal Calculus", although he says that he would find it difficult to name his favourite mathematician. However, when pushed he opts for a contemporary, Charles Fefferman, and adds that he would have loved to have attended the course given by Laurent Swchartz when he was presenting his new vision of distribution theory.

When his Marie-Curie grant comes to an end in October, 2016, Omar would like to have a shot at obtaining a research post of the "*Maître de conférences*" type, which is a senior lecturer post involving both teaching and research work, and in ten years' time he hopes to be able to supervise a PhD student of his own. That would be a far cry from the day when, reading his first scientific article that cited Córdoba and Córdoba and Schonbek and Schonbek, he thought that it was necessary to quote the same contributor twice! However, he did not take him long to realize that the reference was to the brothers Schonbek and to Córdoba senior and Córdoba junior, the latter being his current supervisor at the ICMAT.

When his grant comes to an end, he would like to have a shot at a "*Maître de conférences*" research post

AGENDA

Scientific Activities

Research Term on Analysis and Geometry in Metric Spaces
April 1 – June 30, 2015

International Early Stage Researcher Training School on Applying Expert Judgement Methodologies to Real Problems
April 12-15, 2015

Workshop on Expert Judgement for Geographical and Adversarial Problems
April 15-17, 2015

Venue: ICMAT y Real Academia de Ciencias Exactas, Físicas y Naturales, Madrid (España)

Workshop IlLuminyating 2015

May 7-8, 2015

Workshop on Analysis and Geometry in Metric Spaces
June 1-5, 2015

Joint STAMP conference and 9th ICMAT International GMC Summer School on Symplectic Geometry, Classical Mechanics and Interactions with Spectral Theory
June 29 - July 3, 2015
Venue: Miraflores de la Sierra (Madrid, España)

Outreach Activities

4º ESO + Empresa
March 23, 24 and 25, 2015

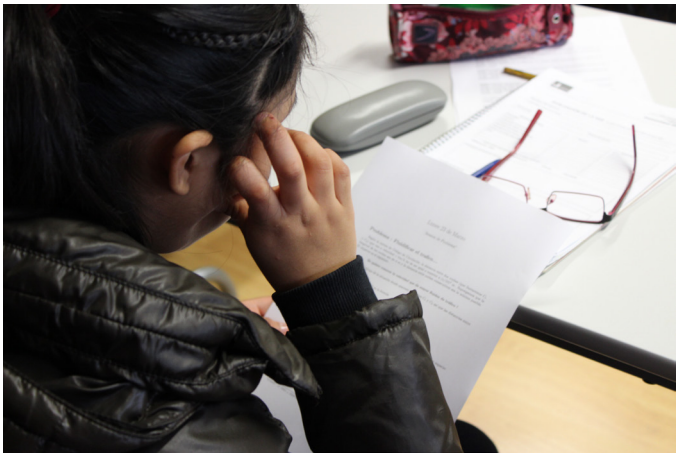
Matemáticas en la Residencia with Sylvia Nasar
"Nerds as rock stars: Math in 21st century pop culture"
April 16, 2015
Venue: Residencia de Estudiantes

Mathematics Today
ICMAT News

30 SECONDARY-SCHOOL STUDENTS BECOME MATHEMATICIANS FOR A FEW DAYS

This is the third year in which the ICMAT has taken part in the Community of Madrid "4º ESO+Empresa" initiative. After receiving more than 60 applications, 30 secondary-school students have been chosen to visit the Institute on March 23rd, 24th and 25th. Over this three-day period, the students will get to know the work of mathematical researchers at first hand thanks to a program specifically designed for the occasion.

On the first day they will visit the ICMAT facilities, including the library, computation areas and other resources available at the center. The director of the ICMAT, Manuel de León, will introduce the students to the center and provide them with an overview of mathematical research work that is conducted within the top-class structure provided by the Institute. This will be followed by problem-solving sessions in which different members of the ICMAT will work side by side with the students, posing questions arising from current research adapted to the age of the students themselves. The researchers participating in "4º ESO+Empresa" on this occasion are as follows: Omar Lazar, post-doctoral Marie-Curie researcher; Fernando Chamizo, UAM professor, and PhD students Cruz Prisuelos (UAM-ICMAT), José Manuel Conde Alonso (UAM-ICMAT) and David Fernández (CSIC-ICMAT).



ICMAT

The students experience mathematical research work at first hand.

ICMAT News

SYLVIA NASAR EXPLORES THE FIGURE OF THE NERD-GENIUS IN MADRID

ICMAT

Sylvia Nasar

On April 16th, at seven-thirty in the evening, Sylvia Nasar, journalist and best-selling author of "A Beautiful Mind", which tells the story of mathematician and Nobel Prize winner, John Nash, gave a talk at the *Residencia de Estudiantes*, where she was introduced by Pablo Jáuregui, chief science editor at the national daily El Mundo.

What do we find so fascinating about figures such as Alan Turing, John Nash or Grigori Perelman? What does this tell us about contemporary culture? These are the questions that Sylvia Nasar poses in her talk "Nerds as rock stars: mathematics in 21st century pop culture", when she explored the figure of the nerd-genius as a media myth.

Sylvia Nasar was economics correspondent for the New York Times and is currently Professor of Business Journalism at Columbia University. Her work has appeared in publications such as The New Yorker, Vanity Fair and Newsweek. Her most recent book is "Grand Pursuit: The Story of Economic Genius."

ERC PRESIDENT VISITS THE ICMAT

On February 27th, the president of the European Research Council (ERC), Jean-Pierre Bourguignon, paid a visit to the ICMAT and the CSIC. He first gave a talk at the CSIC headquarters about the ERC and the Spanish participation in the institution, and later went on to the Autonomous University of Madrid (UAM) campus to visit the ICMAT, where he was accompanied by the Secretary of State for Research, Development and Innovation, Carmen Vela, the president of the CSIC, Emilio Lora Tamayo, and the UAM rector, José Mª Sanz Martínez, among others.

The main aim of the ERC is to further top-level research in Europe by means of competitive funding programs. The grants are provided for scientists to develop cutting-edge projects are structured around three phases of research careers: "Starting", "Consolidator" and "Advanced". Jean Pierre Bourguignon's visit is closely linked to the singular situation of the ICMAT, which has so far been awarded 10 ERC Grants and is thus the research center to have received most backing of this type in Europe, ahead of other institutions such as Oxford University. As ICMAT director, Manuel de León, points out: "The high number of ERC projects is unmistakable proof of the quality of our scientists and the excellence of the Institute at an international level."

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Jean Pierre Bourguignon during his visit to the ICMAT, together with academic authorities and researchers.