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Special Issue

Proceedings of the International Conference in Memory of Professor José Fernando Escobar 1954 – 2004



Under the auspices of



CHEPE

Chepe, you knew
the world does not go on forever.
You held this bitter truth
between your teeth,
daily.
Its taste was with you.

You watched, bemused,
while we frolicked
with our comfortable illusions.

You also knew
that deeper truths,
truths worth fighting for,
Do not yield easily to the grasp.

You watched, bemused,
while we rolled out
our shiny harvesters
And plucked away
the lowlying fruit.

You knew, to be midwife
to the birth of something truly new
Takes strength and cunning,
luck and pluck,
perseverence and serendipity,
The greatest force
in the smallest hands.

You also tasted this.

Bob Strichartz, Ithaca N.Y. 2005

EDITORIAL

Chepe Escobar

Professor Jaime Lesmes' speech in the opening ceremony of the conference in memory of José Fernando Escobar.

First of all, I would like to thank the Organizing Committee of the Conference for choosing me for the extremely honoring task of presenting this biographical sketch of our very dear friend Chepe.

While writing this note I could not avoid feeling an overwhelming sensation of grief and sadness, and yet I did it with great joy and delight. I was bound up with Chepe by a friendship that goes back in time over 26 years, since I had the pleasure of being his teacher at the Instituto de Matemática Pura e Aplicada (IMPA) in Rio de Janeiro. This occasion allows me to express my



A friendship that goes back in time Professor J. Escobar and Professor J. Lesmes.

great admiration and appreciation for his outstanding mathematical capacity, for his work as a scientist, as a teacher and guide, and for his honesty and remarkable human qualities. Admiration and appreciation which was always felt by those who knew Chepe. I would like to point out very specially the gratitude and recognition of the Colombian mathematical community for his untiring determination to be helpful, and his extensive work and decisive contributions to the development and rising of the mathematical level in Colombia. Chepe loved Colombia, his country and our country, and throughout his life he maintained close ties with it.

José Fernando Escobar was born in Manizales in 1954, he was the youngest of three siblings. But Cali, where he lived since he was a little kid and where he was raised, became his home since early childhood and stamped characteristic features on his personality, like his joy for la salsa and la rumba, and his great love for sports. During his childhood and youth he was several times national champion of ornamental dives and in this specialty he won international titles for Colombia. He was extremely fond of soccer. He was almost as proud of his expertise in this matter as he was of his mathematical

achievements, and used to play it regularly during his entire life. Very often he used to say how this habit gave him a feeling of well-being and tranquility. His high school studies were carried out at Lacordaire School in Cali and in 1973 he entered the mathematics undergraduate program at Universidad del Valle, having an outstanding performance throughout his studies and obtaining the mathematician title in 1977. He used to remember lovingly the influence exerted over him by professor Carlos Rodriguez. Throughout his life he maintained strong ties to Universidad del Valle, a topic that I will touch again later.



During his life Chepe almost had time to do everything, even to become in a skilled sportsman.

After being awarded a scholarship from the Brazilian government, in August of 1977 he entered to the master program in mathematics at the Instituto de Matemática Pura e Aplicada (IMPA) in Río de Janeiro. I can assure that Chepe was one of the brightest students at IMPA. He did not just show an excellent mathematical performance, but he was also integrated to a high grade to the academic environment of the institute, which I believe is the first mathematical center in Latin America. In 1979 he obtained his master degree with the thesis work "Equações elípticas de 2ª ordem: soluções C^* ao problema de Dirichlet", written under the advising of the Uruguayan mathematician Ricardo Mañé. I lively remember the impres-

sion I received while I was reading his thesis, of which I was honored of have been a juror.

Moreover, during his years of permanence at IMPA and very accordingly to his personality and human qualities, Chepe took with him a wide range of manifestations of the Brazilian way of living, enjoying and learning about the music, the dances and other cultural expressions of this country. He also found, obviously, an environment more than appropriate to nurture his love of sports, specially his passion for soccer.

Because of his excellent performance at IMPA, the National Council of Scientific and Technological Development (CNPq) of the Brazilian government awarded him a scholarship to pursue doctoral studies at The University of California at Berkeley, where he entered in 1980. A short time after being there Chepe faced one the hardest challenges in his life. In his handling and overcoming of this ordeal he showed strength, serenity, good sense, intelligence, objectivity and control at its best. He was diagnosed a lymphatic cancer, which after two years of treatment in the Stanford's Medical Center and thanks to the exceptional qualities that I have mentioned, was cured.

During that difficult period, he received valuable and unselfish support from his wife, María Helena Jimenez.

Once that painful stage was overcome, it began what would be for Chepe his very brilliant scientific career. The field in which he entered and in which he would become an outstanding figure at a world level, was Geometrical Analysis. This area, since over three decades, has gained a remarkable impulse within the mathematic research. In Geometrical Analysis methods of partial differential equations are systematically used in order to solve problems of Differential



Chepe as Ph.D. student at the University of California at Berkeley.

Geometry; and, conversely, geometric considerations have eased and enriched the solution of problems in partial differential equations. That symbiosis between these two areas, traditionally considered far away from each other, has given origin at some of the deepest works in today's mathematical research. Among the pioneers of this field stands out the figure of Shing-Tung Yau at the seventies, who was awarded the Fields Medal in 1982. The most brilliant disciple and collaborator of Yau has been Richard Schoen, also one remarkably outstanding figure within that field, currently working as a professor at Stanford University, who was José Fernando's thesis advisor at Berkeley, and whose participation we have the honor of counting with in this event.

During his doctoral studies, in 1985, Chepe was a visiting member of the Mittag-Leffler Institute in Sweden, during a special year about non-linear analysis; and of the Institute des Hautes Études Scientifiques (IHES) in France, marking the beginning of his international recognition. In 1986 Chepe received his doctoral degree, with the thesis "Linear and Nonlinear Partial Differential Equations with Applications to Geometry", written, as I already said, under the direction of Professor R. Schoen. In that thesis was given a solution to a problem that had been open for more than 20 years. The problem is: "What functions on the sphere can be the scalar curvature of a metric conformal to the sphere?" That solution appears in an article with R. Schoen: "Conformal Metrics with Prescribed Scalar Curvature", published in *Inventiones Mathematicae* in the same year of 1986.

After receiving his doctoral degree, Professor Escobar successively was:

- Associate of investigation at Courant Institute at New York (1986 to 1987).
- "Dickson Instructor" at The University of Chicago (1987 to 1988).

- Assistant professor at The University of Chicago (1989 to 1990).
- Associate professor at University of Indiana at Bloomington (1990 to 1994).
- Full Professor at Cornell University (since 1994 until his death).

The scientific and professional career of José Fernando Escobar during the 17 years lapsed since he received his doctoral degree until his premature disappearance was of a truly admirable quality and intensity. It is absolutely impossible for me to draw an accurate picture of this career and of the positive influence exerted by Chepe on Colombian mathematics. So I will limit myself to draw a rough sketch of some the most relevant aspects. A very meaningful fact is that after obtaining his doctoral degree, in just 8 years he became full professor at Cornell University, whose mathematics department is considered among the best of the United States.



Chepe as a full Professor at Cornell University.

Referring to professor Escobar, Peter May, director of the mathematics department of The University of Chicago, said in a letter dated in 1989 "... the assistant teachers of The University of Chicago, form an extremely select group. Escobar is outstanding among the best, even within that group. The research in mathematics requires rare talents and there are very few people in the world with his capacity. People like him are the ones who are needed to fill in the best mathematics departments..."

Professor Escobar published over 30 articles of investigation and was editor of 5 books. Something that speaks very positively about his height and ethic as a researcher is the fact that he always guided himself by the principle of "quality before quantity", and in fact, the majority of his investigative articles are of a high quality, published in first rank international magazines.

This is not the place to analyze in detail his mathematical work and I am very far of having the capacity to do it. Most of the lectures in this conference will be, directly or indirectly, touching some of his work. I am just going to say a few words about two of his first works:

1. "The Yamabe Problem on Manifolds with Boundary", published in 1992 in the Journal of Differential Geometry. According to professor Escobar himself, this was maybe the work that people identified him the most often. In that paper he solved a problem dating from the sixties. I quote what is said about that article in professor's May letter, which I referred to before: "This article is an extraordinarily deep work, original and technically difficult, a really big contribution to Mathematics. Possibly no one without an exceptional ability could have proved the theorems existing in it[...] is an article that any of the best mathematicians of the world would be proud of have written". The solution to Yamabe's problem was completed by professor Escobar in a later paper, appeared in 1996 at the Indiana University Mathematical Journal.
2. "Conformal Deformation of a Riemannian Metric to a Scalar Flat Metric with Constant Mean Curvature on the Boundary", published in 1992 in Annals of Mathematics. This 50 pages long article was the fruit of three years of work; about it can be said also that any mathematician would be proud of having written it.

By that time, Professor Simon Donaldson from Oxford University and receiver of the Fields Medal in 1986, said about Escobar's work: "... there are probably a few mathematicians of his age in the world with the same handling of non-linear Analysis and variational problems ..."

I also want to partially quote the review appeared at Mathematical Reviews about his book "Topics in PDE's and Differential Geometry", published by the Universidade Federal de Goiás, in Brazil, in 2002: "this is a beautiful, short book in which the author examines various themes about partial differential equations and their applications to Riemannian geometry... it is very well written and it contains very elegant mathematics... I strongly recommend this book, that I liked very much".

Jose Fernando Escobar was a visiting professor at Universidad Nacional here in Colombia, at Warwick University in England, at the Princeton Institute for Advanced Studies, at the Berkeley Mathematic Studies Research Institute, at Stanford University, at the Courant Institute at New York University, and on several occasions at the IMPA and here at Universidad del Valle. Furthermore, he was a guest speaker at a considerable amount of mathematical gatherings and at an array of universities and research institutes in the United States, Colombia and Brasil. In addition, he visited countries as diverse as England, South Korea, Italy, Argentina and China, where by an invitation made by that country's Scientific Academy he had a chance to visit several universities. Puerto Rico, Germany, Spain, and Canada were also some of the places he visited during his time. He had also been co-president of the "Conferencia sobre Problemas Variacionales en Geometria Diferencial

y en Ecuaciones Diferenciales Parciales" that took place in 1993 at the International Center of Theoretical Physics in Trieste, Italy. He was president of the first and third Differential Geometry, Partial Differential Equations and Numerical Analysis Summer Schools that took place here in Colombia and to which I will refer later on. He was a consultant for the Ford Foundation, for the National Science Foundation and for other entities.

Among the awards and distinctions that professor Escobar received only a few will be mentioned: the Alfred Sloan Fellowship (1985-86); the COLCIENCIAS Mención de Reconocimiento (1992), the Presidential Faculty Fellowship, which he received personally at the White House from the president of the USA in 1992 (this award was given to 15 scientists and Escobar was the only mathematician); he was a honorary member of the Colombian Mathematical Society (1992); a honoris causa Doctorate from Universidad del Valle (1992); the Scientific Excellence Mention from the Alejandro Angel Escobar Foundation (1995); he was a corresponding member of the Colombian Science Foundation (1997). Also he was a member of the American Mathematical Society and of the New York Science Academy. Moreover he was part of the editorial boards for the Electronic Journal of Differential Equations and Revista Colombiana de Matemáticas; he was also international editor for the Science and Innovation magazine which is published by the Colombian Association for Scientific Progress.

Another very relevant aspect of professor Escobar's life was his role as a teacher. As his colleague from Cornell Maria Antonia Garcés expressed in the obituary for the El Pais, a newspaper in Cali: "There (in Cornell) Chepe knew how to create a special environment for Latin-American graduate students, mainly Colombians and Brazilians, who began to arrive at Cornell attracted by his brilliance and the things he published. As a teacher, Chepe's charisma became proverbial in the Cornell Mathematics Department. Bringing down the barriers that separated great scientists from their students, Chepe built an environment of inspiration and camaraderie with his students, even the ones who were not doing their theses with him. He accomplished this by inviting them to his home and making them part of his family life."

His doctorate students were the Colombians Nelson Castañeda in Indiana University, later on in Cornell University Gonzalo Garcia and Jean Carlos Cortissoz, the Brazilians Enrique Araujo and Fernando Codà Marques, the Cyprian Nelia Charalambous and the Chilean Fernando Schwartz. Additionally professor Escobar sponsored academically eight post doctorates at Cornell.

Finally I would like to emphasize on his associations with Colombia. Since 1986 he visited our country at least once a year. He worked with and oriented the Universidad del Valle Geometry and Topology group; a group that has had various published articles and that counts with members who have done doctorate studies in foreign Universities, two of these students under professor



During his life Chepe kept a sincere friendship with many mathematician around the world. From left to right: J. Escobar, G. García, A. Subramanian, J. Peña.

Escobar's direction. Chepe also kept constant communication and relations with researchers from Universidad Nacional both in Bogotá and Medellín, as well as with people from Universidad de los Andes. Moreover, he invited a great number of first class mathematicians from all over the world to visit our country. On top of having taught small, several week courses on different occasions at Universidad del Valle and at Universidad Nacional, he spent all of the second semester of 1996 as a visiting professor at Universidad del Valle as part of his sabbatical year.

To his initiative we owe the consolidation of the Differential Geometry, Partial Differential Equations and Numerical Analysis Summer Schools. And he was president of the Organizing Comittee to the first (Cali,1993) and third (Bogota,1995) of these schools. These schools' memoirs were published by the Colombian Academy of Science. The schools counted with the presence of distinguished mathematicians from abroad, who encouraged mathematical activity in the country and promoted fructiferous contacts. This was shown by an estimation that was done very generally but showed that about twenty Colombians did doctorate and other kind of studies in the USA and Brazil thanks to the contacts made during these schools.

In his constant worry for elevating and improving the mathematical level in our country, professor Escobar promoted the initiative to create a research institute that would not be linked to any universities, just as there are in



Chepe maintained a close tie with Colombian mathematicians. From left to right: Luis Eduardo Giraldo (U. Nacional), Luz Myriam Echeverry (U. de los Andes), Alonso Takahashi (U. Nacional), Victor Albis (U. Nacional), Jairo Charris (U. Nacional), José Fernando Escobar, Svetlana de Arteaga, José Ricardo Arteaga (U. de los Andes).

other countries; for this he came up with a proposal which he turned in to COLCIENCIAS in 1995. We hope that Chepe's dream will come true and the institute, that will have his name of course, will be created.

Professor Escobar was an advisor for the BID-ICFES program in Universidad Nacional and Universidad Del Valle, he collaborated as an evaluator with the Comité Nacional de Acreditaciones and he advised the Departamento de Matemáticas at Universidad de los Andes.

Everything I have mentioned along this talk about professor Escobar's relations with our country, shows us that in spite of having had a consolidated position in the USA and at international level, he never stopped belonging to Colombia.

During his time as a visiting teacher at IMPA in 2000, a second cancer was found, this time in his stomach. He faced this situation once again with great determination and with the complete support of his family. He underwent surgery on in New York. In August of that same year and after few months he recovered, and returned to his work and to his mathematical activity showing strength, resolve and a capacity to dominate adversity. His last three articles were published in 2003. Three years after surgery, the second semester of 2003 to be more exact, the illness that would slowly weaken him manifested. He then returned to his beloved Cali in November, where he passed away in January of 2004, only a few days after his forty-ninth birthday.

At the beginning of this talk and in certain parts of it, I have referred to Chepe's human qualities. In order to complete this idea, I want to mention

the immense love that he always felt toward his parents and siblings, the loyalty he held to his friends, of which he had many in many countries and who expressed a great appreciation for his lack of pretense, his vitality, his intelligence and the multiplicity of his interestes. I've already spoken of his love for parties, salsa music and sports. With time he also developed good cooking skills. He was always looking at the bright and positive side of life.

To finish I'll make my own Maria Antonia Garces' words from the obituary I mentioned earlier: "It was those human qualities that made Chepe a great human being, an appreciated man and someone loved by everyone". His early departure has left emptiness among his friends but specially in the mathematical community.

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