with **Julio Rebelo**

by **Alberto Pinto, Helena Reis**, and **Renato Soeiro**

Julio Rebelo is an expert in dynamical systems and foliations. He has held several prestigious positions such as Clay Mathematics Institute fellow as well as long term visiting positions at *Université d'Orsay* (Paris, France) and IMPA (Rio de Janeiro, Brazil). Currently he is Professor at Institute de Mathématiques de Toulouse — Université de Toulouse (France).

He was a member of the scientific committee for the conference *Geometric Aspects of Modern Dynamics*, together with M. Abate, A. Glutsyuk, M. Lyubich, and H. Reis. This conference took place in Porto on January 2016 and was partially sponsored by CIM.

DISCLAIMER: the questions presented here are based on several interviews; in particular, the interviews published in previous CIM's bulletins.

This was a very successful conference featuring a number of field leaders in complex dynamics and related topics. Is there something you would like to highlight?

This is likely to have been the first meeting where interactions between complex dynamics of a single map (automorphism and/or endomorphism) and dynamics of foliations took the center stage. Both theories have the same origin and the corresponding problems share some important basic properties as well as well-known differences. It is an old dream to have both theories fitting together in a unified and fruitful framework. Some important first steps in this direction were made during this conference and hopefully they will be continued in the near future.

How important do you think that events like this are for students and researchers?

It is of paramount importance for students to be exposed to a large number of problems to go along with ideas and techniques. As mentioned above, the structure of this meeting made it especially rich in terms of ideas and problems that are likely to motivate and inspire students. To some extent, this same principle applies to researchers as well.

On your research: How did you start working in this area? What was the motivations? Could you tell us about your mathematical beginnings and subsequent career development?

Dynamical systems is an area strongly represented in the Brazilian mathematical community so I think my early curiosity on the topic was raised by the fact that so many people around me was talking about it. When I started looking for a thesis problem, I had the opportunity to attend an advanced course that E. Ghys lectured in Brazil at IMPA. Pretty quickly I got fascinated by the mixture of dynamics and geometry that was ubiquitous in those lectures and then I convinced him to supervise my thesis in France.

After completing my thesis, I returned to Brazil (PUC-Rio) and three years later I moved to Stony Brook as a Clay Mathematics Institute fellow. I

remained at Stony Brook for almost four years, then I returned to PUC-Rio for a couple of years before I was appointed professor at the Institut de Mathématiques de Toulouse.

How would you describe the essence of your own research to a young student?

Many phenomena from everyday life to experimental and theoretic Physics evolve with time and these evolutions are described by differential equations. Knowledge about the solutions of these equations allows us to predict the future of the corresponding systems. The relevant equations however can hardly be explicitly solved so that the subject is all about gathering enough information on their solutions without necessarily looking for a closed form for them. It is the fact that the nature of these differential equations can be extremely varied that accounts for the impressive wealth of methods and points of view in the field.

Do you have a preferred result? More generally what in your opinion makes a great paper?

I like papers with nice results but I have especial appreciation for those that also introduce a new method and/or enhance your understanding of the topic so that the reader feels more able to go on and further advance the theory by obtained still more results. The same principle applies also to books. Naturally Milnor's books and papers constitute fantastic examples of deep insight and clarity that often – or maybe always – improve the reader's own understanding of the corresponding material. Other remarkable examples of theorems whose method

of proof turned out to be more important than the original problems are provided by KAM theory and by Sullivan's non-wandering theorem in one-dimensional complex dynamics.

As to my personal results, my construction of a dynamical Lie algebra associated with locally non-discrete subgroups of diffeomorphisms of the circle has proven to be very useful and is quoted in several important papers.

How do you see the relation between traveling and research?

There are three different countries in which I have worked during a significant period (say longer than three years) and I still travel on a very regular basis. For young researchers, I think it is absolutely fundamental to have contact with different research groups not only to widen horizons but also to find new collaborators. In particular I think that all graduates in Mathematics should look to a two-year post-doc overseas before seeking a more permanent job.

Do you have hobbies?

I enjoy wine very much. I have a fair amount of knowledge about French wines as well as Portuguese wines. Among Portuguese wines, those from Douro are my favorite and I also love Port.

Do you have a connection to Portugal?

Despite being born in Brazil, I have inherited Portuguese citizenship from my parents and I really love the country, especially the Douro area. In fact, for personal reasons you all know, I can regularly be found in Porto.