

Preface

In the first semester of 2015, from January 7 to June 30, over a hundred mathematicians visited the Centre de Recerca Matemàtica (CRM) in Bellaterra (Catalonia, Spain) to participate in the thematic semester “Interactions Between Representation Theory, Algebraic Topology and Commutative Algebra”. The local organizers of this research semester were Dolors Herbera (Universitat Autònoma de Barcelona, Spain), Wolfgang Pitsch (Universitat Autònoma de Barcelona, Spain) and Santiago Zarzuela (Universitat de Barcelona, Spain), with the scientific advice of Bill Dwyer (University of Notre Dame, USA), Srikanth B. Iyengar (University of Nebraska, USA), Henning Krause (Universität Bielefeld, Germany) and Bernard Leclerc (Univeristé de Caen, France).

The core of the program consisted of the following activities: The first advanced course: “(Re)Emerging Methods in Commutative Algebra and Representation Theory”, from February 9 to 13, 2015, followed by a more specialized workshop: “Homological Bonds Between Commutative Algebra and Representation Theory” (HobCART), from February 16 to 20, 2015. Then, the second advanced course: “Building Bridges Between Algebra and Topology”, from April 13 to 17, 2015 followed by its workshop: “Brave New Algebra: Opening Perspectives” (BnaOP), from April 20 to 24, 2015. Then finally, a conference: “Opening Perspectives in Algebra, Representations, and Topology” (OP-ART), from May 25 to 29, 2015.

This resulted in a very intensive period of six months, during which mathematicians ranging from the young and enthusiastic PhD students to the respected and very active Emeritus Professor and whose research interests covered a variety of areas (singularity theory, representation theory, commutative algebra, algebraic topology) although with an overlapping interest in homological methods, gathered, exchanged ideas, got acquainted with each others research and results and in some cases started what we hope to be fruitful collaborations. The very dynamic and productive atmosphere we enjoyed during this semester translated into an equally active weekly seminar and a couple of special seminars on specialized topics: Grothendieck Derivators, and Differential Graded Categories.

In this volume of the subseries Research Perspectives CRM-Barcelona (published by Birkhäuser inside the series Trends in Mathematics), we present 33 Extended Abstracts corresponding to selected talks given by participants in the several events of the research program. Seventeen come from the first workshop HobCART, eight from the second one BnaOP and eight more from the conference OP-ART. The variety of topics presented bears the testimony of the rich activity that made the success of the IRTATCA semester. We hope that this volume will give to the authors the opportunity to quickly communicate their recent research: most of the short articles here are brief and preliminary presentations of new results not yet published in regular research journals.

We would like to express our gratitude to the CRM for hosting and supporting our research program. Also, our warm thanks to the CRM staff, its director, Joaquim Bruna, and all the secretaries, and especially Neus Portet, for providing great facilities and a very pleasant working environment. Last but not least, thanks are due to all those who attended the talks, for their interest, their active participation, and their enthusiasm towards mathematics.

The program was possible thanks to the generous support of several organizations: Universität Bielefeld via the Collaborative Research Centre 701 “Spectral Structures and Topological Methods in Mathematics”, the Institut de Matemàtiques de la Universitat de Barcelona (IMUB) that hosted the workshop HobCART, the National Science Foundation, the Simons Foundation, and the research projects “Estructura y clasificación de anillos, módulos y C^* -álgebras” (DGI MICIIN MTM2011-28992-C02-01, Spain) and “Análisis local en grupos y espacios topológicos” (DGI MICIIN MTM2010-20692, Spain) both hosted by the Universitat Autònoma de Barcelona.

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