Preface

The XXXth International Colloquium on Group Theoretical Methods in Physics (ICGTMP), also known as the Group30 conference, took place in Ghent (Belgium) from Monday 14 to Friday 18 July 2014. The conference was organised by Ghent University (Department of Applied Mathematics, Computer Science and Statistics, and Department of Mathematical Analysis). The website http://www.group30.ugent.be is still available.

The ICGTMP is one of the traditional conference series covering the most important topics of symmetry which are relevant to the interplay of present-day mathematics and physics.

More than 40 years ago a group of enthusiasts, headed by H. Bacry of Marseille and A. Janner of Nijmegen, initiated a series of annual meetings with the aim to provide a common forum for scientists interested in group theoretical methods. At that time most of the participants belonged to two important communities: on the one hand solid state specialists, elementary particle theorists and phenomenologists, and on the other mathematicians eager to apply newly-discovered group and algebraic structures. The conference series has become a meeting point for scientists working at modelling physical phenomena through mathematical and numerical methods based on geometry and symmetry. It is considered as the oldest one among the conference series devoted to geometry and physics. It has been further broadened and diversified due to the successful applications of geometric and algebraic methods in life sciences and other areas.

The first four meetings took place alternatively in Marseille and Nijmegen. Soon after, the conference acquired an international standing, especially following the 1975 colloquium in Nijmegen and the 1976 colloquium in Montreal. Since then it has been organized in many places around the world. It has become a bi-annual colloquium since 1990, the year it was organized in Moscow. This was the first time the colloquium took place in Belgium.

There were 246 registered participants at the Group30 colloquium from 46 different countries. This high number of participants makes the 30th edition of ICGTMP one of the most successful meetings of the series. We were particularly happy with the attendance of 32 students and many young postdocs: this is promising for the future of the research field and of the colloquium series. The attraction of young scientists was promoted by a reduced participation fee, the availability of cheap accommodation in the University Student Guest House, grants from a US-NSF project and grants from the Organising Committee supporting participants from countries with limited financial resources.

The colloquium brought together international top researchers, with a variety of different backgrounds but with “group theoretical or algebraic methods” as common ground. The selection of plenary speakers and topics was made by the Organizing Committee, following the suggestions of the International Advisory Committee (consisting of prominent scientists in their domain), and ensuring the diversity of the subjects treated. There were 11 plenary talks, given as well by distinguished world experts as by young rising stars: Matthias Christandl, Alberto De Sole, Rui Loja Fernandes, François Gay-Balmaz, Gitta Kutyniok, Amiram Leviatan, Karl-Hermann Neeb, Christoph Schweigert, Yuji Tachikawa, Luc Vinet and Joshua Zak. Next to the plenary talks, there were 170 talks in six parallel sessions and 10 poster presentations.

All scientific activities took place in the Joseph Plateau Building of the Faculty of Engineering and Architecture of Ghent University, a historical building conveniently located in the city centre of Ghent. In this building we could make use of the main lecture hall (400 seats) for the plenary lectures,
six lecture rooms for parallel sessions, two offices for organizational activities and registrations, two
PC-rooms and a large foyer for coffee breaks, book exhibitions and the poster session.

As part of the colloquium, a panel discussion on recent advances and future challenges in group
theoretical methods in physics was held on Wednesday morning. The panel members were: Maia
Angelova, Heinz-Dietrich Doebner, Jean-Pierre Gazeau, Norbert Hounkonnou, Peter Olver and Luc
Vinet, with Willard Miller Jr. as moderator. In this discussion, the importance of “symmetry” in
physics (and other sciences) was emphasized, and some challenges were made explicit.

On Wednesday evening there was a separate ceremony in the Aula Academica (the “University
Palace”) of Ghent University, for the presentation of the 2014 Wigner Medal and Hermann Weyl
Prize. The Hermann Weyl Prize was established in 2000 to provide recognition for young scientists
having performed original work of significant scientific quality in the area of the understanding of
physics through symmetries. The 2014 Hermann Weyl Prize was awarded to Yuji Tachikawa (Tokyo
University). He is praised for his outstanding contributions to the understanding of supersymmetric
quantum field theories and in particular, to the discovery of the Alday-Gaiotto-Tachikawa
 correspondence that has led to spectacular advances in both mathematics and quantum physics. The
Wigner Medal, established in 1978, is an award designed “to recognize outstanding contributions to
the understanding of physics through Group Theory”, and can be considered as a “lifetime
achievement award”. It was awarded to Joshua Zak (Technion, Haifa, Israel) for his discovery of the
magnetic translation group and the phase and transform that bear his name. In his work, the
relationship between mathematics and physics could hardly be closer, with mathematicians being
familiar with the “Zak transform” and physicists with the “Zak phase”, both concepts originating in
group theory. The ceremony was graced by a saxophone quintet, “Sax Obsession”, and followed by a
reception in the adjacent Peristylium.

The social programme included a variety of events. On Monday evening, the welcome address by
Christophe Peeters, Deputy Mayor of the City of Ghent, was followed by a reception in the historical
“Pacificatizeaal” of the City Hall. On Wednesday afternoon the participants had the opportunity to
take a guided tour through medieval Ghent, admiring its wide range of monuments. The tour was
followed by a much-appreciated boat trip exploring the canals and rivers of Ghent, all in sunny
weather. On Thursday evening the conference banquet was held in the “Brasserie HA”. Located in the
Handelsbeurs Ghent. In the majestic banquet hall, the participants were not only treated to an
exclusive dinner, but also to some fine piano music by Dmitry Gal’tsov and Richard Kerner.

The conference was sponsored by: American Institute of Physics (AIP Publishing), Clay
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Applied Physics, National Science Foundation (USA) and Springer Birkhäuser. We would like to
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It took more than two years to organise a conference of such a size and importance. We express our
gratitude to the International Advisory Committee for its help in selecting the plenary speakers and to
the external members of the Organising Committee for their helpful suggestions and advice. We thank
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Fred Brackx, Hennie De Schepper and Joris Van der Jeugt