FOREWORD

These are the proceedings of the Banach Center school/conference *Noncommutative Geometry and Quantum Groups* that took place in Warsaw between 17 and 29 September 2001. This meeting was a successor of the 1995 mini-semester *Quantum Groups and Quantum Spaces*. Its purpose was twofold. The first aim was to provide an introduction and training in some of the mainstreams of noncommutative geometry and quantum-group theory by means of appropriate series of survey lectures. The second was to enable an efficient communication of most recent results and to enhance mutual understanding among researchers working on different but strongly related aspects of quantum geometry. As organisers, we aimed at encouraging people to undertake research in these advanced and rapidly growing areas of mathematics, and at achieving the synergetic effect of cross-fertilisation by combining complementary fields of expertise. We very much hope that we have, at least partially, succeeded in doing so.

In classical geometry, spaces are thought of as collections of points, and functions on such spaces are treated as auxiliary objects. Noncommutative geometry inverts this picture in a Copernican way, placing the abstract concept of functions at the centre of the theory, and making a generalised version of a space but a derived concept. In the spirit of the Gelfand–Naimark theorem establishing the equivalence between commutative C*-algebras and locally compact Hausdorff spaces, these generalised spaces given by noncommutative algebras are often called noncommutative or quantum spaces. This opens up the world of naturally occurring examples of quantum groups and spaces and turns out to be extremely helpful in studying some particularly difficult spaces, e.g., spaces of foliations, where standard classical geometry techniques do not work.

Noncommutative geometry and quantum-group theory are relatively new (around 23 years old) and rapidly growing branches of mathematics requiring the knowledge of differential geometry, algebraic geometry, group theory, algebra, functional analysis and K-theory. The diversity of prerequisite mathematical tools, short but abundant history and rapid development of these subjects make direct assistance of experts extremely important for advancing research in this area. Therefore, as much as a half of the whole meeting took form of a school designed to provide guidance and inspiration to both newcomers and scientists already active in this field of mathematics. The school topics concerned research themes where recent breakthroughs took place, and which are of strong interest to many mathematicians:

- Noncommutative Index Theory and Hopf Symmetry
- Baum–Connes Conjecture
- Locally Compact Quantum Groups
- Galois Type Extensions of Noncommutative Algebras

To each of the topics corresponded a 7.5-hour lecture course given by one or more lecturers. The account of these courses is planned to appear in the form of lecture notes. In this volume we present refereed articles submitted by participants. Although these papers are often far from the actual talks, their contents is very much focused on or around the aforementioned 4 main themes of the meeting. Let us take this opportunity to express our great gratitude and appreciation to the referees for doing a tremendous job. Their assistance in trying to get the proceedings articles written in the best possible way can hardly be overestimated.

We are grateful to all participants for coming, despite financial or other problems, and contributing to the event. Our special thanks go to people whose help in organising and running the school/conference was particularly crucial. These are: P. F. Baum, who during 4 days delivered 8.5 hours of very enjoyable lectures; A. Connes, who came despite his extremely dense schedule and gave 2 hours of breath-taking expositions; D. Didt, who prepared our on-line application form; N. Higson, who helped so much in preparing the Baum–Connes session and in other organisational matters; S. Majid, who stimulated numerous discussions; A. Masuoka, who arranged the participation of the Japanese group; H. Moscovici, who agreed on the spot to take up an additional lecture and who together with P. F. Baum formed an untiring team which delivered the total of 14.5 hours of lectures; R. Nest, who agreed, on a very short notice, to give an additional lecture and helped us with organisational details; and A. Van Daele, who masterminded the locally-compact-quantum-group session. We thank all school lecturers for their enormous care and effort in preparing the requested expository lectures, and all conference speakers for their state-of-the-art contributions. We are also grateful to the graduate students D. Hobst, A. H. Przybyszewska, P. M. Sołtan and A. Zatorska-Goldstein for taking notes of the school lectures.

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Let us end with the following complete list of 82 conference participants who came from 20 different countries: H. Araki (Japan), I. Bakovic (Germany), P. F. Baum (USA), E. Beggs (G. Britain), J. Bichon (France), P. A. Blaga (Romania), B. Bojarski (Poland), F. Bonechi (Italy), A. Borowiec (Poland), T. Brzeziński (G. Britain), N. Ciccoli (Italy), A. Connes (France), J. Cuntz (Germany), L. Dąbrowski (Italy), P. Desmedt (Belgium), D. Didt (Germany), Y. Doi (Japan), S. Doplicher (Italy), M. Enock (France), J. Esteves (Portugal), R. Fischer (Germany), X. Gomez (G. Britain),

P. M. Hajac (Germany), I. Heckenberger (Germany), M. Heller (Vatican), M. Hilsum (France), D. Hobst (Germany), A. Khmelynitskaya (Russian Federation), T. Kopf (Czech Republic), J. Kustermans (Belgium), M. B. Landstad (Norway), R. Lenczewski (Poland), F. J. L. Lesieur (France), F. Lledo (Germany), S. Majid (G. Britain), W. Marcinek (Poland), A. Masuoka (Japan), R. Matthes (Germany), S. T. R. Melo (Germany), H. Moscovici (USA), G. J. Murphy (Ireland), Y. Nakagami (Japan), R. Nest (Denmark), H. H. Phung (Vietnam), C. Pintea (Poland), N. Prudhon (France), A. H. Przybyszewska (Denmark), W. Pusz (Poland), B. Rangipour (Canada), A. Reyes (Germany), O. Richter (Germany), W. Sasin (Poland), P. Schauenburg (Germany), K. Schmüdgen (Germany), H.-J. Schneider (Germany), A. Schüler (Germany), G. Sharygin (Russian Federation), A. Sitarz (France), Z. Škoda (USA), J. Słomińska (Poland), P. M. Sołtan (Poland), P. Stachura (Poland), W. Szymański (Australia), M. Takeuchi (Japan), M. Tarlini (Italy), N. Teleman (Italy), L. Tuset (Norway), S. Vaes (France), L. Vainerman (Germany), J.-M. Vallin (France), A. Van Daele (Belgium), J. C. Varilly (Costa Rica), C. Voigt (Germany), E. Wagner (Germany), M. Wakui (Japan), A. Weber (Poland), M. Wodzicki (USA), S. L. Woronowicz (Poland), E. Yashagin (Russian Federation), A. M. Zatorska-Goldstein (Poland), B. Zieliński (Poland), P. A. Zito (Italy).

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