

Preface

Two symposia, the Hayashibara Forum and the MJS/IHÉS Joint Workshop, were held at the Institut des Hautes Études Scientifiques (IHÉS) from November 20 to November 23, 2006, and from November 15 to November 18, 2006. The programs of the two symposia are listed after the table of contents.

The Hayashibara Forum, which was supported by the Hayashibara Foundation, focused on singularity theory, a research area that has, over the years, been well represented at IHÉS. Ever since Professor Heisuke Hironaka, who received a Fields Medal for his outstanding solution of the problem of resolution of singularities, was invited to IHÉS as the first foreign visitor, IHÉS and the mathematical community of Japan have developed a long and fruitful relationship. In fact, since Professor Hironaka's visit, more than 100 Japanese researchers have been invited to and stayed at IHÉS. The Hayashibara Forum 2006 discussed recent topics in singularity theory as well as related applications of singularity theory to a wide range of other subjects.

The MJS/IHÉS Joint Workshop, which was supported by the Mathematical Society of Japan, focused on the broad area of noncommutativity, with an emphasis on noncommutative geometry as one of the fundamental themes of 21st century mathematics. It has already achieved remarkable success within mathematics and developed significant promising new connections between mathematics and quantum theory. IHÉS has grown into a leading international institution in this research area, as exemplified by the remarkable works of Alain Connes and Maxim Kontsevich, permanent members of its scientific staff, and of other researchers of the Institute,

It was therefore natural to hold workshops on these particular topics at IHÉS, and to invite with invitations to leading Japanese researchers as well as international experts. We also invited young researchers from Japan and France to these symposia to encourage their research work in cooperation with the 21st Century Centers of Excellence (COE) in Japan: Hokkaido University, Keio University, Kyoto University, Osaka City University, Tohoku University and the University of Tokyo. We would like to thank these COE institutes for their great help.

This volume contains papers presented at the symposia in the form of invited lectures and contributing talks by young researchers. All papers were formally refereed. More than half of the papers include results which have not appeared previously in professional journals. With a few exceptions, these new results are presented with complete proofs. The