

Report on the CIMPA-IPM-UNESCO School 'Representations of Algebras' June 15-25, 2008, Tehran, Iran

An international school and conference on 'Representations of Algebras' was held at the 'Institute for Studies in Theoretical Physics and Mathematics' (IPM) in Tehran (Iran) from June 15 to 25, 2008. It received financial support from the International Center for Pure and Applied Mathematics (CIMPA), the IPM, the Center for International Research and Collaboration (ISMO), the Center of Excellence of Algebraic Methods and Application of the University of Technology of Isfahan (Iran) and the Consejo Nacional de Ciencia y Tecnología (CONACYT, Mexico). The organizers were

Javad Asadollahi, Shahre-Kord, Iran,

José Antonio de la Peña, UNAM, Mexico,

Bernhard Keller, Paris 7, France,

Helmut Lenzing, Paderborn, Germany,

Siamak Yassemi, IPM, Iran.

The aim of the school was to introduce the participants to the modern representation theory of quivers and finite-dimensional algebras and to present some recent developments (concerning in particular the theory of cluster algebras and its links to quiver representations and singularity theory). The school consisted of the following courses (in the order of pedagogical progression):

1. Quivers and representations (4 hours, José Antonio de la Peña),
2. Auslander-Reiten theory (3 hours, Helmut Lenzing),
3. Tilting theory (3 hours, Idun Reiten, Trondheim, Norway),
4. Derived and triangulated categories (4 hours, Srikanth Iyengar, Nebraska, USA),
5. Cluster algebras and cluster categories (4 hours, Bernhard Keller)

The courses 1 to 3 contained mostly classical material. In addition to foundational material, course 4 included an introduction to the recent theory of levels in triangulated categories with applications to recent results on Auslander's representation dimension of important classes of finite dimensional algebras. Course 5 provided an introduction to another highlight of current research, yielding an interesting mixture of combinatorial and homological techniques: cluster algebras and Calabi-Yau categories, in particular cluster categories. The tools of homological algebra played a key rôle in all five courses and formed an important link to commutative algebra, where several participants had good previous knowledge.

For school and conference there were 101 registered participants of whom 57 were from Iran. Due to financial restrictions there was no organized accommodation for Iranian participants, resulting in an uneven participation of this group for school (and conference). 15 participants received financial support from the CIMPA for their expenses for travel and stay. These came from Irak (4), India (3), Lebanon (3), Bhutan (1), Colombia (1), Korea (1), Indonesia (1), and Vietnam (1). Other participants came from Japan (5), Poland (2), Germany, Australia, Ireland, Italy, Mexico, Norway and the USA. With a single exception travel for the speakers of the school (also for invited speakers for the conference) was covered by their universities or national organizations.

The school was followed by a conference centered around the subject of the school but having a wider scope. The invited speakers at the conference were Lidia Angeleri-Hügel (Varese, Italy), Saeid Azam (Isfahan, Iran), Apostolos Beligiannis (Ioannina, Greece), Aslak Bakke Buan (Trondheim, Norway), Christof Geiss (UNAM, Mexico), Ahmad Haghani (Isfahan, Iran), Osamu Iyama (Nagoya, Japan), Henning Krause (Paderborn, Germany), Daniel Murfet (Canberra, Australia), Amnon Neeman (Canberra, Australia), Shokrollah Salarian (Isfahan, Iran), Gordana Todorov (Northeastern, Boston, USA), Alexander Zimmermann (Amiens, France).

In addition to the scientific programme, a special session was organized to honour Michel Jambu (director of the CIMPA) on the occasion of his retirement.

The external organizers express their warmest thanks to the local organizing team: Mohsen Rahpeyma (executive manager of the IPM), Mrs. Baran Yazdi (secretariate), Siamak Yassemi (head of the mathematics section of the IPM) and above all to Javad Asadollahi: We have been very much impressed by the smooth organization of the event and are deeply grateful for your efficient help in all the practical details: From telephone cards to dictionaries and from sweets to tooth brushes, our wishes were fulfilled before we even had the time to express them. We have also been overwhelmed by this first contact with the country of Iran: its history, culture, exquisite cuisine and, above all, by the hospitality of the Iranians, who, often despite the language barrier, have made us feel that we were highly welcome guests. We are sure that the encounters made during this school and conference will lead to lasting contacts both at the scientific and at the personal level and we hope to come again soon.