Mathematisches Forschungsinstitut Oberwolfach

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# Heat Kernels, Stochastic Processes and Functional Inequalities

Organised by
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Karl-Theodor Sturm (Bonn)

November 27th – December 3rd, 2005

Abstract. The conference brought together mathematicians belonging to several fields, essentially analysis, probability and geometry. One of the main unifying topics was certainly the study of heat kernels in various contexts: fractals, manifolds, domains of the Euclidean space, percolation clusters, infinite dimensional spaces, metric measure spaces.

*Mathematics Subject Classification (2000):* 31, 32W, 35J, 46T, 47D, 58J, 60H, 60J.

## Introduction by the Organisers

The workshop *Heat kernels, stochastic processes and functional inequalities* was organized by Thierry Coulhon (Cergy), Bruno Franchi (Bologna), Takashi Kumagai (Kyoto) and Karl-Theodor Sturm (Bonn). It was held from November 27th to December 3nd. The meeting was attended by 56 participants from Australia, Austria, Canada, Finland, France, Germany, Italy, Japan, Poland, Switzerland, United Kingdom, and USA. This workshop was sponsored by the European Union, which allowed the invitation of 18 young people, who contributed positively to the atmosphere of the meeting.

The conference brought together mathematicians belonging to several fields, essentially analysis, probability and geometry. One of the main unifying topics was certainly the study of heat kernels in various contexts: fractals, manifolds, domains of the Euclidean space, percolation clusters, infinite dimensional spaces, metric measure spaces. Some related aspects of geometric analysis were also considered such as $L^p$-cohomology and mass transportation. There was a stimulating exchange between probabilistic and analytic points of view, together with a geometric emphasis in most of the problems. We had 5 one hour survey lectures and

21 thirty-five minutes talks. A lot of time was devoted to discussions and exchange of ideas.

Among the highlights were relations between mass transportation, generalized Ricci bounds and contraction properties, connections between heat kernel estimates and percolation clusters, non-linear aspects of diffusions, functional analytic approach to parabolic regularity, geometric and functional analytic aspects of infinite dimensional analysis.

This diversity of topics and mix of participants stimulated many extensive and fruitful discussions. It also helped initiate new collaborations, in particular for the younger researchers.