

Preface

In 2008 and 2009, two weeks of intensive courses were organized at the University of Strasbourg under the title “Geometry Master class”.

The goal was to give to fifth year students and PhD students in mathematics the opportunity to learn new topics that lead directly to the current research in geometry and topology, and also to give them the opportunity of meeting students from other universities and exchanging ideas for future involvement in research.

Both goals were completely attained, and we had two memorable master classes, with more than 60 participants for each, coming from various countries.

The courses were accessible to a non-specialized audience, the prerequisites being the usual mathematics that is acquired during the first five years at university and the maturity expected from a graduate student. Specifically, the program included hyperbolic geometry, three-manifold topology, representation theory of fundamental groups of surfaces and of three-manifolds, dynamics on the hyperbolic plane with applications to number theory, Riemann surfaces, Teichmüller theory, Lie groups and asymptotic geometry.

Many of the students stated that the courses they heard during these two weeks were the best courses they have ever had. Some of them asked for written notes, and this was the origin of the present volume. Some courses were more specialized than others, as the reader of this book will notice, but the speakers always paid careful attention to the pedagogical needs of the participants, providing background, gentle introductory remarks and motivation.

During the two intensive weeks, ten courses were given, eight of which are represented in this volume. The remaining two were given by Marc Burger (on maximal representations) and by Vladimir Fock (on higher Teichmüller spaces). The texts of these two courses are not included in this volume; they appear elsewhere in a different form. Now that these texts are written up, they can serve the whole mathematical community. The present book cannot really render the friendly and warm atmosphere of the master-classes, but it reproduces the beautiful mathematics that was taught there.

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