

*Geometric Group Theory*/Théorie géométrique des groupes

3–14 *july*/juillet, 2006

• ATELIER •

## Measure-theoretic methods in the study of $L^2$ -invariants

Roman Sauer

sauerr@uni-math.gwdg.de

*Mathematisches Institut*

*Georg-August-Universität Göttingen*

*Bunsenstr. 3-5*

*D-37073 Göttingen*

*GERMANY*

### **Abstract**

By work of Gaboriau we know that the  $L^2$ -Betti numbers of a group only depend on the orbit equivalence class of any of its free, measure-preserving actions on a probability space. This result and the subsequent works of Popa and Connes–Shlyakhtenko point to the intimate relationship between  $L^2$ -Betti numbers of a group  $G$  and the “measure theory” of  $G$  (represented by measure-preserving actions or the von Neumann algebra of  $G$ ). In the present talk we apply measure-theoretic ideas to prove results about  $L^2$ -invariants in a geometric context like the relation between  $L^2$ -Betti numbers of aspherical manifolds and minimal volume, general vanishing results or the quasi-isometry invariance of Novikov–Shubin invariants.