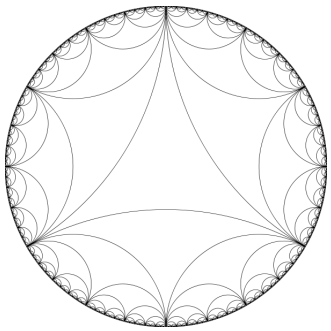
SEMINAR ON HYPERBOLIC GROUPS

WiSe 2012/13



Time and location: Tuesday 4.15–5.45 pm, Sitzungszimmer.
Organisation: Thomas Schick, Bogdan Nica, Jean-François Planchat.
Organisational Meeting: Tuesday, October 16th at 4.15 pm, Sitzungszimmer.

Description:

Introduced by Gromov in the 1980's, hyperbolic groups are a fundamental, and by now classical, topic in geometric group theory. Hyperbolicity is a relaxed notion of negative curvature which, when applied to groups, unifies important examples of combinatorial ("small-cancellation" groups) or geometric origin (uniform lattices in rank one). The general theory of hyperbolic groups is based on geometric arguments which eventually lead to remarkable algebraic and analytical phenomena.

The purpose of this seminar is to build a solid understanding and a working knowledge in this topic. We will mostly focus on algebraic aspects; the analytical side could be a follow-up seminar during the second semester. The general theory will require the introduction of central notions transverse to other topics (e.g. quasi-isometries, boundaries of negatively curved spaces, classifying spaces, geodesic flows ...); its illustration will lead us to touch upon other theories (e.g. classical hyperbolic spaces and their tessellations, language theory, combinatorial group theory...).

The talks can be delivered in German or in English.

Schedule:

Oct.23 Hyperbolic spaces: definitions, examples, invariance under quasi-isometries.
Oct.30 Boundaries of hyperbolic spaces: definitions, visual metrics, homeomorphisms induced by quasi-isometries.
Nov.06 Hyperbolic groups: definition, examples, stability properties. The Milnor-Schwartz lemma.
Nov.13 The Rips complex and algebraic applications.
Nov.20 Boundaries of hyperbolic groups: point stabilizers, topological transitivity.
Nov.27 Hyperbolicity and linear isoperimetry. Small-cancellation groups.
Dec.04 Automaticity, Cannon's cone types.
Dec.11 Quasi-convex subgroups of hyperbolic groups. The Rips construction.

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Jan.09 Report on F. Paulin: *Un groupe hyperbolique est déterminé par son bord* (1996).
Jan.16 Report on B. Bowditch: *A topological characterisation of hyperbolic groups* (1998).
Jan.23 Report on M. Bonk & O. Schramm: *Embeddings of Gromov hyperbolic spaces* (2000).
Jan.30 Report on I. Mineyev: *Flows and joins of metric spaces* (2005).

References:

• M. Gromov: *Hyperbolic groups*, in "Essays in group theory", 75–263, MSRI Publ. 8, Springer 1987
• É. Ghys & P. de la Harpe (eds.): *Sur les groupes hyperboliques d'après Mikhael Gromov*, Birkhäuser 1990
• M. Coornaert & T. Delzant & A. Papadopoulos: *Géométrie et théorie des groupes. Les groupes hyperboliques de Gromov*, Lecture Notes in Mathematics 1441, Springer 1990
• H. Short (ed.): *Notes on word hyperbolic groups*, in "Group theory from a geometrical viewpoint (Trieste, 1990)", 3–63, World Sci. Publ. 1991
• M. Bridson & A. Haefliger: *Metric spaces of non-positive curvature*, Springer 1999