Seminar Advanced Differential Geometry

Hyperbolic Geometry

Summer term 2023

Tuesday 13:15 – 14:45, Augusteum A-314 ; Start: Tuesday, April, 4

Please enrol in **Moodle**

Students:

- mathematics (diploma)
- mathematical physics (M.Sc.), it is a compulsary elective course in the mathematical physics program (10-MAT-MPDG1), formed by the lecture *Advanced Differential Geometry 1* and the seminar

Topic:
Hyperbolic space $\mathbb{H}^n$ in dimension n is the simply-connected space of constant sectional curvature -1. The topic of the seminar is the geometry of compact quotients $\mathbb{H}^n/\Gamma$ of hyperbolic space, i.e. compact Riemannian manifolds of constant sectional curvature -1. There is an essential difference between dimension $n = 2$, in which many distinct hyperbolic structures exist, and dimension ≥ 3, where we have *Mostow rigidity.*

Reference:
R.Benedetti, C.Petronio, *Lectures on hyperbolic geometry,* Springer, 1991

List of talks:

1. Models for hyperbolic space, conformal geometry, A1, A2, p. 1-7
2. Conformal geometry, A3, p. 7-22
3. Isometries of hyperbolic space, geodesics and curvature, A4, A5, A6, p. 22-43
4. Hyperbolic, ellipticf and flat manifolds, B1, p.45-55
5. Hyperbolic metrics on closed surfaces, part I, B2, B3, first part of B4, p. 55-67
6. Hyperbolic metrics on closed surfaces, part II, second part of B4, p. 67-82
7. Mostow rigidity, part I, extension of pseudo-isometries, C1, p. 83-93
8. Mostow rigidity, part II, volume of ideal simplices, C2, p. 94-103
9. Mostow rigidity, part III; Gromov norm of a compact manifold, C3, C4, p. 103-121
10. Mostow rigidity, conclusion, C5, 121-131
11. Margulis lemma (2 talks), chapter D, p.133-158