

Hyperbolicity Course Notes

Summer 2024

Lecture 1 — 24, 08, 2024 (draft version 0)

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1 Overview

These series of notes summarize the lectures from the short course in August 2024 at Kunming.

Here are the topics that will be discussed in this series of lectures:

1. Part 1: we will discuss the classical results on variational Hodge theory,
2. Part 2: we will discuss NonAbelian Hodge theory,
3. Part 3: we will discuss NonAbelian Hodge theory in non-arithemedean setting,
4. Part 4: we will discuss hyperbolicity.

In today's lecture we will first introduce the Brody hyperbolicity (resp. Picard hyperbolicity). The major problem is that these notions are not birational invariant. Consequently we introduce the weaker notion called psudo Brody hyperbolicity (resp. pseudo-Picard hyperbolic). We then introduce 4 different facets of the big Picard theorem: Higher dimension big Picard theorem, Baily-Borel theory about bounded symmetric domain, Viehweg-Zuo theory, and fundamental group viewpoint. We finish today's lecture by a brief survey of the strong Green-Griffiths-Lang conjecture.

2 Brody hyperbolicity, Picard hyperbolicity

3 Psudo-Brody hyperbolicity, pseudo-Picard hyperbolicity

4 Four facets of the big Picard theorem

5 A breif introduction to the strong Green-Griffiths-Lang conjecture