

Mini course on Arakelov geometry II

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Abstract

The Arakelov theory developed by Gillet and Soué is well suited to work with smooth metrics. However, the hermitian metrics that appear naturally when studying modular varieties are not smooth at the boundary. For instance the Petersson metric of the line bundle of modular forms has logarithmic singularities along the cusps. Analogously, the line bundle that defines the Faltings' modular height are log-singular near the boundary of the modular variety. Higher rank examples can be found in the proof by Mumford of the Hirzebruch proportionality principle in the non compact case. Nevertheless, in all these examples, the singularities that appear are so mild that they share many properties of smooth metrics.

In this lecture we will review these examples and we will show how to extend the formalism of Arakelov geometry in order to be able to study with log-singular hermitian metrics. This is a particular case of the cohomological arithmetic Chow groups introduced in the previous lecture.