

XX GAeL

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## Curves, abelian varieties and the Schottky problem

Samuel Grushevsky

Stony Brook University

### **Lecture 1: Abelian varieties and their moduli space $A_g$**

We will introduce the moduli space of complex abelian varieties, algebraically and analytically, Siegel modular forms, and compute its canonical bundle on a suitable compactification.

### **Lecture 2: Kodaira dimension of $A_g$**

Using Siegel modular forms, we will give Freitag's proof that  $A_g$  is of general type for  $g > 8$ . We will then use Grothendieck-Riemann-Roch to compute, following Mumford, the class of the Andreotti-Mayer locus of abelian varieties with a singular theta divisor, proving that  $A_g$  is of general type for  $g > 6$ .

### **Lecture 3: Curves, and the Kodaira dimension of $M_g$**

We will introduce and discuss the moduli space of curves, compute the canonical class, and prove various results on the Kodaira dimension of  $M_g$ . We will also discuss the relationship of this question to the Kodaira dimension of  $A_g$ , via the Torelli embedding of  $M_g$  into  $A_g$ .

### **Lecture 4: Modular forms and the Schottky problem**

We will discuss the classical Schottky-Jung approach to the Schottky problem of characterizing Jacobians among all abelian varieties, the Schottky's original solution to the problem, and recent results on the Schottky problem in genus 5, via Siegel modular forms.

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