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Moduli spaces and their compactifications

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Abstract. Very broadly speaking, geometry is the study of spaces. Here 'space' is a placeholder: different flavors of geometry work with spaces such as differentiable manifolds (differential geometry), topological spaces (topology), varieties (algebraic geometry, my favorite), and so on. But what makes a space an interesting object of study? One class of 'interesting' spaces is the so-called moduli spaces (the word 'moduli' goes back to Riemann and means 'parameters'). Moduli spaces parametrize objects of some type: say, moduli space of triangles parametrizes triangles, moduli space of differential equations parametrizes differential equations, and so on. Thus, geometry of moduli spaces encodes interesting features of the totality of objects that they parametrize.Unfortunately, many naturally arising moduli spaces are not compact, which makes them harder to work with. Sometimes, it is possible to compactify a moduli space by enlargening the corresponding class of objects. In my talk, I will present some examples of compactification of moduli spaces, with emphasis on examples that are relevant to the geometric Langlands program. Time permitting, I will also mention a more categorical approach to compactification, which generalizes the procedure to important 'non-commutative' spaces.