	Monday 28.09	Tuesday 29.09	Wednesday 30.09	Thursday 01.10
09:15-10:15	Schreieder, L	Schreieder; L	Schreieder; L	Zerbini; L
10:15-10:30	Break	Break	Break	Break
10:30-11:30	Schreieder; L	Kucharczyk; L	Boes; L	Zerbini; L
11:30-12:00	Tea	Tea	Tea	Tea
12:00-13:00	Kucharczyk; L	Kucharczyk; L	Boes; L	García Failde; L
13:00-15:00	Lunch	Lunch	Lunch	Lunch
15:00-16:00	Kucharczyk; L	Zerbini; L	Zerbini; L	
16:00-16:30	Tea	Tea	Tea	Tea
16:30-17:30	Discussion	Zerbini; L	Zerbini; L	Boes; L

L = MPI Lecture Hall
S = MPI Seminar Room

	Monday 05.10	Tuesday 06.10	Wednesday 07.10	Thursday 08.10
09:15-10:15	Brügmann; L	Brügmann; L	Brügmann; L	Damiolini; L
10:15-10:30	Break	Break	Break	Break
10:30-11:30	Brügmann; L	García Failde; L	Dyckerhoff; L	Damiolini; L
11:30-12:00	Tea	Tea	Tea	Tea
12:00-13:00	García Failde; L	García Failde; L	Dyckerhoff; L	Boes; L
13:00-15:00	Lunch	Lunch	Lunch	Lunch
15:00-16:00	García Failde; L	Poguntke; L	Damiolini; L	
16:00-16:30	Tea	Tea	Tea	Tea
16:30-17:30	Discussion	Poguntke; L	Damiolini; L	Kaiser; L

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S = MPI Seminar Room

Abstracts

Stefan Schreieder
Title: Introduction to Moduli Problems
Abstract:
Talks 1 and 2: We discuss the moduli functor associated to a moduli problem and define fine and coarse moduli spaces. We discuss various examples, to illustrate these notions. In particular, we will see by examples that many natural moduli problems do not admit fine moduli spaces, and some do not even admit coarse moduli spaces. (This is one of the motivations for the introduction of stacks; they will not be part of this lecture.) Conversely, two important examples of fine moduli spaces are given by Grassmannians, parameterizing linear subspaces of a given vector space, or much more generally, by the Hilbert scheme which parameterizes all subschemes of a given projective space with given Hilbert polynomial. We will discuss these examples in Lectures 3 and 4 respectively.

Talk 3: An easy example of a fine moduli space is given by the Grassmannian Gr(d,n) which parameterizes d-dimensional linear subspaces in a fixed n-dimensional vector space. We prove that Gr(d,n) is indeed a fine moduli space and see how intersection theory on such a moduli space can be used to answer very concrete geometrical questions, such as the following: How many lines in P^3 meet four given general lines?

Talk 4:We discuss Grothendieck's Hilbert scheme, which is a fine moduli space parameterizing subschemes of a given projective space with given Hilbert polynomial; proofs will be omitted or at most sketched. A special case of the Hilbert scheme is given by the Grassmannians discussed earlier.

Robert Kucharczyk
Title: Moduli of Curves and Riemann Surfaces
Abstract: In these talks I will give an overview of the moduli theories of Riemann surfaces and algebraic curves, which can be regarded as two aspects of the same theory. I will begin by recalling the equivalence between Riemann surfaces and algebraic curves, then present some simple low-dimensional examples of moduli spaces and finally give some hints about the general theory, with special emphasis on relating the algebro-geometric and the complex analytic points of view.

Federico Zerbini
Title: Modular Forms
Abstract: The aim of these talks is to give a short and elementary introduction to modular forms and to see some applications to number theory and arithmetic geometry. We will also try to see how they fit into the main topic of the conference by studying the moduli space of elliptic curves, and then by explaining the connection between modular forms, this moduli space and classical problems in the theory of elliptic curves.

Felix Boes
Title: Moduli Space of Riemann Surfaces

Abstract: In this series of talks, we study the Moduli Space of Riemann surfaces from a topologists point of view and our focus lies on computing its homology.
On one hand, it is the classifying space for the mapping class group and on the other hand, it is the interior of a compact simplicial complex. These two facts allow certain calculations in low degrees, but there is more structure.
Considering surfaces with boundary, we can glue two surfaces via a pair of pants construction.
This equips the homology with a commutative Pontyargin product. Moreover, the glueing construction comes from the action of the little-disc-operad. Thus, there are even more homology operations at hand.
If time permits, we discuss some aspects of a (from a topologists point of view) nearby compactification of these Moduli Spaces.

Elba García Failde
Title: Moduli Space of Flat Connections
Abstract: The main aim of this course is to describe, from a gauge theoretic point of view, the moduli space of flat connections, assuming as little background as possible.
We start introducing principal G-bundles, we give different characterizations of connections and, in general, we study all the necessary background to construct the moduli space.
Then, we relate flat connections on a principal G-bundle over M to G-representations of the fundamental group of M. We also comment on the possible structures with which one can endow this moduli space and we give an overview of more advanced results.

Daniel Brügmann
Title: Introduction to Stacks
Abstract: Consider trying to define a space of all vector spaces. If X is a topological space, we would like a map from X to this space of vector spaces to be a vector bundle over X. Such bundles do not just form a set, they form a groupoid. Stacks are a notion of space which have groupoids of maps into them instead of sets of maps. These four talks will include categories fibered in groupoids, the descent condition, geometric stacks, and the realization functor from stacks over the site of smooth manifolds to topological spaces.

Thomas Poguntke
Title: Stable Points and Stable Objects
Abstract: We discuss some general ideas surrounding the construction of moduli spaces of objects (of fixed additive invariants) in (quasi-)abelian categories over fields. In this context, one can often obtain with relative ease representability of a moduli functor classifying surplus data. If the excess is described by the action of an algebraic group, Geometric Invariant Theory allows passage to the quotient (of the stable locus), yielding an answer to the intended moduli problem. Two famous examples where this occurs are vector bundles (on curves) and quiver representations. We will discuss the (a priori unrelated) concept of stable objects in the aforementioned categories. To relate the two notions of stability, we explicitly focus on the quiver example as well as flag varieties over finite fields, at most briefly mentioning their (rigid-analytic) cousins from p-adic Hodge theory, if time permits.

Tobias Dyckerhoff
Title: Moduli of Stable Maps
Abstract: This will be an introductory talk on Kontsevich's moduli space of stable maps. We will see how stable maps fit into the general formalism of moduli formalism of representable functors and then focus on applications such as the formula for rational plane curves and quantum cohomology.

Chiara Damiolini
Title: Uniformization Theorem for G-Bundles
Abstract:
Wednesday: Today I will present some general theory about the stack of G bundles. I will start by giving the definition of what a G bundle is and describing its properties. To be more familiar with these objects, examples will be presented. If we want to parametrize G bundles on a scheme, we need to use the language of stacks and we will obtain that G bundles over a smooth and proper curve gives an algebraic stack.

Thursday: The main goal of the day is to state and prove the uniformization theorem for BunG, the stack of G bundles over a smooth and projective curve. We will define an affine graßmannian Q and describe its properties. We will define a group LA which acts on Q and build a natural map between the quotient stack [LA\Q] and BunG. When G is a semisimple group we will prove that this map is actually an equivalence, which gives the uniformization theorem.

Christian Kaiser
Title: Moduli spaces and Langlands conjecture
Abstract: I will discuss the cohomology of some moduli spaces as sources of Galois representations and relations to the Langlands conjecture.