

MATH-687

Algebraic models for homotopy types

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Cursus	Sem.	Type
Mathematics		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Project report
Workload	60h
Hours	28
Courses	28
Number of positions	

Frequency

Only this year

Remark

Fall semester

Summary

In this course we will develop algebraic and coalgebraic models for homotopy types. Among other things we will learn about Quillen's and Sullivan's model of rational homotopy types and about Mandell's theorem in p-adic homotopy theory.

Content

We will start with an introduction to rational homotopy theory and prove Quillen's and Sullivan's theorem providing a Lie model, coalgebra model and algebra model for rational homotopy types. Moreover we will learn about Koszul duality relating the Lie model to the coalgebra model.

We will continue with p-adic homotopy theory and prove Mandell's theorem classifying p-adic homotopy types by E_∞ -algebras.

To prove Mandell's theorem we will learn about E_∞ -algebras and unstable algebras.

Besides that we will learn about the higher algebra and higher category theory used to prove these results.

Keywords

Rational homotopy theory, p-adic homotopy theory, Sullivan model, Koszul duality, E_∞ -algebras, unstable algebras

Learning Prerequisites**Required courses**

Some familiarity with homotopy theory, category theory.

Learning Outcomes

- why algebraic models for homotopy types are useful.
- Translate between different models of homotopy types.

Resources**Bibliography**

Classical sources for rational homotopy theory

Mandell's article: E_∞ algebras and p -adic homotopy theory

Ressources en bibliothèque

- [E_infinity algebras and p-adic homotopy theory / Mandell](#)