

Towards Chromatic Homotopy Theory

– The Landweber Exact Functor Theorem –

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10:00 – 18:00

This Bayerische AG presents a modern formulation of the *Landweber Exact Functor Theorem* (LEFT) which stands at the intersection of algebraic topology (spectra & cohomology theories), algebraic geometry (moduli stack, elliptic curves), and number theory (class field theories). The LEFT provides a general understanding of how ordinary cohomology theory, complex K -theory and Thom cobordism theory are related to isomorphism classes of formal group laws; it is a keystone in the potential description of the homotopy group of spheres via modular forms.

We present the classification of formal group laws by the Lazard ring L , develop the previous examples of complex oriented cohomology theories and their spectra representability in relation with Thom universal complex cobordism MU , formulate the moduli classification problem via the stack of formal groups \mathcal{M}_{FG} that finally lead to the LEFT:

Any flat graded L -module \mathcal{F} over \mathcal{M}_{FG} provides a complex oriented homology theory of spectrum $E(-) = MU(-) \otimes_L \mathcal{F}$; such spectra are characterized among ring spectra by their even periodicity.

It is expected that speakers will illustrate abstract results with explicit formulations and will rely on examples and geometric motivations to remain accessible to algebraic topologists and geometers.

<p>Talk 1 Formal Groups: Lazard ring & Classifications</p> <p>Functorial definition of formal group laws, their endomorphisms and the Lazard ring; characteristic 0 and p classifications by height; Example of Lubin-Tate formal group laws and elliptic curves.</p> <p style="text-align: right;">~ 60 min.</p>	<p>Talk 2 Complex-oriented Cohomology Theories, Spectra & MU</p> <p>Vector bundles in singular cohomology and group laws; spectra and Adams-Brown's representability; Thom complex cobordism MU is the universal oriented complex cohomology theory and Quillen's theorem.</p> <p style="text-align: right;">~ 60 min.</p>	<p>Talk 3 The stack moduli of formal groups & MU construction</p> <p>The moduli of formal groups, the stack \mathcal{M}_{FG} and Hopf algebroids; strict isomorphisms and smash spectra; the height stratification $\{\mathcal{M}_{FG}^{\geq n}\}_n$; complex oriented cohomologies and MU-spectra as L-sheaves over \mathcal{M}_{FG}.</p> <p style="text-align: right;">~ 60 min.</p>
<p>Talk 4 Landweber Exact Functor Theorem & Flatness</p> <p>Quasi-coherent flat sheaves over \mathcal{M}_{FG} and regular criterion for modules, flatness property of the height stratification; the (LEFT) and applications to elliptic curves.</p> <p style="text-align: right;">~ 60 min.</p>	<p>Talk 5 Landweber Exact Functor Theorem & Periodicity</p> <p>Spectra representability, phantom maps and evenly generated cohomology theories; Landweber exact functors, flatness and even periodicity; Example of K-theory and the MP-spectrum.</p> <p style="text-align: right;">~ 60 min.</p>	

The **Bayerische Arbeitsgemeinschaft** gathers twice a year and gives the opportunity to young researchers (advanced master students, PhD students and postdocs) to actively work on a common topic of Algebraic or Arithmetic Geometry. Topics and organizers are democratically chosen at the end of each meeting following a list of proposals from the participants. Please refer to the website for programmes and more details. If you want to give a talk or attend please contact the organizers.