Program

CT: Contributed Talk, IS: Invited Speaker.

Monday, 26th of June

9:30–10:00	**Registration and coffee**		
10:00–11:00	IS	**Shachar Carmeli** Copenhagen University	On Maps Between Spherical Group Algebras
11:15–12:15	IS	**Gabriel Angelini-Knoll** Université Sorbonne Paris Nord	Syntomic cohomology of Morava K-theory
12:15–14:00	**Lunch**		
14:00–14:30	CT	**Tobias Lenz** Universiteit Utrecht	The universal property of global spectra
14:45–15:45	IS	**Mikala Ørsnes Jansen** Copenhagen University	Compactifications of moduli spaces and stratified homotopy theory

Tuesday, 27th of June

09:30–10:30	IS	**Constanze Roitzheim** University of Kent	How algebraic is a stable model category?
10:45–11:15	CT	**Julie Rasmusen** University of Warwick	THR of Poincaré ∞-categories
11:30–12:30	IS	**Gijs Heuts** Utrecht University	-
12:30–14:00	**Lunch**		
14:00–15:00	IS	**Elizabeth Tatum** Stockholm University	$BP\langle 2\rangle$-Cooperations and Brown-Gitler Spectra
15:00–15:30	**Afternoon break**		
15:30-16:00	CT	**Josefien Kuijper** Stockholm University	The K-theory spectrum of varieties and compactly supported cohomology theories

Wednesday, 28th of June

09:30–10:30	IS	**Jonas McCandless** MPIM Bonn	Equivariant homotopy theory for infinite discrete groups and TR
10:45–11:15	CT	**Alexis Aumonier** University of Copenhagen	Moduli of smooth embedded hypersurfaces
11:30–12:30	IS	**Lukas Brantner** University of Oxford/CNRS	Canonical lifts of ordinary Calabi–Yau varieties
12:30–	**Free afternoon**		

Thursday, 29th of June

09:30–10:30	IS	**Geoffroy Horel** Université Paris 13	Binomial rings and homotopy theory
10:45–11:15	CT	**Adrian Clough** New York University Abu Dhabi	A convenient category for classical homotopy theory
11:30–12:30	IS	**Lyne Moser** University of Regensburg	Straightening-unstraightening for (∞, n)-categories
12:30–14:00	**Lunch**		
14:00–15:00	IS	**Jan Steinebrunner** Copenhagen University	Modular ∞-operads and their algebras
15:00–15:30	**Afternoon break**		
15:30-16:30	IS	**Jack Davies** University of Bonn	Homotopical uniqueness for morphisms between elliptic cohomology theories

Friday, 30th of June

09:30–10:30	IS	**Joana Cirici** Universitat de Barcelona	Hypercommutative algebra structures on Kähler and Calabi-Yau manifolds
10:45–11:15	CT	**Kurt Stoeckl** University of Melbourne	Homotopy Wheeled Props
11:30–12:30	IS	**Irakli Patchkoria** University of Aberdeen	Morava K-theory of infinite groups and Euler characteristic
12:30	**End of conference**		

List of Abstracts – Talks

Monday, 26th of June

On Maps Between Spherical Group Algebras

S. Carmeli IS

Copenhagen University

Commutative ring spectra are one of the central objects of study in higher algebra, as they constitute a natural generalization of ordinary commutative rings. It is generally a challenging task to compute the space of maps between such commutative ring spectra. One basic family of examples of commutative ring spectra is the spherical group algebras of abelian groups. Namely, for an abelian group M, one can form the spherical group algebra $S[M]$, whose modules are spectra equipped with an action of M. In my talk, I will present a work in preparation, joint with Thomas Nikolaus and Allen Yuan, dedicated to the computation of the mapping spaces between such spherical group algebras for finitely generated abelian groups.

Syntomic cohomology of Morava K-theory

G. Angelini-Knoll IS

Université Sorbonne Paris Nord

Work of Hahn–Raksit–Wilson extends syntomic cohomology to the setting of ring spectra. This provides an effective tool for computing topological cyclic homology and algebraic K-theory. I will discuss the examples of truncated Brown Peterson spectra and Morava K-theory where we provide new evidence for a strong form of the redshift conjecture posed by J. Rognes in 2000. This talk is based on joint work with Jeremy Hahn.

The universal property of global spectra

T. Lenz **CT**

Universiteit Utrecht

The passage from unstable to stable homotopy theory has a clear conceptual interpretation in higher category theory: the ∞-category of spectra is obtained from pointed spaces by universally inverting the suspension-loop adjunction. Similarly, we understand well what's going on when passing from unstable G-equivariant homotopy theory to (genuine) stable G-equivariant homotopy theory: while it is not simply given by inverting suspensions, it can be described as universally inverting smashing with certain 'equivariant spheres,' namely the G-representation spheres.

This talk is concerned with the analogous story for global homotopy theory in the sense of Schwede, which studies 'universal' equivariant phenomena that exist uniformly across all finite groups. Here the above point of view cannot be applied directly as there aren't enough invertible objects in the global stable homotopy category. Instead, in joint work with Bastiaan Cnossen and Sil Linskens we use parametrized higher category theory in the sense of Barwick–Dotto–Glasman–Nardin–Shah to define *global ∞-categories* as well as a notion of genuine stability for these. We then give explicit models for the free presentable global ∞-category and the free genuinely stable presentable global ∞-category in terms of unstable and stable global homotopy theory, respectively. As a direct consequence, we can express the passage between them as universally enforcing genuine stability.

Compactifications of moduli spaces and stratified homotopy theory

M. Ørsnes Jansen **IS**

Copenhagen University

Compactifications of locally symmetric spaces or more generally moduli spaces often come equipped with natural stratifications, that is, a "well-behaved" partition of the space. Concrete examples include the Borel–Serre and reductive Borel–Serre compactifications of the locally symmetric space associated to an arithmetic group, and the Deligne–Mumford–Knudsen compactification of the moduli stack of stable curves. Arising from this additional structure are a wealth of interesting constructible (complexes of) sheaves, i.e. sheaves which are locally constant along each stratum. These in turn define interesting cohomology theories, e.g. intersection cohomology and weighted cohomology.

It is a classical result that locally constant sheaves on a sufficiently nice topological space are classified by the fundamental groupoid, or homotopy type. For stratified spaces, we have a similar classification of constructible sheaves as representations of the so-called exit path category, or stratified homotopy type. Calculating the stratified homotopy type of a concrete stratified space would allow us to study the constructible sheaves from a more combinatorial viewpoint – in theory at least.

I will talk about some explicit calculations.

Tuesday, 27th of June

How algebraic is a stable model category?

C. Roitzheim IS

University of Kent

There are many different notions of “being algebraic" used in stable homotopy theory. The relationships between those turn out to be unexpectedly subtle. We will explain the different ways in which a model category of interest can be algebraic, explore the different implications between them and illustrate those with plenty of examples.

(This is joint work with Jocelyne Ishak and Jordan Williamson.)

THR of Poincaré ∞-categories

J. Rasmusen CT

University of Warwick

In recent years work by Calmés–Dotto–Harpaz–Hebestreit–Land–Moi–Nardin–Nikolaus–Steimle has moved the theory of Hermitian K-theory into the framework of stable ∞-categories. I will introduce the basic ideas and notions of this new theory, but as it is often the case when working with K-theory in any form, this can be very hard to describe. I will therefore introduce a tool which might make our life a bit easier: Real Topological Hochschild Homology. I will explain the ingredients that goes into constructing in particular the geometric fixed points of this as a functor, generalising the formula for ring spectra with anti-involution of Dotto–Moi–Patchkoria–Reeh.

TBA

G. Heuts IS

Utrecht University

$BP\langle 2\rangle$-Cooperations and Brown-Gitler Spectra

E. Tatum IS

Stockholm University

In the 1980's, Lellman and Mahowald used Brown–Gitler spectra to construct spectrum-level splittings of the bo and $BP\langle 1\rangle$-cooperations algebras. These splittings helped make it feasible to do computations using the bo and $BP\langle 1\rangle$-Adams spectral sequences. In this talk, we will present an analogous splitting for the $BP\langle 2\rangle$-cooperations algebra.

The K-theory spectrum of varieties and compactly supported cohomology theories

J. Kuijper **CT**

Stockholm University

I will discuss a new description of the K-theory spectrum of varieties, in terms of so-called squares categories. With this new description of $K(Var)$ we can define a derived motivic measure which arises from a functor taking values in "cohomology theories with compact supports". This talk is based on joint work (in progress) with Jonathan Campbell, Mona Merling and Inna Zakharevich.

Wednesday, 28th of June

Equivariant homotopy theory for infinite discrete groups and TR

J. McCandless IS

MPIM Bonn

Inspired by work of Kaledin, I will explain a formalism for equivariant homotopy theory for infinite discrete groups and profinite groups. In this formalism one can form certain infinite convergent sums of transfer maps which for instance has the advantage of making the geometric fixedpoints functors into a jointly conservative family under suitable connectivity assumptions. I will furthermore explain how one can use this formalism to encode the extra structure on TR of any polygonic spectrum akin to the structure of a complete topological Cartier module in the sense of Antieau and Nikolaus. This is joint work with Achim Krause and Thomas Nikolaus.

Moduli of smooth embedded hypersurfaces

A. Aumonier CT

Copenhagen University

The space of smooth algebraic hypersurfaces of a given smooth projective complex variety is an object of geometric interest: it classifies algebraic bundles of embedded hypersurfaces. This motivates the following: what is the cohomology of that space? That is, what are the characteristic classes of such bundles? I will explain how to approach this question from a homotopical viewpoint by constructing a scanning map to a continuous section space. In a range, the cohomology then becomes computable using more classical algebraic topology. In particular, a pinch of rational homotopy theory reveals a phenomenon of homological stability.

Canonical lifts of ordinary Calabi–Yau varieties

L. Brantner IS

University of Oxford/CNRS

Classical Serre–Tate theory shows that ordinary abelian varieties and K3 surfaces in characteristic p admit canonical lifts to characteristic zero. In this talk, I will explain how derived deformation theory can be used to generalise this result to Calabi–Yau varieties. Time permitting, I will also explain a generalization of the BTT theorem to characteristic p. This is joint work with Taelman.

Thursday, 29th of June

Binomial rings and homotopy theory

G. Horel **IS**

Université Paris 13

Inspired by work of Toën, I will explain the construction of a lift of the integral cochain functor to the category of cosimplicial binomial rings. The resulting functor is fully faithful when the relevant weak equivalences are inverted on both sides. This can be viewed as a way to fix Mandell theorem which shows that the integral cochain functor with target E_∞ algebras is faithful but not full.

A convenient category for classical homotopy theory

A. Clough **CT**

New York University Abu Dhabi

Inspired by the problem of providing a good notion of underlying homotopy type of a manifold, I will show how the theory of differentiable sheaves may be used to give a new, conceptual proof of the fact that the Quillen adjunction between simplicial sets and topological spaces is a Quillen equivalence. If time permits, I will use the theory developed in the talk to give elementary proofs of some classical theorems such as Dugger and Isaksen's hypercovering theorem.

Straightening-unstraightening for (∞, n)-categories

L. Moser **IS**

University of Regensburg

Universal properties play an important role in mathematics, as they allow us to make many constructions such as (co)limits, Kan extensions, adjunctions, etc. In the $(\infty, 1)$-categorical case, such universal properties have been constructed using a fibrational approach, and compared to their established analogous enriched notions using Lurie's straightening-unstraightening. In particular, such a theorem allows one to construct $(\infty, 1)$-limits as terminal objects in the $(\infty, 1)$-category of cones.In this talk, I will present a generalization of these results to the (∞, n)-categorical setting for higher n. I will explain how the passage to double $(\infty, n-1)$-categories, i.e., internal categories to $(\infty, n-1)$-categories, is necessary to formulate these universal properties. Typically, $(\infty, 2)$-limits have been shown to not be equivalent to terminal objects in the $(\infty, 2)$-category of cones, but instead to terminal objects in the corresponding double $(\infty, 1)$-categories. This is work in progress with Nima Rasekh and Martina Rovelli.

Modular ∞-operads and their algebras

J. Steinebrunner **IS**

Copenhagen University

∞-operads are at the foundation higher algebra, as they allow us to coherently capture 'many-to-one' operations $\mu\colon x_1 \otimes \cdots \otimes x_n \to y$. Sometimes one encounters algebraic gadgets that combine operadic structure with dualisability conditions. For example, an $\mathbb{E}_\infty$-Frobenius algebra is an $\mathbb{E}_\infty$-algebra A together with a 'non-degenerate' trace $\tau\colon A \to 1$. Such structures cannot be encoded as algebras over an ∞-operad; instead they are algebras over a certain modular ∞-operad.

I will explain the definition of modular ∞-operads and present joint work with Shaul Barkan in which we establish an equivalence between modular ∞-operads and certain rigid symmetric monoidal ∞-categories. This leads to an explicit construction of the free symmetric monoidal ∞-category on a modular ∞-operad, and hence to a convenient theory of algebras over modular ∞-operads.

As applications we obtain a proof of the 1-dimensional cobordism hypothesis with singularities, a new proof of Galatius' theorem about the stable homology of $\mathrm{Aut}(F_n)$, and a proof of Hatcher's conjectures on the stable homology of diffeomorphism groups of handlebodies and of $(S^1 \times S^2)^{\# g}$.

Homotopical uniqueness for morphisms between elliptic cohomology theories

J. Davies **IS**

University of Bonn

Using Lurie's work in spectral algebraic geometry, one can conjure up many highly coherent stable operations on the universal periodic elliptic cohomology theory TMF. For many purposes it is more desirable to work with Tmf or tmf, two cousins of TMF formed by some "compactification" process. In this talk, we will discuss how to extend operations on TMF over these "compactifications". In particular, we quickly see that we require a certain level of homotopical coherence, describe an obstruction theory which captures these coherences, and show that these obstructions vanish in a sufficient range. Some applications of this obstruction theory will be mentioned too, including the uniqueness of the topological q-expansion map up to 3-homotopy, and possibly others.

Friday, 30th of June

Hypercommutative algebra structures on Kähler and Calabi-Yau manifolds

J. Cirici IS

Universitat de Barcelona

Any Batalin–Vilkovisky algebra with a homotopy trivialization of the BV-operator gives rise to a hypercommutative algebra structure at the cochain level which, in general, contains more homotopical information than the hypercommutative algebra introduced by Barannikov and Kontsevich on cohomology. In this talk, I will explain how to use the purity of mixed Hodge structures to prove formality of certain hypercommutative algebras associated to Kähler and Calabi-Yau manifolds. This is joint work with Geoffroy Horel

Homotopy Wheeled Props

K. Stoeckl CT

University of Melbourne

A prop is a free symmetric monoidal category generated by a single object, and a wheeled prop is a prop with a trace. They are useful and ubiquitous structures, not only encoding bialgebras (with traces), but also having applications in knot theory and topology. In this talk, without assuming familiarity with these structures, we will present new definitions of (wheeled) props, and characterise them as algebras over Koszul groupoid coloured operads. We will outline how our proof that these operads are Koszul, using an extension of Groebner bases to groupoid coloured operads, circumvents simple obstructions to existing techniques. We will then indicate how the Koszul machine defines a homotopy (wheeled) prop and unpack what exactly this entails. Finally, we will explore homotopy transfer theory applied to these structures, obtaining consequences in formality theory, and re-obtaining a theorem of Mac Lane.

Morava K-theory of infinite groups and Euler characteristic

I. Patchkoria IS

University of Aberdeen

Given an infinite discrete group G with a finite model for the classifying space for proper actions, one can define the Euler characteristic of G and the orbifold Euler characteristic of G. In this talk we will discuss higher chromatic analogues of these invariants in the sense of stable homotopy theory. We will study the Morava G-theory of G and associated Euler characteristic, and give a character formula for the Lubin–Tate theory of G. This will generalise the results of Hopkins–Kuhn–Ravenel from finite to infinite groups and the K-theoretic results of Adem, Lück and Oliver from chromatic level one to higher chromatic levels. At the end we will mention explicit computations for some arithmetic groups and also discuss connections with special values of zeta functions. This talk is mostly based on joint work with Lück and Schwede.