

# 名工大ホトトピー論集会08-1 Mark Behrens さん連続講演

文部科学省科学研究費基盤研究(B)(1) 課題番号 16340015 (代表 南 範彦)

による研究集会を開催致しますのでご案内申し上げます。

日時 : 2008年1月21日(月) ~ 1月25日(金)  
会場 : 名古屋市昭和区御器所町名古屋工業大学  
52・53号棟(教養キャンパス) 110講義室(月・水・木・金)  
103講義室(火・水), 107講義室(水)

・名古屋工業大学ホームページのキャンパス案内: <http://www.nitech.ac.jp/campus/index.htm>  
には、以下の情報へのリンクが張られています。

- 1 所在地 (名工大近郊の地図による案内があります。)
- 2 交通案内 (主な公共交通機関の路線図と名工大までの経路の案内があります。)
- 3 建物配置図 (名工大敷地内の建物の案内があります。)

講演者: Professor Mark Behrens, MIT

講演題名: Topological automorphic forms

アブストラクト: I will describe methods relating stable homotopy groups of spheres to the arithmetic of automorphic forms. There is a filtration on the stable stems called the chromatic filtration. The first layer may be detected by K-theory, and the second layer may be detected by the cohomology theory of Topological Modular Forms (TMF). After reviewing how this works, I will describe how the  $n$ th layer may be studied using cohomology theories of Topological Automorphic Forms associated to Shimura varieties.

## プログラム

1月21日(月) 午後: 52・53号棟110講義室

13:30 ~ 15:30, Number theoretic background

I will survey Hilbert's 12th problem, which asks for an explicit form of class field theory, and explain how it is solved in different contexts using the multiplicative group, moduli of elliptic curves, and Shimura varieties.

16:00 ~ 18:00, Homotopy theoretic background

I will review some aspects of the chromatic filtration, and explain how it is studied using the multiplicative group and K-theory (first layer), and moduli of elliptic curves (second layer).

1月22日(火) 午前: 52・53号棟103講義室

10:00 ~ 12:00, Classification of abelian varieties in characteristic  $p$

I will outline the Honda-Tate classification of abelian varieties over finite fields, using the concept of  $p$ -divisible group.

1月22日(火) 午後: 52・53号棟103講義室

13:30 ~ 15:30, Tate modules and level structures

I will describe some theorems regarding Tate modules and how to represent isogenies with the data of a level structure.

16:00 ~ 18:00, Polarizations

I will review the theory of polarizations, and classify polarizations of abelian varieties over finite fields.

1月23日(水) 午前: 52・53号棟110・107講義室

9:20 ~ 10:20, 110講義室: Shimura varieties

After briefly reviewing the notion of a stack, I will define the Shimura varieties we will be studying.

10:30 ~ 11:50, 107講義室: Deformation theory

I will discuss the deformation theory of formal groups,  $p$ -divisible groups, and mod  $p$  points of our Shimura varieties.

1月23日(水) 昼: 52・53号棟103講義室

12:10 ~ 13:30, (一般学生向け) 特別講演: Wrapping spheres around spheres

I will discuss the topological problem of classifying ways to wrap  $n$ -dimensional spheres around  $k$ -dimensional spheres. I will describe the patterns that emerge in this classification, and relate them to some elementary number theory.

1月24日(木) 午後: 52・53号棟110講義室

13:30 ~ 15:30, 110講義室: Height  $n$  locus

I will describe a zero dimensional subvariety of particular importance to the  $n$ th chromatic layer in homotopy theory.

16:00 ~ 18:00, 110講義室: Topological automorphic forms

I will describe a generalization of the Hopkins-Miller theorem (due to Jacob Lurie) and explain how the deformation theory allows us to construct the cohomology theory of Topological Automorphic forms (TAF).

1月25日(金) 午後: 52・53号棟110講義室

13:30 ~ 15:30, 110講義室:  $Q$ -spectrum

I will show that the adelic points of a unitary acts on TAF, the homotopy fixed points of this action is a spectrum  $Q_U$ . This spectrum  $Q_U$  is the main object of interest. I will prove

1. the spectrum admits a resolution given by the action of  $U$  on its building
2. the  $K(n)$ -localization of  $Q_U$  is an approximation to the  $n$ th chromatic layer in homotopy theory.

16:00 ~ 18:00, 110講義室: Examples

I will describe some examples

$n = 1$ : Class field theory and K-theory

$n = 2$ : Basically reduces to elliptic curve theory and TMF

$n = p - 1$ : I will show that maximal finite subgroups of the Morava stabilizer group may be realized.

Behrens さんのご快諾を得て、全講演は Hard Disk 付きビデオカメラにて収録されます。これらのビデオファイルをご希望の方は、十二分な容量を持った(30GBあることが望ましい)PCもしくはポータブルの Hard Disk をご持参下さい。

問い合わせ先: 南 範彦 (名古屋工業大学・おもひ領域) nori@nitech.ac.jp