KYOTO UNIVERSITY
GLOBAL COE PROGRAM
数学のトップリーダーの育成

GCOE連続講演会のお知らせ

Prof. Gordon Slade（University of British Columbia）

A renormalisation group analysis of the 4-dimensional self-avoiding walk

下記の予定で連続講演を行います。皆様奮ってご参加下さい。
なお、G. Slade教授は2月から1ヶ月半ほど京都大学理学研究科に滞在されます。

タイトル：　A renormalisation group analysis of the 4-dimensional self-avoiding walk
講　師：　Gordon Slade 氏（University of British Columbia）
場　所：　京都大学理学部3号館（日にちによって部屋が異なりますので、ご注意ください。）
日　時：　2月6日(金)：　1:30−3:00　（3号館552号室）
2月12日(木)：　1:30−3:00　（3号館108号室）
2月13日(金)：　1:30−3:00　（3号館552号室）

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Department of Mathematics
Kyoto University

A renormalisation group analysis of the 4-dimensional self-avoiding walk

Gordon Slade, University of British Columbia

Self-avoiding walks on $\mathbb{Z}^d$ are simple-random walk paths without self-interstections. Self-avoiding walks of the same length are declared to be equally likely. Basic questions are: (1) how many self-avoiding walks are there of length n (started from the origin), and (2) how far on average is their endpoint from the origin? The lace expansion has answered these questions in dimensions 5 and higher. For $d = 2$, SLE appears to hold the key to the answer, but so far no one has understood how to unlock the door. For $d = 3$, there are only numerical results.

In this mini-course, I will describe work in progress with David Brydges for the case $d = 4$. Our immediate goal is to prove that the critical two-point function (Green function) for a spread-out model of self-avoiding walks on $\mathbb{Z}^d$ decays like $|x|^{-2}$ at large distances, as it does for simple random walk.

We begin with an exact representation (due to John Imbrie) of the two-point function for self-avoiding walks as the two-point function of a certain field theory involving both bosons and fermions. In the first part of the course, I will explain this representation. Given the representation, we forget about the walks, and perform a renormalisation group analysis of the field theory. In the second part of the course, I will describe some of the ingredients in the renormalisation group analysis.

I will not assume that the audience has prior knowledge of field theory or the renormalisation group, and these concepts will be developed as the course proceeds.