SFB Colloquium Representation Stability (Research Project C1 and C3)

TIME:
7 Jan 2014, 16:00 - 18:00

LOCATION:
Freie Universität Berlin
Zuse-Institut, Hörsaal 2005 EG
Takustraße 7
14195 Berlin-Dahlem

PROGRAM:

16:00 - 16:45 **Prof. Benson Farb (University of Chicago)**

Representation stability: a user's guide
``Representation stability'' refers to a phenomenon discovered a few years ago by Church-Farb that seems to occur all over mathematics; it was developed into a powerful theory with Ellenberg. One simple application gives results such as: the sequence of vector spaces V_n has dimension equal to a polynomial $P(n)$ for n large enough. A common application is to the fixed degree (co)homology of a sequence of spaces X_n.
This has been applied to examples in algebraic topology (configuration spaces), algebraic geometry (moduli spaces of surfaces with n marked points, spaces of polynomials on rank varieties), number theory (cohomology of congruence subgroups), algebraic combinatorics (co-invariant algebras), and several other areas. In most cases nothing is known about the actual dimension of V_n, but this is now reduced in principle to a finite problem.
The purpose of this talk will be explain to workers in different areas what this theory can do for them, and how they can apply it.

16:45 - 17:15 Coffee-Break

17:15 - 18:00 **Prof. Benson Farb (University of Chicago)**

Contact:
Humboldt-Universität zu Berlin . Institut für Mathematik
SFB 647 . Unter den Linden 6 . 10099 Berlin
Tel. +49 30 2093 1804 . Fax. +49 30 2093 2727
sfb647@math.hu-berlin.de

Representation stability in cohomology and asymptotics for families of varieties over finite fields

In this talk Prof. Benson Farb will consider two families X_n of varieties on which the symmetric group S_n acts: the configuration space of n points in $\C$ and the space of n linearly independent lines in $\C^n$. He will explain via these two beautiful examples how non-experts can use the (twisted) Grothendieck-Lefschetz Fixed-Point Theorem in \'{e}tale cohomology as a machine to convert information, as follows:
Input: How the multiplicity of a given irreducible representation V of S_n in $H^*(X_n;\Q)$ varies with n
Output: Formulas for the number of polynomials over $\F_q$ (resp.\ maximal tori in $\GL_n(\F_q)$) with specified properties related to V.
In particular we explain how representation stability of $H^*(X_n;\Q)$ corresponds to asymptotic stability of various point counts as $n\to \infty$.

Contact:
Humboldt-Universität zu Berlin . Institut für Mathematik
SFB 647 . Unter den Linden 6 . 10099 Berlin
Tel. +49 30 2093 1804 . Fax. +49 30 2093 2727
sfb647@math.hu-berlin.de