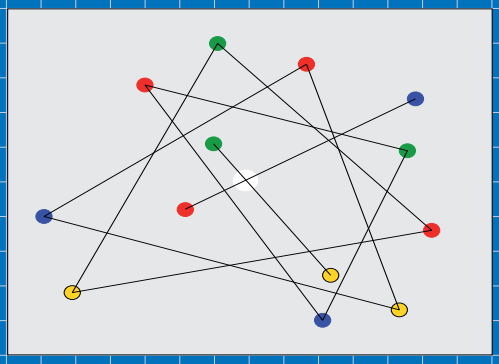
Berlin
Mathematical
School

## BMS Days Talk

Tuesday, 16 February 2010, 10:00 am

BMS Loft, Urania
An der Urania 17, 10787 Berlin



**Günter M. Ziegler** (TU Berlin):

"Colorful Partition Theorems for Points in the Plane"

More than 50 years ago, the Cambridge undergraduate Bryan Birch showed that "**3N** points in a plane" can be split into **N** triples that span triangles with a non-empty intersection. He also conjectured a sharp, higher-dimensional version of this, which was proved by Helge Tverberg in 1964 (freezing, in a hotel room in Manchester).

In a 1988 Computational Geometry paper, Bárány, Füredi & Lovász noted that they needed a "colored version of Tverberg's theorem". Bárány & Larman proved such a theorem for **3N** colored points in a plane, and conjectured a version for **d** dimensions. A remarkable 1992 paper by Zivaljevic & Vrecica obtained this, though not with a tight bound on the number of points. The proof was based on equivariant topology and the beautiful combinatorics of "chessboard complexes".

We propose a new "colored Tverberg theorem", which is tight, and which generalizes Tverberg's original theorem. The proof uses a (by now) standard set-up of a "configuration space/test map" scheme, the combinatorics of special chessboard complexes that are pseudomanifolds, and finishes it off using (your choice) either equivariant obstruction theory, or a degree argument.

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