Geometry Seminar
Tuesday, April 6, 2010
Room 201 WWH at 6:00 P.M.

3N colored points in a plane

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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 a such a theorem for $3N$ colored points in a plane, and conjectured a version for d dimensions. A remarkable 1992 paper by Živaljević & Vrećica 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.

(Joint work with Pavle V. Blagojević and Benjamin Matschke:
`http://arxiv.org/abs/0910.4987`, `http://arxiv.org/abs/0911.2692`)

For more information please visit the seminar website at:
`http://www.math.nyu.edu/seminars/geometry_seminar.html`.