1064-57-372 **Thomas Church***, Department of Mathematics, 5734 S University Ave, Chicago, IL 60637.

Representation stability, configuration spaces, and points over finite fields.

Given a space X, the configuration space $\mathrm{PConf}_n(X)$ parametrizes n–tuples of distinct points, while $\mathrm{Conf}_n(X) := \mathrm{PConf}_n(X)/S_n$ parametrizes n–element subsets of X. Arnold proved that the spaces $\mathrm{Conf}_n(\mathbb{C})$ satisfy *homological stability*: for each i, $H_i(\mathrm{Conf}_n(\mathbb{C})) \approx H_i(\mathrm{Conf}_{n+1}(\mathbb{C}))$ for $n \gg i$.

Unfortunately stability fails for $\mathrm{PConf}_n(\mathbb{C})$, so to talk about the "stable homology of $\mathrm{PConf}_n(\mathbb{C})$", B. Farb and I defined *representation stability.* We take the action of S_n into account and prove the description of $H_i(\mathrm{PConf}_n(\mathbb{C});\mathbb{Q})$ as an S_n–representation stabilizes. More recently I proved that $H_i(\mathrm{PConf}_n(M);\mathbb{Q})$ is representation stable for *any* manifold. This implies that $H_i(\mathrm{Conf}_n(M);\mathbb{Q})$ satisfies homological stability, previously known only for open manifolds.

I will conclude with some arithmetic applications of representation-stable homology with J. Ellenberg and B. Farb. For example, thinking of Conf_n as a scheme, the space of degree–n squarefree polynomials over $\mathbb{F}_q$ is exactly $\mathrm{Conf}_n(\mathbb{F}_q)$, and certain counting problems can be solved in terms of the multiplicities of irreducible representations in $H_i(\mathrm{PConf}_n(\mathbb{C});\mathbb{Q})$. (Received September 14, 2010)