



The Math/Stats Colloquium
Department of Mathematics and Statistics
San José State University



Thomas Church
Stanford Univ.

**Untying braids to find
roots of polynomials**

SEPTEMBER 17, 2014, MH320

Abstract: On average, how many real roots does a random quadratic polynomial have? That's hard to answer: sometimes it has 2 (like $x^2 - 4$) sometimes it has none (like $x^2 + 1$), and in rare cases it has only 1 (like $x^2 + 6x + 9$); in any case, it's hard to average over all polynomials!

But here are two easier questions: On average, how many *complex* roots does a random quadratic polynomial have? (Answer: 2) On average, how many *binary* roots does a random quadratic polynomial have? (Answer: 1) I'll explain how these two questions are related and can be answered via a classical topological problem about strings arranged into braids: which braids can be untied?

Background: Polynomials and roots. No other background or knowledge of topology will be assumed.

About the speaker: Thomas Church is Assistant Professor of Mathematics at Stanford. His research is in representation stability, the application of algebraic techniques to topological and geometrical questions (and vice versa!). He received his Ph.D. from U. Chicago in 2011.

SNACKS IN MH331B AT 2:30 PM

TALKS START AT 3 PM

For more information, see our full schedule at:

<http://www.math.sjsu.edu/~hsu/colloq/>