University of North Texas
Mathematics Undergraduate Colloquium

Tuesday,
January 28, 2013
5:00-6:00 p.m.

General Academic Building, Room 104

A pre-lecture reception with cookies, coffee, and tea will be held at 3:30 p.m. in the General Academic Building, Room 472.

The colloquium is sponsored by UNT Deapartment of Mathematics and the RTG in Logic & Dynamics, a research training group supported by the National Science Foundation and the University of North Texas.

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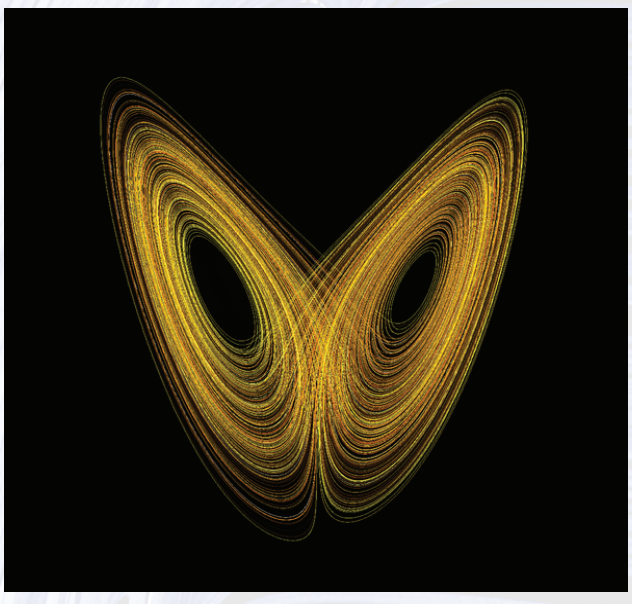
Andrew Török is a professor at the University of Houston. After working on Operator Algebras in Romania, he received his Ph.D. in Dynamical Systems from Penn State University in 1995. Among his current interests are limit laws for systems with some hyperbolicity, transitivity of skew extensions, and twin toddlers generated chaos.

Understanding Chaos: The Lorenz Attractor

Studying an Ordinary Differential Equation meant to be a simplified weather model, Edward Lorenz discovered in 1963 an object that is called today a strange attractor: nearby points are attracted to a set of fractal dimension, move around this set chaotically, with sensitive dependence on initial conditions. Understanding this attractor was one of the 18 problems for the twenty-first century proposed by Fields medalist Steven Smale. Namely: "Is the dynamics of the ordinary differential equations of Lorenz that of the geometric Lorenz attractor of Williams, Guckenheimer, and Yorke?"



In 2002 Warwick Tucker answered this question in the affirmative. His technical proof makes use of a combination of normal form theory and validated interval arithmetic. The talk will explain what's strange about this attractor, what Smale's question was, models for chaos, and how approximate computations (those done by a computer) were used to prove a mathematical theorem. Images and computer simulations are included.