NSF Award in Mathematical and Physical Sciences

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- **Project:** Combinatorial Ergodic Theory
- **Start Date:** June 1, 2009
- **Total Award Amount:** $330,000

How the results of this project will benefit society:
Ergodic theory is an area of mathematics in which probability and dynamical systems meet. As such, it is relevant to the mathematical modeling of many phenomena that arise in the physical sciences, engineering, and economics.

The problem this project is trying to solve:
This project involves a program of research in the intersections of ergodic theory and additive combinatorics. Ergodic theory is a branch of abstract mathematics that studies the way abstract systems evolve over time. Most of the problems are within ergodic theory and are related to the analysis of the long-term behavior of systems whose dynamics are too complicated or too chaotic to be understood locally.

How this project will work:

- Research will be conducted into the new understanding on the role of certain systems (nilsystems) in the analysis. This area of ergodic theory has strong relations to problems in additive combinatorics and harmonic analysis. The project will continue to explore these deep links, developing the applications of ergodic theory to such areas.
- The outreach portion of the project involves organizing conferences, mentoring, advising, and developing new courses.
- Active involvement in the education of researchers will continue in fields with links to ergodic theory, primarily by organizing interdisciplinary meetings.

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