(A) Project Summary

Title:	IGERT: School in Nonlinearity & Complexity
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The emergence of the new field of nonlinear science is one of the great scientific success stories of our generation. Nonlinear science deals with systems whose behavior cannot be understood by knowing how separate components behave in isolation: a nonlinear system (and most systems are nonlinear) is not simply a sum of its parts. By identifying features that are common to widely different systems, advances in nonlinear science continue to have a fundamental impact on many disciplines in the natural sciences, medicine, and engineering.

A modern education in the tools and methods of nonlinear science requires training that bridges traditional departmental boundaries. We propose the creation of an integrated, cross-disciplinary graduate training program which emphasizes the unity of fundamental concepts underlying a broad range of research areas in science and engineering. Our goal is to prepare graduate students for today's rapidly evolving professional environment. Students will learn both the technical tools and physical intuition needed to tackle complex nonlinear problems arising in various guises and scientific fields.

The core program includes, as a key component, an intensive course in which graduate student teams investigate a topic guided by two faculty members with complementary perspectives. This early research experience will be followed by a thesis on a different topic; for IGERT Fellows the project will be co-advised and cross-disciplinary. This restructuring of PhD training replaces the major/minor divisions of traditional doctoral programs, enhancing both the depth and the breadth of Fellows PhD training in a coherent manner.

Complementing this core will be a broad range of IGERT activities: interdepartmental research seminars, student-run seminars, annual retreats, regional workshops, international nonlinear school and an active visiting scientist program. Internships at participating partner institutions will provide additional training experience and opportunities at both academic and industrial sites, domestic and abroad. Together these components will provide a stimulating and diverse graduate experience with emphasis on the importance of cross-disciplinary thinking and communication skills.

The program outreach component flows naturally from the core educational elements of the proposal. The outreach initiatives include undergraduate research participation by students of Atlanta area minority colleges and the establishment of a web-based graduate course on nonlinear dynamics suitable for distance learning.