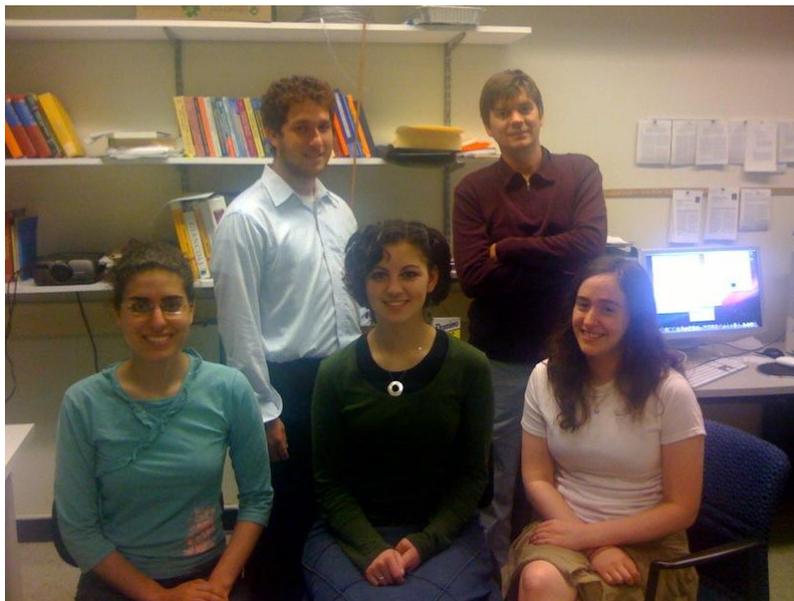


Dr. Emil Prodan
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Prodan's research group during the Summer of 2009:
(Top row) Mordechai Birnbaum and Dr. Prodan;
(Bottom row) Ramona Rahimian, Dassi Shulman and Amy LeVee.

Dr. Prodan welcomes participation from all students interested in applying the laws of physics, mathematics and computers to obtain a better understanding of the world around us. The students can participate in research projects during the academic semesters or during the Summers (typically from June 1st till July 31st). The research topics are aligned with the general interests of the scientific community and they evolve whenever interesting phenomena and topics emerge.

The research projects are designed with three things in mind: 1) To allow the students to learn and get familiar with a current and important scientific and technological problem. 2) To showcase how fundamental research in physics can lead to technological progress. 3) Skill development: students can practice basically all the skills acquired in the physics, chemistry and mathematics courses; They will also become familiar with new mathematical techniques, learn how to program a computer and discover new physical realms.

Dr. Prodan's research activity, since he joined Stern College in Fall 2007, generated 12 scientific publications. Several works that are under review or in preparation are co-authored by undergraduate students. Dr. Prodan's articles received more than 500 citations during the last two years. Dr. Prodan's papers can be accessed using the online database [Web of Science](#) from our Library webpage.

The projects immediately available from Dr. Prodan are tied to the following topics:

1) Investigations of charge and spin transport in a newly discovered class of materials called "Topological Insulators." The main property of such materials is their ability to conduct charge and spin even in the presence of strong impurities. In this project, Dr. Prodan and

his students will try to provide explicit evidence for this property, using the fundamental laws of physics, mathematics and computers.

2) Investigations of wave propagation in complex harmonic lattices, with emphasis on search and discovery of novel wave modes with topological properties. The harmonic lattices that are currently investigated by Dr. Prodan were inspired from the structure of soft materials synthesized by living organisms. In this project, Dr. Prodan and his students will search for novel harmonic lattices with similarly interesting physical properties.

3) Investigations of charge and spin transport across molecular and nanoscale structures. In this project, Dr. Prodan and his students will use the laws of Quantum Mechanics, mathematics and computers to simulate and understand how electricity flows through such structures.