Brown University Memorandum

To: Registrar
From: Prof Richard Gaitskell, Senior Thesis Coordinator, Physics Department
Subject: Undergraduates meeting requirements for Sc.B. with Honors: Concentrations which include Physics, 2003
Date: May 2, 2003

The following 6 undergraduates have satisfied the criteria for Sc.B. with Honors within the Physics Department. I include their names, full concentrations, the titles of their senior theses, and recommendations from their thesis advisors.

Name/ID: Amandine Cagnioncle, SISD19012
Concentration: Physics
Thesis Title: Melt migration and interaction with the mantle at subduction zones
Thesis Advisor: Prof. Marc Parmentier
Recommendation from Advisor:
I would like to confirm that Amandine has completed an honors thesis under my supervision. She has done excellent work that qualifies her for honors. The problem that she attacked was an important one that has been on the minds of geologists for some time. She looked at the buoyant migration of fluids release by mineral dehydration reactions as oceanic crust, altered by its interaction with seawater, is sinks back into the Earth's mantle at convergent plate boundaries. Her work has identified the parameters that will govern the relative effects of flow and deformation of solid mantle and the percolation of a fluid through it. With a little more work, this research will make a nice short paper. It also helps pave the way for a more realistic treatment of this problem.

In my experience with her Amandine impresses me with her intelligence. She very quickly understands concepts and has the ability to apply concepts to physical questions of interest. I do not have a copy of her transcript, but I am guessing that it must be strong since she has received honorable mention in the NSF Graduate Fellowship competition and has been admitted to a number of outstanding graduate programs in geophysics.

Name/ID: Andres Morey, SISD16900
Concentration: Engin-Physics ScB
Thesis Title: Quantum Mechanics and Determinism: An Investigation into Gerard ’t Hooft’s Recent Theories
Thesis Advisor: Prof Antal Jevicki
Recommendation from Advisor:
I am very happy to nominate Andres Morey for an Honors Degree in Physics. Andres chose to write his Senior Thesis on the very interesting and very deep question concerning the deterministic foundation of Quantum Mechanics. As Andres advisor I was not certain this topic was accessible. Andres pursued recent theories of Gerard ’t Hooft who has recently put forward specific deterministic ideas as the basis of Quantum mechanics. In his Thesis Andres was not only able to trace through ’t Hooft’s (sometimes) intricate reasoning but has also thought of possible generalizations and extensions. His persistence in understanding things fully resulted in an excellent Thesis.
Name/ID: Rachel Rosen, SISD19132
Concentration: Math-Physics ScB
Thesis Title: Supersymmetries and Giant Gravitons
Thesis Advisor: Prof. Antal Jevicki
Recommendation from Advisor:
It is a pleasure to nominate Rachel Rosen for an Honors Degree in Physics. Rachel wrote her Senior Thesis "Symmetries in Curved Space and Giant Gravitons" under my guidance. Rachel was a thorough and very determined investigator, she quickly mastered the basic subject of quantum mechanics in curved space-time and went on to study modern developments concerning symmetries and dynamics of extended branes in Anti de Sitter space of M-theory. I was most impressed by her ability to work through the complex details of a fairly advanced subject and at the same time grasp its general significance. She was an excellent student highly deserving of an Honors Degree.

Name/ID: Ellen Syracuse, SISD19001
Concentration: (1) Physics ScB (2) Geol-Phys/Math AB
Thesis Title: Determining crustal parameters along the FLED (Florida to Edmonton, Alberta Seismic Stations) Array
Thesis Advisor: Prof. Karen Fischer
Recommendation from Advisor:
I would like to enthusiastically recommend Ellen Syracuse for Honors with her Sc.B. in Physics. Ellen has been working with me on her Senior Research Thesis since the Summer of 2002. She has studied how the thickness and seismic velocity of the Earth's crust varies across North America using data from a long linear array of broadband seismometers that extended from central Florida to Edmonton, Alberta in 2001 and 2002. Ellen has done a superb job of analyzing Ps conversions and reverberations from the Moho. Her task of identifying high quality waveforms and jointly migrating them to image the Moho involved a daunting amount of data analysis. She carried out this work very efficiently and was quick to learn how to recognize good seismograms and how to work with the migration code. She then did a fine job of modeling her data images by migrating theoretical seismograms to determine the range of crustal thickness and velocity values that provide good fits to the crustal phases. Again she demonstrated excellent reasoning ability, independence and motivation.
**Name/ID: Tyler Wellman, SISD19050**
Concentration: Math-Physics ScB
Thesis Title: An Introduction to Supersymmetry in Quantum Mechanical Systems
Thesis Advisor: Prof. Antal Jevicki
Recommendation from Advisor:
I am glad to nominate Tyler Wellman for an Honors BSc Degree in Physics. Tyler has written his Senior Thesis "An Introduction to Supersymmetry in Quantum Mechanical Systems" under my guidance. He has done a thorough and most competent job on technically challenging topics of investigating quantum mechanical systems with extra fermionic degrees of freedom. He was able to investigate a generalization of these systems to many-body problems with multiparticle interactions. He deserves to be awarded a Physics degree with Honors.

**Name/ID: Sam Wurzel, SISD21161**
Concentration: Engin-Physics ScB
Thesis Title: Prospects for studying negative gravitaxis in Paramecia using magnetic field gradient levitation
Thesis Advisor: Prof. James Valles
Recommendation from Advisor:
Sam Wurzel made important progress in his senior thesis research that is worthy of honors. Sam's goal was to learn about and measure some of the hydrodynamic properties of paramecia, a single celled organism of interest to our ongoing studies of gravitational sensitivity in biological systems. His work gave him the chance to learn some fluid dynamic theory, design and troubleshoot an apparatus and make and analyze measurements. He succeeded on all fronts. His work consisted of two main parts. First, he reviewed the hydrodynamic models relevant to the drag forces they experience during their translation and rotation. Second, he measured the sedimentation and rotation rates of non-swimming paramecia in media of varying viscosity. He designed and constructed a sample cell for the sedimentation measurements taking care to minimize spurious, convective effects. He compared the results to his model and obtained reasonable agreement. Those results will be of direct use to us as we study the swimming behavior of paramecia in modified "artificial gravity" environments. In addition, throughout the project, Sam exhibited a good deal of independence and initiative. His thesis presentation was very clear. He revealed that he had a strong grasp of the physics behind his experiments and exhibited composure. For the reasons above, I recommend that he receive his degree with honors.