Summary of Activities of the University of Central Florida SPS Outreach Program

The UCF SPS Outreach Program has been subdivided into two focus audiences. The first subprogram is directed toward pre-collegiate students—middle and high school students. The activities of this subprogram are being carried out by student members of our SPS chapter—Erin Riley, Robert Grissetti, Sergio Tafur, Casey Schwarz, and Jarrad Pond. This subprogram has been designed based on the highly popularized 'Physics in Films' course developed by Dr. Costas Efthimiou and Dr. Ralph Llewellyn at UCF. We use popular films to elicit the interest of the students we visit. We impart physical concepts by discussing the feasibility of events depicted in our clips. The goal of this endeavor is to provide an early introduction to physical concepts in a way that may be especially compelling. We hope thereby to produce future scientists and future science advocates. *So* far, the responses from teachers and students have been positive.

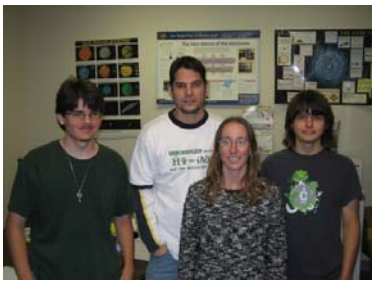

Photo 1: From left to right: R. Grissetti, S. Tafur, E. Riley, J. Pond.

The second subprogram is being conducted primarily by our chapter Advisor, Dr. Costas Efthimiou. This endeavor also makes use of the 'Physics in Films' concept. However it has additional components relating to the promotion of awareness of Einstein's accomplishments in recognition of his bicentennial, as well as the promotion of critical evaluation of superstition. Dr. Efthimiou has given presentations to several interest organizations on topics varying from the scientific truth of "Vampires, Ghosts and Zombies" to the "Concepts of Space-time." These presentations are in pursuit of the same goals as the youth program. This is especially a strongly felt need in the wake of current events such as the Creationism vs. evolution debate.

Youth Outreach:

To date, we have visited one Middle School, presented to three classes, over the course of two visits. Our first visit was to Jackson Heights Middle School in Oviedo, Florida, on April 5th 200. Reel Physics was presented to two of Mrs. Kathie Rue's eighth-grade, advanced science courses. Our presentations during this visit described the concepts of velocity, acceleration, and centripetal force. We opened with the concept of speed and acceleration, discussed the SI units, and showed how to calculate average speed and acceleration. We then introduced the notion of a Fermi problem—obtaining good answers to questions by rough estimates. We then lead the students through performing numerical estimates of a sprinter's and a car's average speed and average acceleration. We had a student run a given distance in the classroom after leading the students to decide that they could use the room tiles as a distance measurement and have the students with stopwatches time him. The class then together calculated his average velocity. For example, we had the students estimate the average acceleration of a car coming to a halt at a stoplight. We guided students in intuition and obtaining the rough figures for distances, times, and speeds by asking questions such as: Should the stopping distance be on the order of miles? Light-years? Feet? Should the time be of the order of hours? Minutes? Seconds? We had them time out ten seconds to give them an intuitive feel for how long such an interval really was.

We ended with clips from *Speed* 2. We had the students calculate the acceleration of the Cruise liner, which very slowly comes to a halt in our clip from *Speed 2* as it tears through a pier. It was found that its acceleration was on the order of one one-hundredth of a car's gentle deceleration at a stoplight, at best. The students were then able to recognize the humorous flaw in the director's portrayal of two individuals being flung through the ships control room window.

On February 17th, we visited one of Mrs. Kathie Rue's eighth-grade, gifted science classes at Jackson Heights Middle School and two her advanced classes on February 22nd. Using the feedback we received from last year's presentations and Mrs. Rue and her first class this year, which specified that the data collection page was confusing to students and that too much information was being given, we altered the presentation. In our subsequent presentations, we retained only the portion on speed and acceleration detailed above and had the students work in pairs to determine the unit conversion from minutes to seconds.

We have had positive responses from both the students and teachers we have visited. The students have indicated that the presentations were both compelling and educational, wish to have the outreach team return, and have expressed interest in learning more. Students have asked why studying energy is relevant and some examples of the topics they would appreciate learning about are space, black holes, simple machines, weather, rockets, airplanes, car crashes, any kind of explosion, and the physics of baseball. Many have mentioned that they will now consider whether what they see shown on the silver screen is physically realistic. A sample of the reviews and thank you letters will be included in the final report. The teachers have indicated that the presentations were helpful with respect to their design of the curriculum and were very eager to have us back. They have offered several suggestions emphasizing teamwork, more unit conversion work, and handouts for the students that will be adopted for future presentations. This program is planned to continue in the same fashion indefinitely. We are working on dates of return to Lawton Chiles Middle School so that we may visit Mrs. Leslie Daniels' and Mrs. Joanne Babyaks' classes and have set up a timeframe to continue with Kathleen Moreno's classes next January when she begins her physics section. We are preparing material for visiting sixth graders to speak about tsunamis and asteroid collisions with the earth and using a tsunami documentaries and movies such as *Deep Impact*. We are also in the continual process of working with middle schools to match content with curriculum, particularly using scenes from *Batman Begins* and *Daredevil* for the simple machines curriculum segments. Finally, we are beginning to work on matching our presentation material and the level of the content with the curriculum of local high schools. To this end we have entered favorable discussions with the GK-12 program in Orange County regarding how their participants can use this program. We hope to begin visiting high schools in the next academic year.

Community Outreach

Dr. Efthimiou has made two presentations to local interest groups, to date. On January 11, 2005, Dr. Efthimiou addressed the Central Florida Astronomical Society, consisting of amateur astronomers, and an audience of fifty regarding "Astronomy in Hollywood." He gave examples of good and bad astronomy in various Hollywood films. On April 12, Dr. Efthimiou spoke with LIFE@ucf, an organization of elderly retirees from academia, and an audience of 300 on "Ghosts, Vampires and Zombies." He used arguments in physics to prove that the concept of a ghost is contradictory and that the belief of `cold spots relating to ghosts' is a myth created by the imagination and the construction of old buildings. He also showed that existence of Vampires and Zombies contradicts our existence and that zombiefication has a physical explanation.

This program is also planned to run in the same fashion indefinitely. Dr. Efthimiou has two more talks scheduled in the near future. On April 16th, he gave his "Astronomy in Hollywood" presentation, this time at Orlando Science Center for an approximate audience of 200. In late April, Dr. Efthimiou gave a presentation at the university to an estimated audience of between fifty and one hundred on the "Concepts of Space-time." In commemoration of Einstein's miraculous year, he discussed the idea of time and space as they have evolved from Newtonian to String Theory.

Financial Report

The Marsh White award has been used to both promote return trips to the schools and to create new presentations. In each of the classes visited one student was selected by lottery and they and the teacher were given new movies, such as *The Day After Tomorrow*. Comments made by the students on the follow up surveys indicate that this tactic has increased their willingness to have a team return to present more physical concepts via the films. Students have also asked that clips from newer movies be used so we have bought additional movies, such as the tsunami documentary, *The Abyss*, *What the Bleep Do We Know*, and *Hellboy* from which clips will be taken for future presentations. Further funds were used to purchase the The Science of Superheros by Gresh and Weinburg to provide background information for the development of new presentations from *The Fantastic Four*, *Daredevil*, and *Batman Begins*.