

Society of Physics Students & the Students for the Exploration & Development of Space present:

# PROJECT HELIOS

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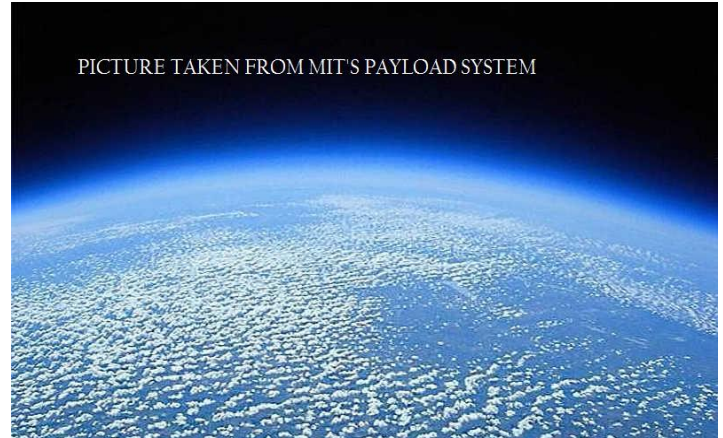
## **Project Helios**

Project Helios is a joint effort between the Society of Physics (SPS) and the Students for the Exploration and Development of Space (SEDS).

The group employs students from just under a dozen departments in the UNCW community: Physics, Mathematics, Environmental Science, Computer Science, Biology, Chemistry, Film Studies, Marketing, Business, and Fine Arts.

We are participating in a national competition known as the SEDS Innovation Challenge along with five other universities: MIT, University of

Alabama at Huntsville, University of Arizona, Iowa State University, and the University of Kansas. The long term goal for Project Helios is to establish a continuing space program at UNCW that includes sending unmanned free balloons and rockoons – rockets being launched from weather balloons – into near or sub-orbital space.



## **Objectives for the Project**

Our mission is to reach sub-orbital space at an altitude of over 125,000 feet by using Helium filled weather balloons and a single level 2 rocket to successfully capture images of Earth from the upper stratosphere. Many electrical devices will be utilized during the flight to track the rockoon system from ground control. With reusable equipment at our convenience, we will provide the opportunity for many more near space scientific explorations for future students at UNCW.



## **System Design**

We will execute a non-traditional research method that will follow a cutting-edge design for future government and/or institutional purposes. We are planning to launch a rocket from a weather balloon with a payload system consisting of three cameras to take pictures of Earth from near space, a GPS system and altimeter that will track the position of the rocket in time, a Central Processing Unit (CPU) to act as the motherboard for all of the electrical equipment, an inclinometer to determine the deviation angle of the rocket from the balloon system, and a radio frequency transmitter to stream live data back to ground control. The cameras will capture high resolution images and stream live video feedback of planet Earth from over 125,000 feet above sea level.

## **Preliminary Testing**

There will be many preliminary launches to test the validity of the rockoon system equipment. The first two tests will incorporate a tethered weather balloon with payload that will be connected to a wench on the ground to control the height of the system. The objective for these tethered launches will be to test computer and electrical equipment in the payload, as well as to experiment with

design ideas to optimize balloon configurations for future launches. The first balloon launch will prioritize the finalizing of all of the necessary electrical components and rocketry equipment. The rocket will not be fired; however, the balloon configuration will reach bursting altitude so that the parachute deployment system can be tested. The final preliminary launch will be the first and only rockoon test launch. The rockoon design, electrical equipment, and parachute deployment methods must be finalized in this final test launch. A secondary rocket will be fired to practice rocketry launching procedures. It is worthy to note that the rocket must be fired from mission control and that we must retain the capability to abort the mission if the rocket deviates by more than twenty degrees from the vertical.

### **Benefits of Project Helios**

The preparation for this competition includes several months of research into aerodynamic, thermodynamic, mechanical, and electronic design. Team members will gain practical hands-on experience in the engineering of electronic systems and in the construction of rockoon design. We will also gain valuable practice in graphic design, documentary film making, marketing and fundraising, project coordination, and team building. Project Helios will also stimulate interest in advance study and research in Physics through group interaction and will attract vast positive media attention, both local and national, toward UNCW as a whole. This national competition will help team members to develop crucial discussion and presentation skills as well as to establish a strong rapport toward faculty members and scientific organizations. Project Helios will reflect positively on the ingenuity of UNCW students, attracting many prospective students to study at this university, especially in the areas of science. This will convince employers to look more closely at UNCW graduates.

### **Tentative Dates for Preliminary Launches**

- ***First Tethered Launch*** – March 13<sup>th</sup>, 2010 at noon during Science Olympiad.
  - *Goal* – Test basic payload design ideas and camera equipment. Capture high resolution images and streaming live video of UNCW from 200 feet above ground.
- ***Second Tethered Launch*** – Circa March 31<sup>st</sup>, check Facebook account.
  - *Goal* – Test electronic equipment. Optimize payload and balloon configuration design. Assess HAM radio and wireless communication devices.
- ***First Balloon Launch*** – Circa April 20<sup>th</sup>, check Facebook account.
  - *Goal* – Develop ideal canister to suspend rocket and payload. Test inclinometer and CPU electronics. **NO ROCKET TEST LAUNCH!**
- ***First Rockoon Launch*** – Circa June 20<sup>th</sup>, check Facebook account.
  - *Goal* – Optimize rockoon launching system. Finalize electrical equipment. Test launch rocket under SEDS competition guidelines.
- ***SEDS Innovation Challenge*** – August 15<sup>th</sup>, check Facebook account.
  - *Goal* – Abide by competition rules. Travel to Nevada and launch optimized rockoon system design. Achieve the highest altitude and win the Grand Prize of \$5,000 for future SEDS missions!

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