SOCIETY OF PHYSICS STUDENTS
An organization of the American Institute of Physics

Marsh W. White Award Proposal

Project Proposal Title	Physics Escape Room: Hosted by the Society of Physics Students at UTD.
Name of School	University of Texas at Dallas
SPS Chapter Number	7258
Total Amount Requested	$479

Abstract

SPS at UTD will host a Physics-themed escape room to increase interest in physics and inspire local high school and UTD students to pursue physics. Students will be tasked with solving interactive, challenging puzzles in a fun, team-oriented game.

Proposal Statement

Overview of Proposed Project/Activity/Event

Building on the experience and success of our Escape the Physics Building event in April 2018, SPS at UTD plans to host an escape room event specifically targeted at local high school students as well as students at UTD. Our goal is to introduce students to physics as a fun and interesting subject, one in which they might consider majoring. Participants will be organized into teams and each team will be locked in a room containing physics-themed puzzles and challenges. Members of the team will have to work together to solve puzzles that will eventually lead them to the key to escape the room. The escape room will have physics-themed decorations.

Figure 1 Thermal cameras infuse games with inspiring physics.

How Proposed Activity Promotes Interest in Physics

SPS plans on creating the puzzles and events in the escape room by centering on common physics facts (such as a code word derived by finding famous physicists names/pictures), and also by showcasing both commonly known and more unfamiliar physical phenomena. As an example, last April we used a thermal camera (Figure 1) to identify heated resistors in a circuit, revealing a clue for participants to continue on. Magnetic (Figure 2) and optically (Figure 3) encoded messages were also included. We hope that through the showcases and puzzles will be able to act as pseudo-demonstrations to reveal the more intriguing aspects of physics to students who are still studying at university, as well as to those who are just now approaching higher education.

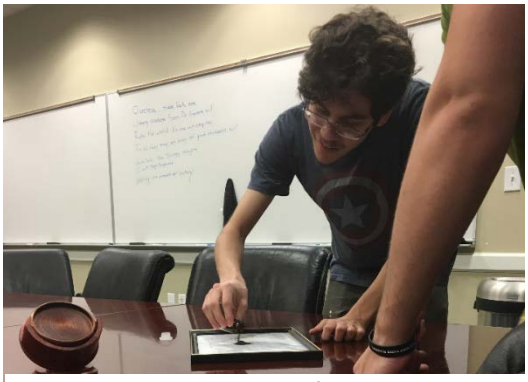
Figure 2 Students using iron filings to uncover a hidden magnetic message. April 2018.

After completing a smaller version of the escape room during the 2017-2018 academic year, we had the opportunity to reach out not only to current physics students, but also a handful of non-physics and non-natural science students. This year we hope to increase the outreach to not only a greater number of UTD students (both physics oriented and otherwise) but also focus on reaching out to local high school students. This will be done by reaching out to local schools with existing UTD educational connections (including many from underrepresented groups), by rallying other organizations on campus, and by advertising to the general public.


Figure 3 A hidden message in an electronic display had to be deciphered with red glasses. April 2018.

The Marsh White award would allow us as an SPS chapter to organize a much larger and more polished event, in which we can advertise to, accommodate, and interact directly with a greater number of students from both of these groups. By engaging with the local high schools we will be able to create or enforce interest in physics, which is especially important to this group who may still be discovering what they want to pursue in their higher education. By also showing that we as a collegiate SPS chapter can organize such an event to the administration and teachers of these high school, we can set a precedent to continue this event (and others like it) in future years. This will

allow us to not only interact with a handful of potential physics students this year, but multiple generations of students for years to come.

Plan for Carrying Out Proposed Project/Activity/Event

Figure 4 Night vision goggles will be integrated in our future Escape Room.

The officers of the UT Dallas chapter of SPS will be responsible for the overall planning of the Escape Room (ie. advertising, scheduling, room design, etc.). Progress will be monitored within the group of officers along with the guidance of the SPS advisor, Dr. Jason Slinker.

The escape room will be marketed within the university using flyers, posters, and handouts within the university common spaces that have high traffic. We will also be promoting through the school newspaper as well as through our own social media, Twitter and Facebook. SPS officers will be contacting various high schools within the district as an outreach to the high school students. President Andrew Marder is in the UTeach program (a college program that develops secondary teachers in STEM and regularly places interns in area schools) and will use the accumulated contacts of the UTeach program to ensure broad outreach to local high schools. We will also work with Dr. Magaly Spector, the UTD Vice President for Diversity and Community Engagement, to guarantee broad dissemination and promote diverse participation.

We will be recruiting members within SPS through our meetings, primarily with monitoring the individual escape rooms. Volunteers are needed for advertising, decorating, designing new puzzles, and proctoring the event. In addition to the 6 SPS officers, we estimate that we will have around 5 volunteers from our organization. This is a conservative estimate, given that we have seen approximately 30 students at regular meetings and up to 80 for our special events. We aim to recruit volunteers from other UT Dallas organizations, such as the Robotics Club.

Concerning expertise, the current officers were all involved in the April 2018 escape room. This established a core expertise that sets reasonable expectations for the efforts involved, particularly puzzle creation and event organization. Furthermore, many creative ideas were already successfully implemented that may now be modified and enhanced for a new installment. One of our own officers coded and built an intricate logic puzzle (Figure 2), this coming Escape Room. Others were considered but not yet utilized, such as night vision (Figure 4). To expand our breadth in puzzle diversity and bring to fruition a puzzle involving robotic engineering, we will involve the Robotics Club (mentioned previously). To enhance the aesthetics and potentially inspire new puzzles, we will work with our unique UTD Arts and Technology majors, who can contribute animation, gaming, and interface expertise.

Project/Activity/Event Timeline

Jan-Feb: Outreach to local high schools; planning of puzzles.
Feb-March: Construction of puzzles.
First week of April: Advertisement begins for campus and high schools.
April 18th: Snacks are acquired; last minute tests of the puzzles are done.
April 19-21: Escape room runs.

Activity Evaluation Plan

The Escape Room event allows us to promote the Society of Physics Students and the physics as a subject in the local high schools and UTD campus. Our goal is to spark interest in physics and the SPS chapter. To ensure our growing success, we plan to expand our event on a larger scale by making it more advertised and accessible to a larger number of participants, including local high schools. From the Escape Room we successfully carried out last semester, aside from physics majors and society members, the participants were students from a variety of disciplines and levels as well as the faculty. The activity involved a tremendous amount of teamwork. We had a bigger turnout than expected but had to limit our event to a number of participants. An attainable goal would be to triple the event to 100 participants.

To survey our strengths and weaknesses and to plan better, we will conduct an anonymous online survey similar to ours from last semester. The feedback greatly impacted our decision to continue and expand the activity. Team slots filled up in two days with 39 participants. The response on "will come again/recommend" was 100%.

Improvement suggestions included:

- "Give a prize and [serve] food"
- "More story to the game, more difficult puzzles"
- "Clearer instruction in regard to hints. Visible timer to keep track."

Comments on strengths:

- "...liked the use of thermal camera"
- "Puzzles...impressively clever. Liked the iron [sand and magnet] puzzle…"
- "I love how much work went into the event! The puzzles in the second room were phenomenal! First room was a great warm up room"
- "Ambience was nice...Moutaz Box [puzzle] was a blast!"
- "Actual use of physics knowledge"
- "The variety"
- "Liked the magnet [and] physicists puzzles"

Budget Justification

UTD SPS's inaugural Escape the Physics Building event combined the teamwork driven, against the clock action of a traditional escape room with exposure to varied topics in physics, like magnetism and optics. In its inaugural run the event was bare bones, with the expenses associated with the event being absorbed by the officer team of UTD SPS. The Marsh White Award would facilitate us to be able to craft a more finished, polished project. Using the budget to procure the basic necessities of puzzle construction would allow us more leeway in constructing a thorough event to help broaden its appeal to non-physics focused students. This greater appeal would allow us to reach a greater audience and help gravitate their attention towards an interest in further exploration of physics. The award would also allow us to procure varied electronic components, such as laser pointers and an Arduino, that would allow us to create more complex puzzles involving coding and EM phenomena. This would broaden our appeal to students already interested in physics and expand their scope of what is involved in physics at a level beyond high school. The UTD Physics Department will support our event by supplying sensitive equipment, like IR and thermal cameras, space in the physics building to host the event, and matching funds on the order of $100, which we will reserve for unanticipated expenses. Our previous SPS awards have been supplemented by our Provost's office and our local student activities office, which effectively doubled the financial impact of the award in each case. In this event, these funds will be used to enhance the puzzles and support the supplemental efforts of our collaborating partners in robotics and aesthetics.