



# SIGMA PI SIGMA

The physics honor society

## Sigma Pi Sigma Chapter Project Award Proposal

<b>Project Proposal Title</b>	The Engineer's Catapult
<b>Name of School</b>	St. John's University Jamaica, NY
<b>Sigma Pi Sigma Chapter Number</b>	303
<b>Total Amount Requested</b>	\$496.00

### Abstract

The St. John's University Chapter of Sigma Pi Sigma will be hosting our 10th annual induction ceremony in Spring 2019. We will be inviting local scientists, St. John's University physics alumni, current students and faculty, and local high school students to discuss the places where we can collaborate as physicists to address the challenges facing humanity.

The ceremony will begin by dividing our guests into 5-8 teams, comprised of a mix of faculty, alumni, and students. Our Proposed Team project involves the application of basic engineering. Specifically, Teams will be challenged to build the "Engineer's Catapult" which launches a grape across the greatest distance, using the minimum amount of materials. After the teams become acquainted, they will first brainstorm to develop an approach. Construction is restricted to the materials provided. Part of the challenge is related to these materials: 11 Popsicle sticks, 1 tongue depressor, hot glue sticks and glue gun, 1 non-flexible drinking straw, 1 wooden dowel, 1 small rubber band and 6-8 grapes. They will then have 30 minutes to build their catapults. Construction will continue during the subsequent ceremony; in the background our catapults will be standing firm. Prior to the meal the catapults will be judged and prizes announced.

We intend to invite a cross section of local scientists and alumni speakers. These Speakers will describe the role of Physics in their careers, how they dealt with the transition from undergraduate to career or graduate studies, and their contributions toward the bettering of humanity. The induction ceremony allows us to showcase our vibrant Sigma Pi Sigma students, support and encourage our graduating seniors to continue to confidently take their next steps in further study or careers. Additionally, we seek to encourage, inspire, and welcome our high school students to Physics and STEM community. The SPS Chapter Award will be used to cover expenses related to: Engineer's Catapult activity and prizes, souvenirs for alumni, and the ceremony dinner.

## Overview of Proposed Project

The St. John's University chapter (6170) of the Society of Physics is continuously growing, becoming more vibrant and flourishing into a nationally recognized organization through its strong efforts to care for its members and through outreach programs. For example, our faculty advisor (Dr. Charles Fortmann) represented our efforts to build 100 solar chargers for Puerto Rico after Super Storm Maria through a PBS interview in February 2019 on ScTech Now (<https://www.scitechnow.org/videos/solar-power-to-save-lives/#>). We continue to develop Outreach projects and are presently working on a self-contained solar-powered water purifier for crisis impacted regions and have engineered solar-powered deep well pumps for remote farm applications. The Sigma Pi Sigma Chapter was also recently revived and has inducted a total of 62 fine physics undergraduates in the past six years. In addition to encouraging the study of physics and honoring those with outstanding academic achievements, our SPS and Sigma Pi Sigma chapters have also engaged in a variety of activities to assist St. John's students of various majors with their physics courses and to promote a science and engineering education among the local community. Each semester our SPS chapter organizes a series of tutoring events and physics seminars: promoting student fellowship, fostering interaction between students and faculty, and encouraging undergraduate research. For example, since October 14th of 2015, St. John's SPS and Sigma Pi Sigma chapters offer a Physics Mid-term Prep Tutoring Session which continues on to this day.

We are also committed to promoting education of science and engineering among the general public by participating in various outreach activities and helping local inventors check the validity of their science. Often local inventors call St. John's to tap St. John's Physics Professors for a trusted sounding board for their inventions and concepts. Our Professors generously spend their time listening and helping where possible. Interesting these contacts also confirm to St. John's that the public at large continues to be concerned about the energy, climate change, and the global resource supply. Teaming with St. John's Science & Technology Entry Program STEP, St. John's SPS chapter has been conducting a total of 12 physics workshops for the students in the STEP program since fall 2009. During these workshops, students from local middle and high schools gain hands-on experience by performing experiments adapted from our College Physics lab class. These workshops are well received by the high school students as indicated by their positive feedback form responses. Working with St. John's Academic Service Learning ASL program, St. John's SPS chapter also visits local high schools to give workshops to stimulate our younger generation's interest in science. Members of St. John's SPS chapter culturing Algae for chlorophyll studies related to bio-mimicry based photovoltaic research. With the generous support of the Sigma Pi Sigma national office and the St. John's University, St. John's Sigma Pi Sigma chapter has successfully hosted eight induction ceremonies from 2010 to 2017, honoring the outstanding achievements of our students and alumni. All events were well received by the students and their families and friends, invited guest speakers, and faculty and staff. Students were especially interested in networking with alumni and asked them for career advice.

As the public is becoming increasingly aware of environmental issues like climate change, at this year's Sigma Pi Sigma induction ceremony, we would like to bring our guest speaker, alumni, current students and faculty together to learn how physics can help the environment. As physics majors, we have the unique power of understanding and we must use this power responsibly. To the St. John's SPS this means using the physics skills obtained in our education and careers to find innovative ways to help the poor and protect our planet. This year plenary talks will focus on Physics in Medicine, Invention, and Patent Law. The point is that Physics degrees not only fuel meaningful careers but also provide an essential vehicle for technological revolution. We will also invite our physics alumni whose careers are related to energy and environment to the ceremony and ask them to share their experiences of applying

the physics learned at St. John's to solve various environmental and socially important issues. The Sigma Pi Sigma induction ceremony and the dinner banquet following the ceremony will be held in the evening of April 6th, 2019. About 15-20 physics alumni and their family members, 15-20 Sigma Pi Sigma members including new inductees and their guests, and 10-15 students and faculty members from all science departments of the St. John's University are expected to attend the event.

In addition, we will invite 7-8 local high school students plus their parents to the ceremony. A total of 60 attendees are thus expected at the ceremony. The event will start with the catapult-building contest where teams will compete to build their catapults and apply principals of engineering and gravity to optimize the distance crossed by a grape launched by the catapult and take measures to mitigate structural decay all the while using low cost materials such as popsicle sticks and tongue depressors. We expect the contest should bring a lot of fun to the event, especially with the participation of alumni and high school kids. The formal ceremony will be opened by the Chair of the Physics Department, followed by induction of the new Sigma Pi Sigma members. The main part of the ceremony is for our guest speaker and alumni to share with the audience how they have used their physics knowledge to help the environment. We expect the event will promote students' interest in physics, provide opportunities for students and faculty, alumni, and the local communities to interact with each other, and inspire the younger generation to become tomorrow's leaders in science and engineering fields.

### **How Proposed Project Meets the Purpose of the Award**

- Since 15-20 alumni and their family members are expected to attend the event and interact with our students and local high school students, the event will build community among alumni, new and current Sigma Pi Sigma members, and local high school students.
- We expect to induct 7-8 new members into Sigma Pi Sigma, bringing the total number of inductees at St. John's University to more than 70. The celebration of these inductees will hopefully motivate our younger students to work hard in their physics studies to be inducted as well.
- By inviting local high school students and their parents to our Sigma Pi Sigma induction ceremony, it will raise the awareness of Sigma Pi Sigma and the Society of Physics Students in the local community and promote the study of science among the younger generation
- Our SPS chapter has been named one of the outstanding chapters by the SPS national office twice in recent years, hoping to named outstanding chapter again for this past 2018-2019 year. We also won the Blake Lilly Prize for our physics outreach and received excellent feedback from it. We will celebrate these achievements at the event and make our SPS chapter more visible to the community.

## Plan for Carrying Out Proposed Project

- Personnel planning and organizing the event:

SPS President: Seychelle Khan

SPS Vice-President: Jeremy Chiu

SPS Secretary: Arnold Lee

SPS Treasurer: Anthony Santagata

The team will be assisted by Ms. Mary Ann Frohnhoefer, secretary of the Department of Physics and Dr. Charles M. Fortmann, faculty advisor of SPS who will organize the event with Seychelle. The activity will be organized by Jeremy. Anthony will be consulting Seychelle and Mary Ann to monitor the budget.

- Marketing:

Invitation letters will be sent to alumni and local high school students and emails will be sent to current students and faculty of the St. John's University physics as well as the general STEM community (to encourage greater Physics Minor enrollment) to invite them to the event by Mary Ann. Event flyers will be made and posted on the St. John's University Website, St. John's SPS chapter Facebook page, and on bulletin boards at various places on campus by Arnold Lee.

- Sigma Pi Sigma member participation :

We expect to induct about 7-8 new members into Sigma Pi Sigma at the ceremony. About five to six current Sigma Pi Sigma members are also expected to attend the event. In addition, 15-20 students and faculty members from all science departments of the St. John's University are expected to attend the event.

## Project Timeline

January-February 2020	Invitations sent out to alumni and local high school students
February 1-15, 2020	New inductees selected by the committee
February 15, 2020	Invitations sent out to new inductees
March 1, 2020	Deadline for inductees to reply to invitation
March 10, 2020	New inductees' information sent to the Sigma Pi Sigma national office and reception items ordered. Invitations sent out to current students and faculty
March 15, 2020	Materials for contest prepared
March 31, 2020	Deadline for alumni, high school students and guests, current students and faculty to confirm attendance
April 1, 2020	Acquire prizes for contest
April 10, 2020	St. John's University 2018 Sigma Pi Sigma Induction Ceremony

## Project Evaluation Plan

The project will be evaluated in the following aspects: The number of participants will be recorded by asking attendees to sign in at the event and this number will be compared with our expected number of 65 participants. A post-event survey will be conducted to get feedback from the participants. Suggestions and feedback will also be sought by speaking with current students and faculty directly after the event.

## Budget Justification

The Engineer's Catapult activity is not merely a way to pass time while the induction gets underway. This activity allows guest to put their science minds to work. The only way to win is to employ fundamental concepts of physics and engineering. Through friendly competition, guests will realize that they know more about physics than they think. The winning team will then be given brain-teaser puzzles as an award, so the learning never stops!

The dinner banquet will provide all participants of the event opportunities to network with each other and bring our alumni, students and faculty, and local communities closer, spark friendly and productive communications, and promote fellowship among them. This event is designed to demonstrate that the Physics Community is a welcoming, supportive, and diverse group of caring people striving to better the world through creative scientific endeavor. These interactions will inspire our local high school students as well as our students to pursue careers in science and engineering and become tomorrow's leaders to ameliorate humanity!