Princeton Rocketry Club

2021-2022 Sponsorship Packet
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Club Overview

Who are we?

- ~85 students across all disciplines who are passionate about space sciences and space tech
- One of the largest engineering and science student orgs on campus!

What do we do?

*Our project teams this year include*...

- Spaceport America Cup 2022
- High Power Rocketry Level 1 Certification Program
- High-Altitude Ballooning
- NASA RASC-AL Challenge 2022
- Active Controls

*In the past, we’ve worked on*...

- SpaceShot (sounding rocket capable of going to space)
- Project Nebula (7th place rocket at SA Cup 2019)
- NASA’s Micro-g NeXT finalists
- NASA’s BIG Idea Challenge

How do we reach out to Princeton and our local community?

- Arduino workshops with local schools
- Hosting speaker events with aerospace professionals from academia and industry
- Community rocket build + launch events
- Society of Women Engineers annual High School Engineering Day for local students

Have more questions? Contact us at rockets@princeton.edu.
Sponsorship Information

Princeton Rocketry Club is seeking sponsors for the 2021-2022 academic year. In return for monetary and in-kind donations, PRC provides several sponsorship packages to help thank our sponsors.

If you would like to provide in-kind donations such as hardware or materials for our projects, we can attribute the value of those donations to the appropriate sponsorship level. Additionally, if you'd like to sponsor a specific project, please let us know.

*As a student organization within Princeton University, PRC is a 501(c)3 Nonprofit. All donations are tax deductible. University W-9 forms can be provided if requested.*

<table>
<thead>
<tr>
<th>Level</th>
<th>Amount (USD)</th>
<th>Benefits*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bronze</td>
<td>$1,000</td>
<td>Logo on website.</td>
</tr>
<tr>
<td>Silver</td>
<td>$2,500</td>
<td>Access to resume booklet. Sponsored shout-out posts on club social media.</td>
</tr>
<tr>
<td>Gold</td>
<td>$5,000</td>
<td>Use of all club media (videos, photos) for marketing.</td>
</tr>
<tr>
<td>Platinum</td>
<td>$10,000</td>
<td>Logo on all competition and high-profile launch vehicles. Access to and recognition at all speaker events.</td>
</tr>
<tr>
<td>Title Sponsor</td>
<td>$25,000</td>
<td>Large logo on all vehicles. Explicitly mentioned as a sponsor in all press releases and University publications.</td>
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</tbody>
</table>

*All benefits are cumulative.*

Want to sponsor us? Contact us at rockets@princeton.edu.
Past Projects: SpaceShot
INTERNAL CLUB PROJECT

We designed, built, and launched the smallest sounding rocket ever designed with the capability to reach an altitude of 150 km. We obtained federal approval for the space launch from the Federal Aviation Administration (FAA) Office of Commercial Space Transportation.

SKILLS
CAD, 3D printing, finite element analysis (FEA), advanced manufacturing techniques

TOOLS
State-of-the-art composites lab, 3D printers, CNC mill

RESULTS
May 2018: Our first rocket successfully launched from Spaceport America, reaching an altitude of 47,610 feet. The rocket had a second-stage ignition failure.

May 2019: Our second rocket was launched from Spaceport America, and preliminary data showed that the rocket reached the Karman line.
Past Projects: CanSat
ORGANIZED BY AAS AND AIAA

We participated in a competition to build rocket payloads for aerospace applications.

In 2017, we built a solar-powered Venus glider for atmospheric sampling to be launched on a high-power rocket for an Earth-based test.

In 2018, we built a probe that deployed an aero-braking heat shield that descended at a target velocity.

SKILLS
CAD, 3D printing, PCB design and manufacturing, RF communications design, fluid mechanics analysis, microcontroller programming

TOOLS
Creo, KiCAD, EAGLE, Fritzing, Arduino, Stratasys and MakerBot 3D printers, Epilog laser cutter, electronics shop tools, machine shop tools, wind tunnel

RESULTS
2017: Placed 25th out of 87 teams in the international competition.
Past Projects:

Spaceport America Cup
ORGANIZED BY SPACEPORT AMERICA

We successfully designed and built PRC’s first competition rocket, launched at Spaceport America Cup in 2019. The 10ft, 50lb rocket reached an altitude of over 10,000 ft and was judged on design, execution, project report, and flight success.

SKILLS

CAD, 3D printing, PCB design and manufacturing, RF communications design, flight trajectory simulations, microcontroller programming, control systems design

TOOLS

Creo, QGroundControl, MAVLink, PX4 flight stack, electronics shop tools, machine shop tools

RESULTS

Placed 7th out of 46 teams in the 10k COTS division. Placed 14th out of 1044 teams overall.
Past Projects: Micro-g NExT
ORGANIZED BY NASA

The Princeton Micro-g NExT team competed in the **Mini-Arm End-Effector challenge**, which is related to potential missions to ocean worlds such as Europa where a robotic arm would handle ice underwater. We designed a soft robotic gripper that uses a neoprene bag filled with small granules that can go between malleable and rigid states to grip objects.

**SKILLS**
CAD, 3D printing, PCB design and manufacturing, microcontroller programming, mechanical design, control systems design

**TOOLS**
PTC Creo, laser cutter, electronic shop tools, waterproof enclosures

**RESULTS**
Successfully submitted proposal to NASA and received feedback.
Past Projects: ThinSat
ORGANIZED BY VIRGINIA SPACE

ThinSat is organized by Virginia Space, in partnership with Twiggs Space Lab, Orbital ATK, and NASA Wallops Flight Facility. We launched several types of rapid prototype circuit boards into space to determine which ones are able to function in the extreme environment of open space.

SKILLS
CAD, 3D printing, PCB design and manufacturing, RF communications design, fluid mechanics analysis, microcontroller programming

TOOLS
Creo, KiCAD, EAGLE, Fritzing, Arduino, laser cutter, 3D printer, electronics shop, machine shop

RESULTS
Successfully completed the hardware build of the ThinSat payload. Presented design to the ThinSat program. Successfully launched into space on board an Antares rocket in February 2021.
Current Projects: High-Power Rocketry
INTERNAL CLUB PROJECT

The high-power rocketry project is PRC's longest-running project, currently in its fifth year. It is a great introduction to rocketry for students who want to take ownership of a hands-on project as soon as possible. With the mentorship from experienced rocketeers, 15+ members have already gained Level 1 rocketry certification through the NAR.

HPR team members also have the opportunity to lead project subteams tasked with building the electronics payload. The payload will collect flight data and transmit it to a ground station in real time.

**LEAD**
Gavin Cotter (MAE ’23)

**BUDGET**
$6,000

**SKILLS**
CAD, 3D printing, PCB design and manufacturing, mechanical design, GUI/data transmission, Arduino, Raspberry Pi

**TOOLS**
PTC Creo, KiCAD, electronics shop tools, machine shop tools, Python
Current Projects:
Spaceport America Cup 2022
ORGANIZED BY SPACEPORT AMERICA

The SA Cup team will be designing and building a fiberglass rocket to be launched to 30,000 feet at Spaceport America in June 2022. This minimum diameter ocket will feature an 8.8lb scientific payload flying with an N3301 motor.

Preparation is also already underway for our 2023 rocket, which will include a student researched and developed motor which will be fully designed and built inhouse with a custom propellant. The team also plans on building their own test stand to test the rocket motor.

LEADS
Shannen Prindle (MAE ‘23), Yousuf Tariq-Shuaib (MAE ’22)

BUDGET
$15,000

SKILLS
CAD, 3D printing, PCB design and manufacturing, mechanical design, advanced fabrication, simulation/trajectory estimations, fin simulations, motor simulations, stress simulations

TOOLS
PTC Creo, BurnSim, MATLAB, electronics shop, composites lab, OpenRocket, Fritzing, machine shop
Current Projects:
High-Altitude Ballooning Team
INTERNAL CLUB PROJECT

Our High-Altitude Ballooning (HAB) Team will build balloons strapped with GoPros and GPS sensors and launch them to 90,000+ feet.

This project involves designing and fabricating our payloads from scratch, and even collaborating with Princeton departments on payload options (such as a small particle detector). Engineering-design goals and constraints will provide interesting and challenging aspects to each launch, such as maximizing data collection, achieving high altitudes, and minimizing cost.

The ultimate goal of this project team is to continue momentum through future semesters to eventually restart a HAB launch competition once run by MIT & Stanford.

LEAD
Rishi Gorrepati

BUDGET
$2,000

SKILLS
CAD, PCB design and manufacturing, Arduino, design and fabrication of delectronic payloads, engineering design constraints

TOOLS
PTC Creo, electronics shop
Current Projects:

NASA RASC-AL Challenge 2022

INTERNAL CLUB PROJECT

The 2022 RASC-AL Competition is seeking undergraduate and graduate teams to develop new concepts that leverage innovation to improve our ability to operate on the moon, Mars, and beyond. This year’s themes range from operations for extending mobility and enabling sample return on the Moon to large-scale in-situ resource utilization of water on Mars. Each team’s response should address novel and robust applications to support expanding humanity’s ability to thrive beyond Earth.

Our RASC-AL team will be focusing on their proposal this semester related to the themes of Portable Utility Pallets, University Sample Containment, Mars Water-based ISRU Architecture, or a Suitport Logistics Carrier.

This project will last up to at least the proposal submission deadline in March, with the potential for further technical paper submissions and a presentation if our team is selected.

LEADS
Rosy Monaghan (MAE ‘24), Kenya Ripley-Dunlap

BUDGET
$0 (all costs will be covered by RASC-AL)

SKILLS
Research, mechanical design, technical writing, CAD

TOOLS
PTC Creo
Community Engagement

Community Rocket Launches
We hold several launches open to the University community as well as the Princeton community at large. Additionally, we hold launches with local homeschool groups where all the students had the opportunity to launch a rocket that they built.

In previous years, we taught over 100 people about the basics of rocket science through demonstrations and launches. During the virtual year, we continued to support the University community through virtual events such as workshops and tutorials.

Visiting Local Schools
We have reached out to over 300 elementary school students through launches and demonstrations at the Wilberforce School and at Riverside Elementary School as part of their annual Science Day.

Media/Press Coverage
PRC has been featured in the following publications:
- *Princeton University ODUS newsletter:* https://tinyurl.com/yczmsz5k
- *VICE Motherboard:* https://tinyurl.com/y8fxx2uw
- *Spaceport America:* https://tinyurl.com/y9cc45yg
- *Princeton University:* https://tinyurl.com/yyux2ff5
Community Engagement

Workshops
We’ve held rocket-building workshops for the University community and held occasional workshops for a local homeschool group. We’ve helped over 20 people construct low-power rockets as a way to teach them about aerospace engineering.

Inviting Speakers
We have invited several speakers to give a public lectures to our club over the years, including prominent aerospace professionals from industry and academia. In previous years, we had George Whitesides discuss space travel and the future of the space industry to our club. In addition, we had Prof. Luigi Martinelli talk about computational aerodynamics and how it can be used in the design of space and aircraft.

Collaboration with SWE
We have a strong relationship with the Princeton chapter of the Society of Women Engineers, and for the past few years we have worked with them at their event for high school students each semester. Through presentations, demonstrations, launches, and activities we have taught over 400 high school girls about aerospace engineering.
The Flying Tigers
OFFICER CORP

President: Shannen Prindle
Shannen Prindle (MAE ‘23) is President of the Princeton Rocketry Club and serves as a lead for the Spaceport America Cup team. She’s minoring in planets & life, and leads the Droid Team as part of the Princeton Robotics Club. Formerly she received her L1 certification as mechanical sub-team lead and co-led the High Power Rocketry team, and is now working towards her L2 certification. Shannen is immensely passionate about the commercial space industry, and spent her recent gap year interning at Venturi Astrolab, Inc. and SpaceX. Outside of academics, she is interested in astrophotography, hiking, and visiting local coffee shops.

Treasurer: Gavin Cotter
Gavin Cotter (MAE ‘23) is the Treasurer of and High Power Rocketry team lead for the Princeton Rocketry Club. Gavin has interests in robotics, space exploration, and economics. During his freshman year, Gavin earned his L1 rocketry certification through the Princeton Rocketry Club and served as one of the electrical sub-team leads for that launch. Last year Gavin worked as one of the co-leads of the High Power Rocket Team.

Technology/Training Officer: Abhinav Agarwal
Abhinav Agarwal (MAE ‘23) is the Technology and Training Officer for the Princeton Rocketry Club. In the past, he’s been the President of the club and the lead for the LIGHTSABER team, which he currently works on. He is majoring in Mechanical and Aerospace Engineering with certificates in Physics, Robotics, Computer Science, and Applied Math. Additionally, he’s interested in control theory, machine learning, and space flight. He loves reading about aircrafts, spends his free time on flight simulators, and is one of the biggest Star Trek fans.
The Flying Tigers

OFFICER CORP

Business Development Officer: Rachel Qing Pang
Rachel Qing Pang (PHY ’23) is the Business Development Officer of the Princeton Rocketry Club. She is part of the Spaceport America Cup team and loves the exhilaration of watching a rocket launch! Rachel is a Physics major and her passions include applying physics to oceanography and environmental conservation. At Princeton, she is a Residential College Advisor and an Outdoor Action leader. She enjoys hiking in the great outdoors, exploring the town, and performing with her dance company. She is excited to meet more amazing Princeton Rocketry Club members!

SEDS Officer: Mina Musthafa
Mina Musthafa (NEU ’22) is the Students for the Development and Exploration of Space (SEDS) Officer. She has co-led the High-Powered Rocketry team after receiving L1 certification, and is working towards her L2 certification while also participating in the Spaceport America Cup team. She is interested in medicine and engineering biology, as well as data analysis and public scholarship literature focused around public/global health issues.

Speaker Officer: Ethan Sample
Ethan Sample (CBE ‘24) is the Speaker Officer for the Princeton Rocketry Club. Last semester he worked primarily on simulators for the BIG Idea Challenge Team and is excited to get involved in some hands-on projects. Ethan is fascinated by aerospace medicine, as well as protein engineering, physics, math, and anything space-related. When he isn’t thinking about such deep topics, he enjoys swimming, chess, and video games.
Outreach Officer: Riya Gandhi

Riya Gandhi (COS ‘24) is the Outreach Officer for the Princeton Rocketry Club. She was previously part of the High Power Rocketry team, on the software sub-team. This year, she is excited to be an officer for Princeton Rocketry Club and hopes to learn more about rocketry and space exploration!

Launch Operations Officer: Khoa Le

Khoa Le (MAE ‘24) is the Launch Operations Officer for the Princeton Rocketry Club. He is currently working on the Spaceport America Cup team. He has interests in working with the aerospace industry and enjoys learning about aviation and aerodynamics.

Social Officer: David Chang

David Chang (ECE ‘25) is the Social Officer for the Princeton Rocketry Club, and also serves as one of the co-leads for the Electrical/Software sub-team within the High Power Rocketry division. David holds interests in robotics, electronic devices, sustainable energy, and economics. His current goals include obtaining an L1 certification alongside expanding the presence of Princeton Rocketry Club.