

A. Phy 420 (Capstone) Wind Tunnel Design

Amended on January 21, 2015. This Amendment presents the revised version of Document A: Phy 420 Capstone. The due date for proposals is January 28, 2015. Proposals must include a preliminary design. Teams will not be allowed to begin building until the design is cleared by Phy420.

1 Scope of Program

Through characterization of the forces and pressures that an object experiences when submersed in a fluid in motion is key to ensure proper functionality of the object during it's intended use. In order to understand the behavior of such an object, scientists and engineers can rely on the operation of a wind tunnel that drives air at a range of velocities towards an object and includes instrumentation to measure the relevant quantities.

The primary goal of this call is to solicit proposals that aim to construct a small, table-top, wind tunnel to be used for the characterization of small model rockets. Designs should focus on obtaining the measurements relevant to the characterization of such an object in a realistic flight setting, including measuring the lift and drag forces that are exerted on the rocket and the flow velocity at the rocket.

2 Programmatic Information

The total funding available in fiscal year (FY) 2015 for new proposals submitted in response to this solicitation is expected to be about \$1000. This funding is expected to support 1 award. Proposals for efforts up to 2 months are allowed, with the final deliverables to be provided to Physics and Astronomy on March 30, 2015. Funding beyond 2 months is not allowed and no-cost extensions will **not** be permitted.

Proposals will be evaluated on the scientific and technical merit of the proposal document, as well as the broader impacts of the activity, and relevance to the Physics and Astronomy department.

3 Proposal Requirements

Proposals to this solicitation are expected to satisfy the following requirements:

- Each team member should submit 1 proposal. The proposal document should follow the guidelines stated in Section 4.
- The total award size for any proposal is not to exceed \$1000.
- The proposal must provide a set of clearly defined milestones and a description of how and when these milestones will be accomplished.
- The proposal must include a description of how all flight equipment will be tested, and how the test results will be provided to the community.
- The total page length for the central Science-Technical-Management section of the proposal is 6 pp. See Section 4 for guidelines for the proposal document.
- A specific science focus should be addressed.
- The proposal should include a description of each component of the wind tunnel, why it is necessary, and how it will function.
- A preliminary design of the structure and the measurement devices should be included.

4 Guidelines for Proposal Document

This section outlines the general guidelines to be followed for submissions to Phy 420. All proposers who plan to respond to a research announcement (RA) released by Phy 420 should adhere to the guidelines specified here.

4.1 Proposal Personnel

Every person who is expected to play a significant role in the execution of the proposed effort must be identified on the Proposal Cover Page using one of the following 4 categories of personnel. Each individual proposed must also identify the organization through which he/she is participating in the investigation.

- Principal Investigator (PI)- The PI is the individual a research organization designates as having an appropriate level of authority and responsibility for the proper conduct of the research. Every proposal shall identify a PI who is responsible for the quality and direction of the proposed research and for the overall management of the proposal team.

- Science Project Manager (SP)- The SP is the individual(s) responsible for ensuring that the mission meets its scientific milestones. They are responsible for ensuring that the scientific instruments are operational and calibrated and that the development of the technologies required for proper operation of the wind tunnel is done on schedule.
- Project Engineer (PE)- The PE (s) is/are responsible for ensuring the overall design of the wind tunnel structure meets minimum requirements set forth by the sponsoring agency as well as the team. They are responsible for ensuring that the build follows the approved design and that all milestones that relate to the build occur on schedule.

4.2 Proposal Preparation and Style Formats

The standard formats for all types of proposals submitted in response to RAs are as listed below. Hard copies of all proposals should be submitted by the due date specified in the appropriate RA.

- Single-spaced, typewritten, English-language text, formatted using one column format using an easily read font having no more than 15 characters per inch including spaces (e.g., 12-point, Times New Roman Western font). While text within figures and tables may contain more than 15 characters per inch, it must be, in the judgment of the reviewer(s), legible without magnification. In addition, the text shall have no more than 5.5 lines per inch of text.
- Headers and footers are allowed as long as they do not contain proposal material, e.g., page numbers, section titles, proposal short titles, authors last names, etc.
- Units must be metric and standard discipline-unique. If English units are used, approximate metric units shall be provided as reference.
- Double sided print on white 8.5 x 11-inch paper with at least 1 inch (2.5 cm) margins on all sides.
- Bound only with metal staples to facilitate recycling (i.e., no loose leaf binders, cardboard, plastic, etc.).

4.3 Proposal Contents

Unless otherwise specified in the RA, a proposal should be assembled with the items given in the following table in the order shown, using the page limits provided herein. Proposals that omit required materials or that exceed the page limits may be rejected without review. In some cases, an RA may specify exceptions to these page limits.

REQUIRED CONSTITUENT PARTS OF A PROPOSAL (in order of assembly)	PAGE LIMIT
Proposal Cover Page	1
Proposal Summary (abstract)	4,000 characters, included in <i>Proposal Cover Page</i>
Table of Contents	1, included in <i>Proposal Cover Page</i> if possible
Scientific/Technical/Management Section	6
Preliminary Design	1
References and Citations	As needed
Biographical Sketch for the author	1
Budget and Justification	As needed

4.3.1 Proposal Cover Page

The cover page should include the name of the RA, the title of the proposal, the names and titles of the team members, the team name, and the project summary. The proposal summary should provide an overview of the proposed investigation that is suitable for release to the scientific community at large. It should be concise, should not exceed 4000 characters in length, and should not include any special characters.

4.3.2 Table of Contents

The table of contents should provide a guide to the organization and contents of the proposal.

4.4 Scientific/Technical/Management Section

As the main body of the proposal, this section must cover the following topics in the order given, all within the specified page limit.

- The objectives and expected significance of the proposed research.
- The technical approach and methodology to be employed in conducting the proposed research, including a description of any hardware proposed to be built in order to carry out the research, as well as any special capabilities of the Proposer(s) that would be used for carrying out the work.

- Description of the preliminary design that refers to the attached drawing itself.
- The relevance of the work.
- A general plan of work, including the management structure for the proposal personnel and a description of the expected contribution to the proposed effort by the PI and each person as identified in one of the additional categories in Section 4.1. Additionally, a detailed time-line must be included that specifies the dates that important milestones are anticipated to be achieved. This should include all aspects of the project, including the building of specific instruments, testing of specific instruments, etc.

The Scientific/Technical/Management Section may contain illustrations and figures that amplify and demonstrate key points of the proposal. They must be of an easily viewed size and have self-contained captions that do not contain critical information not provided elsewhere in the proposal.

4.5 Preliminary Design

You must include a preliminary design of your wind tunnel. These should be prepared using some type of software, such as AutoCAD, Adobe Illustrator, Google Sketchup or similar. Hand drawn designs are not acceptable. The design should specify the location of each component of the wind tunnel and the location of the scientific instrumentation. The design should be to scale and include references to overall dimensionality.

4.6 References and Citations

All references and citations given in the Scientific/Technical/Management Section must be provided using easily understood, standard abbreviations for journals and complete names for books.

4.7 Biographical Sketch

The author must include a biographical sketch that includes his/her professional experiences and positions. This description should include training, capabilities, and expertise that is relevant to the current project, so to provide confidence that the proposed objectives will be achieved.

4.8 Budget Justification

Each proposal shall provide a budget and justification for the proposed effort which is supported with budget details for the essential elements of the project. This includes a description of any primary components required for the construction of an apparatus. The proposer must state the source of cost estimates (e.g., based on quote, on previous purchases for same or similar item(s), cost data obtained from internet research, etc.) including the company name and/or URL and date if known, but need not include the actual price quote or screen captures from the web. The proposal should clearly state the total estimated cost of the project.