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

High altitude ballooning refers to unmanned free balloons that travel to an altitude of approximately 100,000 feet. This region of the atmosphere is referred to as near-space, since 99% of the Earth's atmosphere lies below this altitude. Due to the variation of temperature with altitude between the ground and 100,000 feet, the atmosphere is broken up into two distinct regions, the lower portion is the troposphere and the upper portion the stratosphere. Knowledge of the fundamental physical processes that take place in these two regions is important for a number of scientific and societal reasons, including better understanding terrestrial weather, local, regional, and global transport, important chemical processes such as the destruction of ozone, and global climate change. This knowledge is being obtained through a utilization of a number of methods, including in-situ measurements, remote sensing, and atmospheric modeling.

Still, the dominant physical processes that govern the lower and middle atmosphere occur on both large and small spatial scales. Therefore it is necessary to obtain measurements and model results on large and small scales. Amateur high altitude balloons are ideal for this, as they can take high temporal resolution measurements of a variety of physical quantities at a relatively low expense. In addition, because of the nature of the balloons flight, much of the hardware that is used on one flight can be reused on subsequent flights, further enhancing the cost-effectiveness.

The primary goal of this call is to solicit proposals that aim to study the atmosphere from the ground to 100,000 feet altitude through the use of a high altitude weather balloon. Investigations should focus on obtaining measurements of the relevant state variables of the atmosphere, including temperature, pressure, humidity, and horizontal winds. In addition, the acceleration of the balloon should be tracked to allow for detection of the altitude ranges for different atmospheric layers, such as the jet stream, and the tropopause.

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 $3,600. This funding is expected to support 3 awards. 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 $1200.
- 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 instrument on-board, why it is necessary, and how it will be incorporated into the payload.
- A preliminary design of the balloon payload, payload structure, and payload support system should be included
- A description of how the balloon will follow FAA guidelines 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 it's scientific milestones. They are responsible for ensuring that the the scientific instruments onboard the payload are operational and tested prior to launch and that the development of the technologies required for proper operation is done on schedule.
- Communications Manager (CM)- The CM is responsible for ensuring that the comm systems are fully functional and tested prior to the launch and that the technologies necessary for proper operation are developed on schedule.
- Operations Manager (OM)- The OM is responsible for taking the lead on ensuring that any and all federal regulations regarding the mission are complied with and for ensuring that the payload is complete and ready for launch by the beginning of the launch window. This includes verifying that all testing is complete, preparing a flight plan, and organizing operations on the launch day.

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 *Proposal Cover Page*
Table of Contents	1, included in *Proposal Cover Page* 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 overall balloon and the instrument payload. 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 piece of the payload train, as well as a detailed layout of the science package which includes the sizes of the components included in the package and the overall size of the package itself. 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.