

## **REQUEST FOR INFORMATION (RFI)**

### **Science Objectives and Requirements for the Next NASA UV/Visible Astrophysics Mission Concepts**

#### **General Information**

Solicitation Number: NNH12ZDA008L  
Release Date: May 25, 2012  
Response Date: August 10, 2012  
Recovery and Reinvestment Act Action: No  
Classification Code: A – Research and Development  
Issued by: Science Mission Directorate, NASA

#### **Description**

The National Aeronautics and Space Administration (NASA), through the Astrophysics Division and its Cosmic Origins (COR) Program, is soliciting information through this Request for Information (RFI) pertaining to potential ultraviolet (UV) and visible wavelength astrophysics science investigations. Specifically, NASA seeks information that can be used to develop a cohesive set of science goals that motivate and support the development of the next generation of UV/Visible space astrophysics missions. Information may include broad science goals, justifications for investigations that support COR science goals (for examples, visit <http://cor.gsfc.nasa.gov/>), specific measurements or proxy observing plans for well-defined astrophysical experiments, or any aspect of scientific inquiry in the UV/Visible that supports the above COR goals.

This is a Request for Information only and does not constitute a commitment, implied or otherwise, that NASA will take procurement action in this matter. Further, neither NASA nor the U.S. Government will be responsible for any costs incurred in furnishing this information.

#### **Background**

Answering the question “How did we get here?” is one of the key goals in NASA’s Astrophysics Division and is the prime objective of the COR Program. Some of the questions included in the broad study of our cosmic origins include:

- When did the first stars in the universe form, and how did they influence their environments?
- How did dark matter—which is pervasive, mysterious, and poorly understood—clump up in these very early times, pulling gas along with it into dense concentrations that eventually became galaxies?
- How did galaxies evolve from the very first systems to the types we observe in the local universe such our own Milky Way galaxy?

- When did supermassive black holes form in the early universe, and how have they affected the evolution of the galaxies in which they are found?
- What are the mechanisms by which stars and their planetary systems form?
- How are the chemical elements distributed in galaxies and dispersed in the circumgalactic and intergalactic medium?
- How does baryonic matter flow from the intergalactic medium to galaxies and ultimately into planets?

No single space or airborne observatory can provide all the answers. The COR Program includes telescopes—both present and future—that together operate across a wide swath of the electromagnetic spectrum, from the far-UV through meter-wavelength radio.

This RFI is limited to observing capabilities in the near-UV and visible parts of the spectrum, as recommended by the 2010 Decadal Survey of Astronomy and Astrophysics, in its report “New Worlds, New Horizons in Astronomy and Astrophysics” (NWNH), available at [http://www.nap.edu/catalog.php?record\\_id=12951](http://www.nap.edu/catalog.php?record_id=12951).

The science topics above may ultimately be addressed in part with an UV/Visible telescope that will continue the important work accomplished with the Hubble Space Telescope (HST). Deep, high-resolution imaging in the near-UV and visible parts of the spectrum is a touchstone for astronomical research. Such imaging, over a much larger area of the sky than has been possible with HST, has the capacity to expand our knowledge of the universe in a revolutionary manner. UV spectroscopy is likely to be a key component in advancing COR science because high-resolution UV spectroscopy is essential for detecting gas in plasmas and probing low-density inflows and outflows of matter and energy that profoundly affect galaxy evolution.

In the previous decade, many concepts of a UV/Visible mission that might operate in the post-HST environment were studied at various levels of detail. These studies considered a wide assortment of science cases and required mission concepts with a wide range of basic parameters, such as aperture size and wavelength coverage. Although NWNH recommended a 4-meter-diameter aperture, the expected implementation of a UV/Visible mission is far enough in the future that specifying a particular mission configuration is premature until a well-defined, suitably detailed, and appropriately derived set of science requirements is first developed. The fundamental mission parameters will be derived only after the set of science requirements is defined. This RFI is intended to initiate the process of defining those requirements by delineating the science investigations such a mission might ultimately fulfill.

### **Requested Information**

The COR Program seeks to build a broad-based, community-derived set of science requirements for the next generation UV/Visible space astrophysics mission(s). This RFI solicits input from any interested party or parties who wish to contribute scientific questions of interest that can be addressed with not-yet-specified future UV/Visible mission(s). Future possible mission concepts and pursuant technology investments will

be defined using the results of this RFI. Potential respondents are strongly encouraged to submit science investigations that are unconstrained by specifications of prior mission concepts.

The requested information must touch on COR science goals, but could span the gamut from broad, well-justified science questions to specific observing plans for narrowly defined astrophysical experiments. A broad response might consist of a top-level science question with a thorough explanation of its compelling appeal. A specific plan could detail how a particular question in astrophysics is addressed with a selected set of observables at a specified level of sensitivity, wavelength range, spatial or spectral resolution, time resolution, field of view, target numbers, etc. In between these two extremes, a range of definitive explanations of scientific investigations that pursue COR science goals is solicited.

In order to provide suitable guidance for a mission in the far future, it is implicit in this RFI that respondents attempt to imagine compelling scientific investigations in an era well beyond the present. The goal of this RFI is to synthesize a wide range of far-reaching ideas into a coherent vision, thereby fostering tangible progress in the near future.

Respondents should submit the requested information in the format most effective for conveying that information (e.g., white paper, presentation charts, technical paper, other). Submissions should contain, at a minimum, the following information:

- Name of submitter and contact information, including all team members, institutional affiliations, and E-mail addresses. Note that a lead submitter or point-of-contact must be identified (name and position, organization, E-mail, phone number);
- A description of how the science addresses the top-level COR science objectives (briefly).
- A description of the science investigation, including a justification for its compelling nature. The description can be as general or detailed as the respondent desires.
- An indication of your willingness to participate and present your science objectives and investigations at a workshop, if invited.

## **Future Plans**

Shortly after the release of this RFI, NASA plans to coordinate with existing Science Analysis Group (SAG) within the Cosmic Origins Program Analysis Group (COPAG: <http://cor.gsfc.nasa.gov/copag/>). This group will work with the astrophysics community and the COR Program Office to review the diverse set of RFI responses and to define coherent sets of science objectives and requirements for mission concepts.

As a part of the science definition process, NASA will sponsor a workshop in September 2012. Information regarding the workshop will be updated online at: <http://cor.gsfc.nasa.gov/RFI2012> as the arrangements are solidified.

At the workshop, NASA will present:

- a) The broader context for NASA's effort to engage the widest possible community for science definition,
- b) A summary of the information received in response to this RFI,
- c) The plan for realizing a synthesized, prioritized set of science objectives and requirements, and how they will be used for developing next UV/Visible mission concept(s).

All responders to this RFI, as well as the broader community, are encouraged to attend the workshop and participate in this process. The workshop will serve as a forum for discussing community input and for mapping those contributions into relevant science objectives. The SAG and the COR Program Office will use the RFI responses and the deliberations of the workshop to synthesize the varied science investigations and to further define and prioritize science objectives and requirements.

The final product of this effort will be a document that defines the resulting science objectives. These science objectives will provide a basis for developing and refining future UV/Visible mission concepts and pursuant technology investments. The current mission concept development plan includes both Medium- and Large-class missions. The science objectives will be assessed for appropriate mission class for concept development.

Following the closure of this RFI (#1) process and workshop, NASA intends to issue another RFI (#2) for the purpose of soliciting mission concepts, instrument concepts, and constitutive technologies that will satisfy some or all of the science objectives defined via the previous RFI #1 process.

### **Disclaimer**

It is NASA's intent to disclose publicly information obtained through this RFI and to incorporate relevant portions into the workshop proceedings and the final requirements document. Responders shall not submit proprietary information, export controlled information (including ITAR restricted information), or confidential information in response to this RFI. It is emphasized that this RFI is NOT a Request for Proposal, or Invitation for Bid. This RFI is for information and planning purposes only, subject to FAR Clause 52.215-3 titled, "Request for Information or Solicitation for Planning Purposes," and is NOT to be construed as a commitment by the U.S. Government to enter into a contractual agreement, nor will the U.S. Government pay for any information submitted in response to this RFI.

No solicitation exists; therefore, do not request a copy of the solicitation. If a solicitation is released, it will be synopsisized in FedBizOpps and on the NASA Acquisition Internet Service (NAIS). It is the potential Officer's responsibility to monitor these sites for the release of any solicitation or synopsis. NASA Goddard Space Flight Center (GSFC) may contact respondents to this Request for Information (RFI), if clarification or further

information is needed. The review process will be conducted on the entire ensemble of responses, and so Respondents will not be notified individually of their review.

### **Instructions for RFI Response Submittal**

Page Limitation: The response must be limited to six pages. A page is defined as one sheet, 8.5 x 11 inches, with one-inch margins, using a minimum of 12-point font size for text and 8-point font for graphs.

All responses submitted in response to this RFI must be submitted in electronic form via NSPIRES, the NASA online announcement data management system, located at <http://nspires.nasaprs.com/>. For this RFI, a response submission will take the form of a Notice of Intent (NOI) within the NSPIRES online announcement data management system. The RFI response itself will be a PDF-formatted document that is attached (uploaded) to the NSPIRES system.

You must be registered with NSPIRES to submit a RFI response. See registration instructions at <http://nspires.nasaprs.com/> (select “Getting an account”). Neither institution registration nor an institution affiliation is required to respond to this RFI.

1. Log in to your account at <http://nspires.nasaprs.com/>.
2. Select “Proposals” from your account page.
3. Select “Create NOI” from your proposals page.
4. Click “Continue” on the next page.
5. Select “Request for Information: NNH12ZDA008L (Science Objectives and Requirements for the next NASA UV/Visible Astrophysics Mission Concepts)” from the bullet list of announcements. Click “Continue.”
6. Enter RFI response title (“NOI title” field will be shown).
7. Select "do not link at this time" for submitting organization page.
8. Click “Save” on next page.
9. It is not necessary to complete any of the “NOI Details;” all requested information must be included in the attached PDF document. Information, which is entered into “NOI Details” but not included in the attached PDF document, will not be considered.
10. Prepare your RFI response offline and save as a PDF document (note NSPIRES instructions on .pdf formats). The response document must include the respondent’s Name, institution, phone number, and E-mail address so the file is self-contained. File names format should be “Respondent Last Name - First Name – RFI.” The response should not exceed six pages in length.
11. To attach (upload) your PDF document: a. Click “add” under NOI attachments section; b. Select “Proposal Document” from the drop down list; c. Browse to attach your PDF file; d. Select “Upload;” e. Click “OK;” f. Your RFI document has been uploaded to NSPIRES.
12. Click “Submit NOI” button. NOTE that this does not complete the submission process.
13. Ignore any warnings about incomplete NOI elements. Ensure that your NOI

- document is attached and click “Continue.”
14. Click “Submit”. This will take you to the NOI submission confirmation page, which provides you with the NOI/RFI number for your records.

Please note: You may delete and replace form fields and uploaded documents anytime before the submission deadline. Submitted NOIs cannot be deleted.

### **For Additional Information**

For further information on this RFI, please contact:

Name: Dr. Mario R Perez  
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Please check <http://cor.gsfc.nasa.gov/> for the most up-to-date information on the COR Program and this RFI activity.

Two teleconferences/WebEx™ shall be held to provide an opportunity for potential respondents to learn more about the overall process and ask questions. The first teleconference/ WebEx™ will be held on June 7, 2012, from 4 P.M. to 5 P.M. EDT. The second teleconference/WebEx™ will be held on July 17, 2012, from 4 P.M. to 5 P.M. EDT. Any and all information presented at these teleconferences, as well as all comments, questions, and answers, will be recorded and made public and posted on the COR website. Instructions on accessing this open informational session will be updated online at: <http://cor.gsfc.nasa.gov/RFI2012> as the arrangements are solidified.