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ROSES 2014, Appendix D.14

Extreme Precision Doppler Spectrometer

Pre-proposal Workshop

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NASA Headquarters

17 March 2015

Outline of Presentation

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"I'm a fiction writer in the grant-proposal genre."

"Agreed. We fund only those proposals we can understand."

Background

- NASA/NSF EXoPLanet Observational Research partnership (NN-EXPLORE)
  - Partnership capitalizes on the NOAO share (40%) of the observing time on the 3.5-m WIYN at Kitt Peak National Observatory.
  - Primary objective is to enable a community-based exoplanet research program in support of NSF research interests and NASA mission goals (e.g. K2, TESS, JWST, etc.).
  - Cornerstone will be a state-of-the-art precision radial velocity facility instrument with open access to the US astronomical community.

3.5-m WIYN Telescope at Kitt Peak National Observatory

Background

- The NN-EXPLORE be carried out in two stages:
  - Stage 1. FY2015 – FY2018 (est.)
    - *Manage an exoplanet-targeted Guest Observer program with existing instrumentation using NOAO share (40%) of WIYN time.*
    - *NASA to issue solicitation for a facility-class extreme precision Doppler spectrometer (EPDS) for the WIYN telescope with the goal of commissioning in 2018.*
  - Stage 2. FY2018 (est.) – TBD
    - *Manage an exoplanet-targeted GO and guaranteed time program at WIYN with EPDS instrument and existing instrumentation on WIYN*
    - *Maintain a data management system to serve EPDS data products and make them available to the community.*
    - *Provide open community access to a cutting edge EPDS instrument for observations that support NASA missions.*

EPDS Solicitation - Process

- Selection of EPDS instrument will be conducted through a two-phase competitive process
  - Modeled after the process used to select competed flight missions (e.g. Explorer missions).
  - Consists of a Proposal Phase and an Instrument Concept Study (ICS) Phase.
- **Proposal Phase** – open solicitation of proposals to develop and deliver an EPDS instrument that meets or exceeds specified minimum performance requirements
  - Ultimate performance specifications/scientific capability of proposed instruments will be a factor in proposal evaluation.
  - Proposal phase will proceed through a two-step proposal process
    - ***Step 1 proposals*** *– essentially a required NOI. Includes a one-page summary of the proposed instrument concept, and identifies all participants (people and institutions) involved in the proposal. Not peer reviewed and no budgetary information required. Compliant proposals will be allowed to proceed to Stage 2.*
    - ***Step 2 proposals*** *– the "full" proposal including all elements described in Section 2 of the NASA Guidebook for Proposers (http://www.hq.nasa.gov/office/procurement/nraguidebook/). Step 2 proposals will be subject to scientific and technical peer review.*
  - Proposal phase will conclude with the selection of not more than two (2) proposals to move forward into the ICS Phase

EPDS Solicitation - Process

- **Instrument Concept Study (ICS) Phase** – Not more than two proposals will be selected from the proposal phase to conduct an instrument concept study.
  - Goal of the ICS will be to mature the instrument design, but also to fully flesh out all instrument interfaces (e.g. telescope, facility, data management), as well as a feasible schedule and budget profile.
  - Engineering support will be available through the Exoplanet Exploration Program Office at JPL.
  - ICS duration with be not more than 6 months
  - Funding in the amount of $250,000 will be provided for the ICS
  - ICS phase will conclude with the submission of a written report and a presentation to the selecting official at NASA HQ
  - Based on a technical review of the ICS reports and consideration of programmatic factors, one instrument concept will be selected to move forward into development.

EPDS Solicitation - Process

- Planned Timeline for EPDS Solicitation
  - ✓ 16 Dec 2014 – Issue Community Notice announcing plan to issue solicitation for EPDS.
  - ✓ 21 Jan 2015 – Release ROSES 2014 App. D.14 Extreme Precision Doppler Spectrometer.
  - ✓ 17-18 Mar 2015 – Pre-proposal workshop for EPDS solicitation
  - ❑ 20 Mar 2015 – Step-1 proposal deadline (11:59 pm EDT)
  - ❑ 24 Apr 2015 – Step-2 (full) proposal deadline (11:59 pm EDT)
  - ❑ Jun 2015 – Review of Step-2 proposals
  - ❑ Jul 2015 – Announcement of downselect to not more than two proposed instruments
  - ❑ Aug 2015 – Start of Instrument Concept Studies (ICS)
  - ❑ Feb 2016 – End of ICS, review of concept study reports.
  - ❑ Mar 2016 – Downselect to one instrument to move forward into development.

EPDS Solicitation - Requirements

- Solicitation is specifically intended to procure an EPDS instrument for installation on the 3.5-m WIYN telescope.
- Solicitation is NOT intended to solicit:
  - Proposals for scientific research projects*;
  - Proposals for technology development.

  ** - should not be interpreted to mean that there is no science component of the proposal.*
- Proposals should address all aspects of instrument delivery, including:
  - Instrument design and fabrication;
  - Telescope interface and facility requirements;
  - Development of control software and data reduction pipeline;
  - Delivery through operational commissioning and any required post-delivery support.
  - Expected instrument performance and scientific capability;

Your results are clear and irrefutable, Dr. Gardner. Obviously, our agency can't approve this.

EPDS Solicitation - Requirements

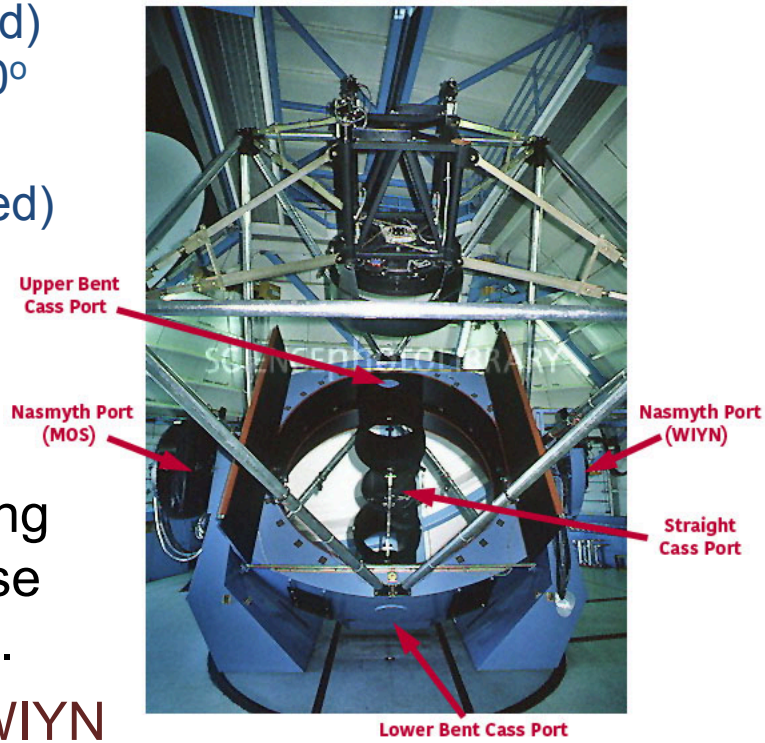
- Instrument Minimum Requirements

Spectral Range	Spectral coverage is left to the proposer, but should not go below 360-nm[a]
Spectral Resolution (R= λ /Δλ)	≥70,000
Wavelength Calibration	Calibration source/methodology left to proposer
Thermal Stability	As needed to support optimal performance
Optics Enclosure in Vacuum	As needed to support optimal performance
Detector Type	As needed to support optimal performance
Interface with Telescope	Fiber feed to instrument; proposals should specify optical, mechanical, and control interfaces[b] between the telescope beam and the fiber.
Doppler Precision (single measurement accuracy)	< 50 cm/s single measurement accuracy with a target of 10 cm/s (excluding astrophysical noise)

[a] – the performance of the WIYN telescope has not been characterized at wavelengths shorter than 360-nm, and cannot be guaranteed.
[b] – interface considerations may include compensation for atmospheric effects.

EPDS Proposal Considerations

- The WIYN 3.5-m telescope has 5 optical ports, 2 of which are developed and currently in use with other instrumentation, 3 of which are undeveloped.
  - Nasmyth ports (2, developed) located at either end of the altitude axis;
  - "bent"-Cassegrain ports (2, undeveloped) located on the mirror cell at positions 90^{o} from the altitude axis;
  - "folded"-Cassegrain port (1, undeveloped) located behind the mirror cell (the telescope beam is folded because of mechanical constraints)
- To optimize the performance and flexibility of the EPDS instrument during operations, proposals should make use of one of the three undeveloped ports.
- Additional technical detail about the WIYN telescope and observatory will be provided by J. Rajagopal.



EPDS Proposal Considerations

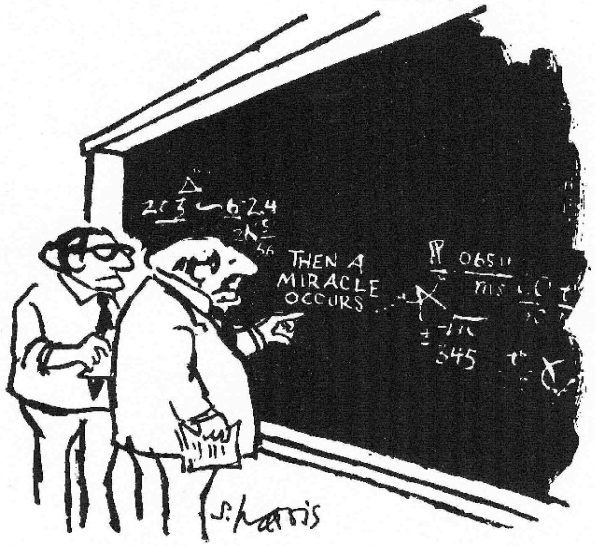
- The page limit for the Scientific, Technical, and Management section of the proposal is 25 pages.
  - INCLUDES all text, tables, and figures;
  - DOES NOT INCLUDE table of contents, references, supporting materials (which may have their own limits);
  - Fold-out pages allowed, count as 2 pages against page limits.

- While this not a solicitation for scientific investigations, *per se*, that does not mean that proposals should not have a scientific component
  - The case for a proposed instrument should include a discussion of its scientific capabilities and relevance to key NASA missions.
  - The proposing team is encouraged to include a description of their desired GTO program (science scope and time allocation).

All day long, a tough gang of astrophysicists would monopolize the telescope and intimidate the other researchers.

EPDS Proposal Considerations

- Proposals must identify all instrumental requirements and specifications for the interface between the EPDS fiber feed and the telescope. A design concept for the telescope interface is strongly encouraged.
  - It is expected that port development will ultimately be undertaken by NOAO in accordance with instrument requirements.
- Proposals must identify all facility requirements and specifications for installation and operation of the proposed instrument.
- While proposals must address instrument interfaces and quantify their associated requirements, **the cost of facility modifications and telescope port development need not be included in the proposal budget.**



"I think you should be more explicit here in step two."

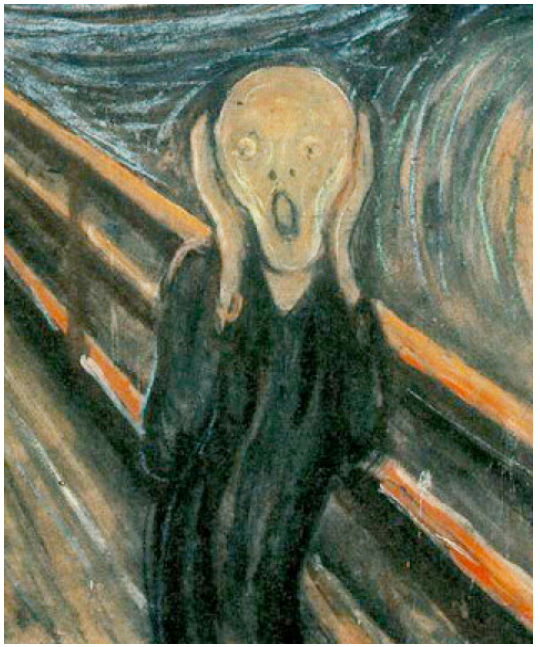
Proposal Evaluation Criteria

- All EPDS proposals will be evaluated according to the factors described in the Appendix C of the NASA Guidebook for Proposers. In addition to the standard evaluation criteria described in the Guidebook:
  - **Evaluation of Scientific/Technical Merit** will include consideration of both the scientific merit of the proposed EPDS measurement capability, and the merit of the instrument design for delivering those measurements.
  - **Evaluation of Programmatic Relevance** will include consideration of the degree to which the proposed instrument is able to advance the scientific capabilities of NASA's current and future exoplanet-relevant missions.
  - **Evaluation of Cost Reasonableness** will include consideration of such implementation and cost risks factors as:
    - *the maturity of the instrument design;*
    - *the probability of technical success;*
    - *the capability of the data analysis pipeline;*
    - *the quality of the data calibration.*

EPDS Implementation

- Budget Profile
  - NASA has established a cost target of $7M over the period FY2015 - FY2018 for the development and commissioning of the EPDS instrument.
  - This budget target does not constitute a cost cap, and proposals that exceed that target amount will not be considered non-compliant.
  - The same is true for the $3M/yr maximum mentioned in the Summary of Solicitation table (Section 8).
  - Proposals should reflect the budget and profile required to deliver the proposed instrument.
  - However, the total cost of a proposed instrument is a programmatic consideration, and the availability of funds above the $3M/year and $7M target may factor into the selection decision.
  - The costs associated with facility modifications and telescope port development do not count against the budget target.

EPDS Implementation



- Schedule
  - The baseline schedule described in the solicitation reflects NASA's need date; K2 mission is underway, TESS LRD is Aug. 2017, JWST LRD is Oct. 2018.
  - This may or may not represent a realistic time frame for the development of the solicited EPDS instrument.
  - Proposers should provide a realistic schedule for the development, delivery, and commissioning of their proposed instrument.
  - The realism of the proposed schedule will be a factor in the technical evaluation of proposals.
  - The degree to which the schedule for delivery of a proposed instrument accommodates NASA's need date may be a factor in the selection decision.

EPDS Implementation - Oversight

- The EPDS Project will be managed in accordance with NASA Procedural Requirements (NPR) 7120.8 - *NASA Research and Technology Program and Project Management Requirements* (http://nodis3.gsfc.nasa.gov/lib_docs.cfm?range=7).
- Development to be conducted within a formal project framework from the outset to avoid some of the pitfalls of some previous NASA ground-based and suborbital projects, and to provide a solid foundation for project success.
- Project management responsibility will be delegated to the Exoplanet Exploration Program Office (ExEPO) at JPL.
  - Project Manager (M. Jaganathan, Acting) – oversight of progress against budget and schedule, liaison to internal stakeholders, contract management.
  - Project Scientist (R. Capps, Acting) – "defender of the science", liaison between instrument scientists and stakeholders.

EPDS Data Management

- The development and delivery of a functional pipeline (together with all necessary documentation) with the capability to serve a large community of users is a required component of the selected instrument.
- NASA anticipates archiving two levels of EPDS data:
  - Raw Data (Level 0): raw data in the form of FITS files, with headers that contain all the keywords needed for automated data processing, archive searching, and file organization.
  - Internally Calibrated Data (Level 1): Level 0 data will be processed through the pipeline to perform bad pixel removal, dark and background subtraction, wavelength calibration, and flat fielding.

EPDS Data Management

- During normal operations, responsibility for processing EPDS data will be assigned to the NASA Exoplanet Science Institute (NExScI) and NOAO.
  - Proposers should expect to coordinate software development activities with NExScI and NOAO to ensure the compatibility of their products with existing systems.
  - These interfaces **do not** need to be described in the Step-2 proposal. They will be developed as part of the ICS.
- Long-term archiving of EPDS data products will be managed by NExScI.
- Astronomical data secured at the WIYN telescope will have an exclusive use period of not more than 12 months (including GTO observations).
- Information on science data policies, periods of exclusive use, and archive policies will be included in a Data Management Plan (DMP) document developed in collaboration with NExScI and NOAO prior to the start of the regular operations.

Questions?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Q&A - 1

- “Telescope interface” refers only the development of one of the currently undeveloped ports on the WIYN. Proposals should not assume that they have the latitude to require any further modifications to the telescope.
- Proposal should specify requirements on the input to the fiber/bean transfer optics. NOAO will finalize design and cost during ICS.
- Proposal should specify environmental requirements for housing the instrument. NOAO will determine and design necessary facility modifications and costs during ICS.

Q&A - 2

- Solicitation:

  "NASA has established a cost target of $7M over the period Fiscal Year 2015 - Fiscal Year 2018 for the development and commissioning of the EPDS instrument. This target does not constitute a cost cap, and proposals that exceed this amount will not be deemed noncompliant. However, proposers are reminded that the total cost of a proposed instrument will be a factor in its selection, and the availability of funds above the specified $7M target may factor into the proposal selection decision."

- NASA does not have a separate sum of money set aside for telescope and facility modifications. Although those modifications do not need to be included in the proposal budget, they do count against the $7M that NASA has budgeted for the instrument. Thus, proposers should not ignore these costs, as the total cost may be taken into consideration in the selection decision.