# NASA Joint Dark Energy Mission Investigations: Community Announcement of Future Solicitation

Synopsis – 11.03.2008

General Information

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DESCRIPTION

The National Aeronautics and Space Administration (NASA) Science Mission Directorate (SMD), in coordination with the Department of Energy (DOE) Office of Science, intends to release an Announcement of Opportunity (AO) for Joint Dark Energy Mission (JDEM) science investigations.

OVERVIEW OF THE OPPORTUNITY

It is anticipated that the JDEM AO will invite proposals for Principal Investigator (PI)-led science investigations using the Joint Dark Energy Mission (JDEM) observatory. The development of flight hardware will not be solicited in the AO. Management of the development and operation of the JDEM observatory is the responsibility of NASA. For NASA, JDEM is a strategic mission and will be managed in accordance with NASA policies and procedures for strategic missions, including NASA Procedural Requirement 7120.5D. NASA has assigned project management responsibility for JDEM to the NASA Goddard Space Flight Center in Greenbelt, Maryland. NASA will appoint a JDEM Project Manager and JDEM Project Scientist who will be responsible for JDEM mission and science management, respectively. The Department of Energy (DOE) will provide contributions to the mission in accordance with DOE project management practices and has assigned its project management responsibility to Lawrence Berkeley National Laboratory which will work within the NASA JDEM Project Office framework.

Participation in this AO will be open to all categories of organizations (non-U.S. and domestic), including educational institutions, industry, not-for-profit organizations, Federally Funded Research and Development Centers, NASA Centers, the Jet Propulsion Laboratory (JPL), and other Government agencies. Principal Investigators are responsible for and allowed to assemble investigation teams from any and all of these organizations.

## THE JOINT DARK ENERGY MISSION

The importance of the development and flight of a space-based dark energy (DE) mission was first enunciated in the National Research Council's 2003 report, Connecting Quarks with the Cosmos, Eleven Science Questions for the New Century. To determine an interagency strategy in response to this report, an Interagency Working Group on the Physics of the Universe (IWG) was chartered by the National Science and Technology Council's Committee on Science. In 2004 the IWG completed its report, A 21st Century Frontier of Discovery: The Physics of the Universe; A Strategic Plan for Federal Research at the Intersection of Physics and Astronomy, with the recommendation that "NASA and DOE will develop a Joint Dark Energy Mission (JDEM). This mission would best serve the scientific community if launched by the middle of the next decade." In 2007 the National Research Council's Beyond Einstein Program Assessment Committee (BEPAC) recommended (based on scientific importance and technical readiness) that JDEM be the first of NASA's Beyond Einstein Program mission suite to fly.

Based on these recommendations, NASA and DOE plan to develop and launch JDEM by the middle of the next decade. The prime mission duration, driven by the requirements of DE investigations, will be three to five years. A website has been established to convey JDEM programmatic information and is located at http://jdem.gsfc.nasa.gov.

An ad hoc JDEM Figure of Merit Science Working Group (FoMSWG) was convened in July 2008 to update the pioneering work of the Dark Energy Task Force (DETF). This group has re-examined the overarching science goals of a space-based DE mission and how the science performance of a mission could be evaluated. The FoMSWG will provide their methodologies and formulations for the quantitative calculation of these measures in a format useable by the science community. The work of the FoMSWG is anticipated to be completed by November 30, 2008, at which point their report will be posted to the JDEM website and the FoMSWG will be dissolved.

A JDEM Science Coordination Group (SCG), convened in October 2008, will determine the top-level science and preliminary observational requirements and instrumentation capabilities for a JDEM mission using the science performance measures from the FoMSWG, considering at a minimum the Baryon Acoustic Oscillation, Supernovae, and Weak Lensing techniques. The membership of the SCG is posted on the JDEM website.

The JDEM Project Office, in coordination with the SCG, will develop a Reference Mission (RM) pre-conceptual design that demonstrates the existence of a configuration that meets the FoMSWG science goals as well as JDEM's programmatic constraints. The work of the SCG is planned to be completed by mid-December 2008 and will be posted to the JDEM website. The SCG will be formally dissolved before the AO is released.

## DETAILS OF THE PLANNED SOLICITATION

It is anticipated that the AO will solicit six types of proposals:

(a) DE Baryon Acoustic Oscillation (BAO) science investigations using the relevant JDEM data set;

(b) DE Supernovae (SN) science investigations using the relevant JDEM data set;

(c) DE Weak Lensing (WL) science investigations using the relevant JDEM data set;

(d) DE science investigations based on other techniques, using the relevant JDEM data set;

(e) Leader of the JDEM Science Working Group (SWG);

(f) Interdisciplinary non-DE science investigations using the relevant JDEM data set.

Pending the submission of an adequate number of proposals of merit, and pending the Reference Mission pre-conceptual design, it is anticipated that there will be selection of three to eight investigations from categories (a) – (d) above, at least one each from categories (a) – (c), one from category (e), and at least one from category (f).

The PIs selected under this AO, plus possibly one or two Co-Investigators (Co-Is) proposed by each PI, will constitute the JDEM Science Working Group (SWG). The JDEM SWG will work with the NASA JDEM Project Office and the NASA Project Scientist (who will be ex officio a SWG member) in the design, development, and operation of the JDEM observatory.

All members of a selected science investigation team will have access to that JDEM data necessary for the execution of their proposed science investigation.

Proposals for Leader of the JDEM SWG are anticipated to be solicited from all members of the community, regardless of affiliation (or lack thereof) or position in any team that is proposing a JDEM science investigation.

It is anticipated that the AO will contain a JDEM Reference Mission pre-conceptual design to which proposers must strictly adhere in the proposal of science investigations. It is anticipated that the Reference Mission will not allow observations outside the visible / near infrared band. It is anticipated that, subsequent to the AO-based selection of the JDEM SWG, the JDEM design may evolve from the Reference Mission.

It is anticipated that the AO will require proposers to demonstrate that they have the expertise to combine their results with those of other techniques. Subsequent to selection of JDEM DE investigations, and under the leadership of the SWG Leader, it is anticipated that the SWG will determine an appropriate approach for the synthesis of multiple DE investigation techniques.

It is anticipated that the AO will require proposers to use the methodology defined in the JDEM FoMSWG Report to document the relevant figures of merit of their proposed investigation and thereby quantify its science performance. This methodology includes the use of a set of priors defined by the FoMSWG that specifies cosmological parameter values and anticipated Stage III data sets (using the designation of the Dark Energy Task Force), as delineated by the FoMSWG, that will be available for input to JDEM analysis. These figures of merit will include the effects of the systematic errors that must be identified in the proposal.

It is anticipated that proposals for JDEM DE science investigations may include some limited support for ground-based observations, with the requirement that such ground-based observations contribute to the specific type of the proposed JDEM DE science investigation. It is anticipated that proposals will be evaluated firstly on their use of JDEM data in conjunction with Stage III priors as defined by the JDEM FoMSWG. Proposers will be further allowed to include additional ground-based data (other than the Stage III priors defined by the FoMSWG) in order to improve the figure of merit of their proposal. Formal institutional commitments for any proposed ground-based observatory time must be supplied in the proposal.

It is anticipated that a Participating Scientist Program will be established near the time of launch to conduct ancillary non-DE science investigations using a relevant JDEM data set, in addition to any such investigations selected in the AO. During a possible extended mission, there may be additional solicitations for new observational investigations including science that may not be directly related to DE.

It is anticipated that the AO will contain an aggregate science investigation funding profile over the life cycle of the mission. The funding profile is expected to ramp up towards launch as appropriate support personnel are assigned to the project. Proposers will be required to include in their proposals a work plan and budget profile, and this will be assessed as part of the evaluation. It is anticipated that each Co-Investigator and named Collaborators of an investigation team will be required to have specific and essential responsibilities. (Other science investigation team personnel need not be personally identified.)

JDEM data, including suitable calibration and processing tools, must be made available to the public within one year following data acquisition. Any exception to this policy, either earlier or later data release, must be justified on the basis of scientific merit, must be proposed by the science investigation team in response to the AO, must be peer reviewed, and must be accepted by both NASA and DOE. All data products shall be documented, validated, and calibrated in physical units usable by the scientific community at large.

The following schedule describes the anticipated major milestones of the JDEM AO. These dates are subject to change.

AO Release: Approximately late-2008 or first half of 2009

Preproposal Conference: Release + 2 wks

Notice of Intent to Propose Due: Release + 4 weeks

Proposals Due: Release + 3 months

Selections Announced (target): Release + 6 months

The issuance of this Community Announcement does not obligate NASA to issue the AO and solicit proposals. Any costs incurred by prospective investigators in preparing submissions in response to this Community Announcement are incurred completely at the submitter's own risk. The JDEM AO may contain provisions that differ from this announcement, in which case those in the AO will take precedence.

Questions or comments about this Community Announcement on the JDEM AO may be addressed to the NASA JDEM Program Scientist: Dr. Richard Griffiths, Science Mission Directorate (SMD), National Aeronautics and Space Administration, Washington, DC 20546-0001; E-mail: Richard.E.Griffiths@nasa.gov. Comments on the details of this AO should be provided within 3 weeks of this posting to Dr. Griffiths in order to be considered in the AO. The character string "JDEM AO" (without quotes) should be included in the subject line of all transmissions.

Point of Contact

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