

**MEMORANDUM OF UNDERSTANDING
BETWEEN THE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND THE
DEPARTMENT OF ENERGY
CONCERNING
COOPERATION ON THE JOINT DARK ENERGY MISSION**

ARTICLE I - AUTHORITY

This Memorandum of Understanding (MOU) is entered into by the National Aeronautics and Space Administration (NASA) and the U.S. Department of Energy (DOE) (jointly referred to as "the Parties" hereinafter). NASA enters this MOU pursuant to its authority under the National Aeronautics and Space Act of 1958, sections 203(c)(5) and (c)(6); 42 USC § 2473(c)(5) and (c)(6). DOE enters into the MOU under the authority of section 646 of the Department of Energy Organization Act, Pub. L. 95-91, as amended, 43 USC § 7256, and the Atomic Energy Act of 1954, and pursuant to its authority to do research and development activities under Section 31, Atomic Energy Act, as amended, and Section 107 of the Energy Reorganization Act of 1974.

ARTICLE II - BACKGROUND

One of the most significant scientific findings in the last decade is that the expansion of the universe is accelerating due to a previously unknown "dark energy", which makes up approximately three-quarters of the total mass-energy content of the universe. The Parties both consider the quest to understand the nature of dark energy a high priority in their science programs. It is not known whether the dark energy is due to a vacuum energy (e.g., Einstein's cosmological constant), or whether the expansion rate varies with time as a result of the existence of a new scalar field, a breakdown of Einstein's general relativity or an artifact of the existence of more than four space-time dimensions in our universe. Any discoveries about its nature will have a fundamental impact on physics and astronomy.

The Joint Dark Energy Mission (JDEM) will lead us to these discoveries by measuring the expansion rate of the universe and the growth of structure in the universe to high precision. The importance of understanding dark energy has been emphasized in a number of significant reports. For example: the National Research Council (NRC) report, Connecting Quarks with the Cosmos (2003), the National Science and Technology Council's Interagency Working Group on the Physics of the Universe report (2004), the National Research Council's report,

Revealing the Hidden Nature of Space and Time: Charting the Course for Elementary Particle Physics (2006), and the Dark Energy Task Force (DETF) report (2006).

In the Fall of 2006, the Parties jointly funded an NRC study by the Beyond Einstein Program Assessment Committee (BEPAC). The purpose was to assist NASA in determining the highest priority of the five proposed missions in NASA's Beyond Einstein program. In September 2007, the BEPAC released its report and noted two findings relating to JDEM:

- "A JDEM mission will set the standard in the precision of its determination of the distribution of dark energy in the distant universe. By clarifying the properties of 70 percent of the mass-energy in the universe, JDEM's potential for fundamental advancement of both astronomy and physics is substantial. A JDEM mission will also bring important benefits to general astronomy. In particular, JDEM will provide highly detailed information for understanding how galaxies form and acquire their mass.
- The JDEM mission candidates identified thus far are based on instrument and spacecraft technologies that have either been flown in space or have been extensively developed in other programs. A JDEM mission selected in 2009 could proceed smoothly to a timely and successful launch."

BEPAC recommended that JDEM be the first of the NASA Beyond Einstein missions to be developed and launched: "NASA and DOE should proceed immediately with a competition to select a Joint Dark Energy Mission for a 2009 new start."

Following the BEPAC report, the Parties agreed to proceed with JDEM.

ARTICLE III - PURPOSE

The purpose of this MOU is to define the agreement between the Parties concerning roles and responsibilities on JDEM. This MOU acknowledges the Parties' effort to leverage each agency's complementary expertise in the study into the nature of dark energy and identifies resources that are available to each Party. The Parties will work together to develop the first U.S. space-based mission specifically designed to study the nature of dark energy with capabilities that include a wide-field telescope and appropriate focal plane instrumentation. The goal for launch is the middle of the next decade.

ARTICLE IV - SCOPE

This MOU provides a framework for cooperation and coordination and is not intended to be an exhaustive description of the work to be carried out over the

term of the MOU. While the Parties agree to partner in JDEM, NASA will be the lead agency for JDEM, responsible for the success of the overall space mission.

JDEM will be a medium-class strategic mission with competitively selected, Principal Investigator-led (PI-led) dark energy science investigations. The Parties have agreed that the PI-led dark energy science investigation teams will be selected through NASA's Announcement Opportunity (AO) process. DOE will assist NASA in writing the AO, in conducting the science peer review process, and will concur in the selection of the science investigations.

The selected PI-led science investigation teams will not provide flight hardware. The Parties will provide the mission-level components, including launch services and the spacecraft bus, as well as the science payload. Cost control will be a central tenet of JDEM project management and mission design.

International contributions may increase the scientific return of JDEM and may also allow the Parties to leverage resources. In consultation with DOE, NASA will investigate the possibility for international in-kind contributions. NASA will be the principal point of contact in negotiation and conclusion of international agreements related to JDEM.

ARTICLE V - AGENCY ROLES AND RESPONSIBILITIES

The basic roles and responsibilities agreed upon by the Parties are described in this MOU. Detailed roles and responsibilities will be established via an Implementation Agreement after the selection of the dark energy science investigations.

The Parties will both participate in the fabrication of instrumentation necessary to implement the dark energy science investigations. NASA responsibilities will include the telescope, the main science instrument and the spacecraft bus.

DOE's responsibilities will include fabrication of a major science instrument and the development of a science operations center.

NASA's responsibilities will include overall mission management, science requirements to which the mission is designed, mission requirements, mission systems engineering, mission integration and test, launch operations, and mission operations.

The Parties will both participate in the dark energy science operations and both will provide support for the AO-selected dark energy science investigations throughout the dark energy mission.

In the implementation of the Parties' decisions and resultant actions, each agency will follow its own policies and procedures.

The Parties will each allocate appropriated funding for components as necessary to fulfill the responsibilities each Party has agreed to accept. Each Party will follow its applicable procurement rules with respect to its construction, fabrication and other activities associated with its contributions to the mission.

ARTICLE VI - FINANCIAL RESPONSIBILITIES

All activities under or pursuant to this agreement are subject to the availability of appropriated funds, and each agency's budget priorities. No provision herein shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. § 1341, et. seq.

The Parties shall be responsible for the costs they respectively incur in implementing their responsibilities under this MOU. Cost overruns on mission level components will be the responsibility of the Party that is providing the component.

This agreement is neither a fiscal nor a funds obligation document. Nothing in this agreement authorizes or is intended to obligate either Party to expend, exchange, or reimburse funds, services, or supplies, or transfer or receive anything of value.

ARTICLE VII - LIABILITY

Each Party agrees to assume liability for its own risks associated with all activities undertaken in this MOU. There shall be no obligation for either Party to reimburse funds to the other Party.

If DOE or other third party contributions are not finalized in a timely manner and will significantly delay the mission, NASA reserves the right to go forward with JDEM without these contributions.

ARTICLE VIII - DATA RIGHTS AND SHARING OF INFORMATION

It is expected that JDEM data produced during the operations phase, including suitable calibration and processing tools, will 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 a science investigation in response to the AO, must be peer reviewed, and must be accepted by both Parties. All data products shall be

documented, validated, and calibrated in physical units usable by the scientific community at large.

Nothing in this MOU is intended to affect a Party's or its contractor's ownership, use, or licensing of background intellectual property, including patents, copyrights, trade secrets, or its existing rights to models, productions, processes, prototypes, contrivances, test fixtures, structures, drawings, software, and the like, existing on or before the date of this MOU, or first produced outside this MOU, unless the Party or the owning contractor specifically agrees otherwise.

The sharing and disclosure of information between the Parties will be consistent with each Party's legal obligations under applicable legal authorities, or as otherwise agreed to by the Parties. It is the intent of the Parties that the information and data exchanged in furtherance of the activities under this MOU will be exchanged without use and disclosure restrictions unless required by applicable regulations or otherwise agreed to by the Parties for specifically identified information or data.

The Parties agree that prior to the public release of any significant information regarding this MOU, the JDEM mission or science results, such as a statement to the media, they shall consult together regarding the content of such a release.

Both Parties recognize the need to protect from public disclosure data and information exchanged between them, that fall within the definition of trade secrets, privileged, confidential commercial or financial information, or other information exempt from public disclosure, under the Atomic Energy Act of 1954, as amended, the Freedom of Information Act, as amended, and other applicable laws.

If one Party provides the other with non-public information, it must be properly marked as such. The recipient Party will not release the information outside the agency, (except to its contractors that are subject to suitable restrictions on further disclosure), without the written consent of the other agency. Freedom of Information Act requests, Congressional requests, press requests, or other requests for documents will be referred to the Party that provided the non-public information for resolution. In the event of third-party investigation requests (i.e., Office of Inspector General, General Accountability Office), the parties will cooperate and coordinate any necessary release of non-public information.

Any subject inventions will be allocated in accordance with the laws and policies of the inventing Party.

ARTICLE IX - TERM OF AGREEMENT

This non-exclusive agreement is strictly for DOE and NASA internal management purposes. This agreement is not legally enforceable and shall not be construed to create any legal obligation on the part of either party. This agreement shall not be construed to provide a private right of action for or by any person or entity.

All agreements herein are subject to, and will be carried out in compliance with, all applicable laws, regulations and other legal requirements.

ARTICLE X - EFFECTIVE DATE

This MOU shall take effect upon the date of the last signature of the Parties. Unless terminated early, this MOU will remain in force for ten (10) years, after which it may be renewed by written agreement of the Parties.

The Approval signatories, their designees, or their successors in office shall resolve all disputes or unresolved items or issues covered by this MOU at the participant level within their respective agencies, using appropriate means necessary, including alternative dispute resolution consistent with Federal law and regulation.

This MOU is made by the signatories below and can be modified as required by the mutual consent of the same signatories or their successors. The signatories of this agreement, or their successors, may terminate this MOU upon presentation of ninety (90) days written advance notice to the other, or by the agreement in writing of both Parties.

ARTICLE XI - OVERSIGHT AND COORDINATION

Responsibility for interagency coordination is exercised through the Astrophysics Division of the Science Mission Directorate at NASA and the Office of High Energy Physics of the Office of Science at DOE. The Parties will meet semi-annually, and more often as needed, to keep each other informed on budgetary and project status.

During the development, construction and integration and test phases, NASA will perform reviews of the overall JDEM mission to assess project performance. DOE will perform reviews of its activities during this phase according to its own practices and procedures, in consultation with NASA's JDEM Project Office. The technical expertise of the Parties on JDEM will be used in these reviews, thereby maximizing the potential for a world-class dark energy mission and continuing the legacy established in the jointly-developed Fermi Gamma-ray Space Telescope observatory's primary instrument, the Large Area Telescope.

Each Party shall participate in the relevant reviews of the other Party.

ARTICLE XII - KEY PERSONNEL POINTS OF CONTACT

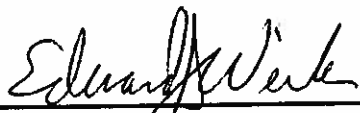
The following individuals are designated as the primary points of contact for this MOU:

For DOE: Dr. Kathleen Turner
JDEM Program Manager
Office of High Energy Physics
Office of Science
Phone: 301-903-1759

For NASA: Dr. Michael Salamon
NASA Program Scientist for Physics of the Cosmos Program
Astrophysics Division
Science Mission Directorate
Phone: 202-358-0441

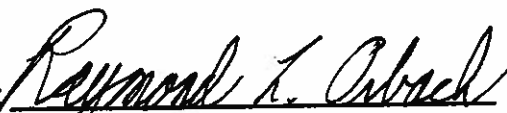
Signed on behalf of:

National Aeronautics and Space Administration

BY: 
Edward J. Weiler
Associate Administrator for
Science Mission Directorate

DATE: Nov. 7, 2008

Department of Energy

BY: 
Raymond L. Orbach
Undersecretary for Science

DATE: Nov. 3, 2008