

MEMORANDUM OF UNDERSTANDING

between

**JEFFERSON SCIENCE ASSOCIATES, LLC,
OPERATOR OF THE THOMAS JEFFERSON NATIONAL ACCELERATOR
FACILITY**

and

**UNIVERSITY OF SYDNEY
FOR CO-OPERATION IN TRANSFER OF NUCLEAR PHYSICS DETECTOR
TECHNOLOGY TO BIOMEDICAL APPLICATIONS**

Jefferson Science Associates, LLC (JSA), the management and operating contractor of the Thomas Jefferson National Accelerator Facility (JLab) for the United States Department of Energy under U.S. DOE Contract No. DE-AC05-06OR23177, located at 12000 Jefferson Avenue, Newport News, Virginia 23606, and the University of Sydney (U. Sydney) located in Sydney, at City Rd, Darlington NSW 2008, Australia, collectively herein the "Participants",

SHARING an interest in collaboration on nuclear physics detector applications to biomedical research,

HAVE REACHED THE FOLLOWING UNDERSTANDING:

I. OBJECTIVE

1. The Participants intend to work together to develop technology and methodologies to advance development of detectors for biomedical applications.
2. The entities expected to collaborate in the activities under this Memorandum of Understanding (MOU) include:
 - 2.1 JSA is a Southeastern Universities Research Association/Computer Sciences Corporation, limited liability company created specifically to manage and operate JLab. The DOE Office of Nuclear Physics within the Office of Science operates the Continuous Electron Beam Accelerator Facility (CEBAF) as a national user facility at JLab. CEBAF is a world-leading facility in the experimental study of hadronic matter. The 12 GeV CEBAF Upgrade directly addresses a major scientific opportunity identified in both the 2002 and the 2007 Long Range Plans in which the Nuclear Science Advisory Committee of DOE and the U.S. National Science Foundation

recommended the 12 GeV CEBAF Upgrade as one of its highest priorities for the program of the DOE Office of Science's Office of Nuclear Physics. The full scope of the 12 GeV CEBAF Upgrade project includes upgrading the electron energy of the main accelerator from 6 GeV (billion electron volts) to 12 GeV, constructing a new experimental area (Hall D), and enhancing the capabilities in the existing experimental halls. Construction started in 2009 and the start of commissioning is scheduled for 2014. As a center for both basic and applied research, JLab also reaches out to help educate the next generation in science and technology. One of JSA's secondary or collateral missions is to promote research and education in scientific and technical fields of interest to DOE. As part of JSA's Technology Transfer efforts, the JLab Radiation Detector and Imaging Detector Group is a group of nuclear physics detector specialists uniquely qualified with advanced detector systems for biomedical and other applications.

2.2 Dr. Steven Meikle is Professor of Medical Imaging Physics and Head of the Imaging Physics Laboratory at the Brain and Mind Research Institute, which is a node of the NCRIS-funded National Imaging Facility at the University of Sydney. He is active in the development of nuclear medicine based imaging technology to advance clinical and pre-clinical based research.

II. PLANNED AREAS OF COOPERATION

Proposed collaboration may include, but is not limited to, the following:

1. Dr. Steven Meikle's Research Group:

- a) Collaborate on a project to develop Burrow-SPECT, an imaging system based on high resolution radiation detectors for imaging awake and freely moving small animals for novel biomedical research applications,
- b) Collaborate on exploration and development of research proposals leveraging new developments in detector technology,
- c) Evaluate JLab detector technology electronics system in pre-clinical biomedical applications,
- d) Evaluate JLab DAQ electronics system in pre-clinical biomedical applications;
- e) Provide research and technical training opportunities for JLab visiting scientists

2. JSA/JLab:

- a) Provide detector expertise to further the development and testing of Burrow-SPECT;
- b) Loan JLab DAQ electronics system – already at JLab – to U. Sydney as appropriate to allow detector implementation;
- c) Develop and provide the forum for regular progress updates by pre-clinical personnel.

Other collaborative activities may be added by the Participants' mutual consent in writing.

III. FORMS OF COOPERATION

Cooperation may include, but is not limited to:

1. Exchange of information, publications, reports, and technical data;
2. Exchange of scientists, engineers, students, and other specialists for participation in project activities. Each Participant's staff is to abide by the health, safety, and environmental requirements of the host Participant when on an exchange assignment at the host Participant's facility.

IV. MECHANISMS OF COOPERATION

- A. Key personnel to act as the liaison and primary point of contact for this collaboration:

JLab: Dr. Drew Weisenberger (head, Radiation Detector and Imaging Group)

U Sydney: Dr. Steven Meikle (Professor)

V. GENERAL CONSIDERATIONS

1. This MOU does not create any legally binding obligations between the Participants. If commitment, obligation, or transfer of funds is required, a contractual agreement or other reimbursable arrangement is to be concluded between JSA/JLab and the participating organization.
2. The conduct of cooperative activities contemplated by this MOU is subject to the availability of funding, personnel, and other resources.
3. Each Participant should conduct the cooperation contemplated by this MOU in accordance with applicable laws and regulations to which it is subject, including export control laws and regulations, and international agreements to which its Government is party.
4. Each Participant is to be responsible for the costs it incurs in participating in cooperative activities under this MOU, except as provided in Section II, paragraphs 2(b) and 2(c).

5. Any transfer or loan of equipment is to be implemented under an appropriate written agreement therefor.
6. The Participants intend to acknowledge in publications all institutions that contribute to results achieved from activities conducted under this MOU and in the manner customary for scholarly publication. Each Participant intends to utilize its institution's review procedures for all publications (to include presentations) developed under this MOU.

VI. COMMENCEMENT, MODIFICATION AND DISCONTINUATION

1. Cooperative activities under this MOU may commence upon signature by the Participants and continue for a 5-year period unless discontinued in accordance with paragraph 2 of this Section VI.
2. The Participants may discontinue this MOU at any time by mutual consent in writing. A Participant that wishes to discontinue its participation in this MOU should endeavor to provide at least ninety (90) days written notice to the other Participant.
3. This MOU may be modified in writing by the mutual consent of the Participants, and may be extended for additional periods.

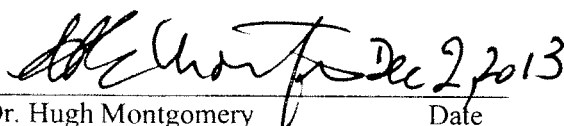
VII. INTELLECTUAL PROPERTY

If the Participants decide to engage in future collaborative R&D, they intend to conclude a written agreement to provide for the adequate protection and allocation of any intellectual property created or furnished in connection therewith.

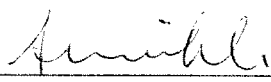
Signed in duplicate.

Jefferson Science Associates, LLC :

University of Sydney:

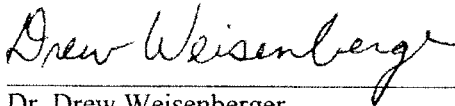


Dr. Hugh Montgomery Date
Director

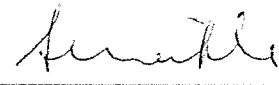
 28/11/13

Authorized Person Date
University of Sydney

Thomas Jefferson National Accelerator
Facility

 12/2/2013

Dr. Drew Weisenberger
Radiation Detector and Imaging Group
Thomas Jefferson National Accelerator
Facility

 28/11/13

Dr. Steve Meikle
University of Sydney

 12/2/13

Robert McKeown
Deputy Director of Science
Thomas Jefferson National Accelerator Facility

 12/4/13

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