

MEMORANDUM OF UNDERSTANDING

Between

**JEFFERSON SCIENCE ASSOCIATES, LLC,
THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY**

And

**HELMHOLTZ-INSTITUT FÜR STRAHLEN UND KERNPHYSIK
RHEINISCHE FRIEDRICH-WILHELMS UNIVERSITÄT BONN**

THE ANALYSIS OF THE BARYON SPECTRUM

Jefferson Science Associates, LLC, the Managing and Operating Contractor of the Thomas Jefferson National Accelerator Facility (JSA/Jefferson Lab), located at 12000 Jefferson Avenue, Newport News, VA 23606 for the United States Department of Energy, under the U.S. DOE Contract No. DE-AC05-06OR23177, and Helmholtz Institute für Strahlen und Kernphysik at the Universität Bonn, located at Nussallee 14-16, D-53115 Bonn, collectively herein the "Participants,"

SHARING an interest in collaborating on the analysis of data on excited baryons with a view to a determination of the spectrum and corresponding couplings and transition form factors,

HAVE REACHED THE FOLLOWING UNDERSTANDING:

I. OBJECTIVE:

1. The Participants intend to collaborate in the area of partial wave analysis, in particular incorporating Jefferson Lab Hall B data in the global Bonn-Gatchina partial wave analyses, in cooperation with the CLAS group.
2. The entities expected to collaborate in activities contemplated by this Memorandum of Understanding (MOU) include:
 - a. JSA is a Southeastern Universities Research Association/Computer Sciences Corporation, limited liability company created specifically to manage and operate Jefferson Lab, 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 Jefferson Lab. CEBAF is a world-leading facility in the experimental study of hadronic matter.

- b. Helmholtz-Institut für Strahlen und Kernphysik at the Rheinische Friedrich-Wilhelms-Universität Bonn

II. PLANNED AREAS OF COOPERATION:

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

1. Universität Bonn:
 - a. Participate as a limited member of the Hall B CLAS collaboration,
 - b. Abide by the rules of the CLAS Collaboration with respect to dissemination of the CLAS data.
2. JSA/Jefferson Lab:
 - a. Provide an appropriate on-site work environment including space, computer access, necessary training and other resources as required for all user scientists,
 - b. Anticipates providing \$US 50,000.00 in 2013 to promote this activity. Any such support is to be implemented under a written agreement therefor,
 - c. Provide a sufficiently detailed Statement of Work describing the goals and expectations,
 - d. Keep key Universität Bonn personnel informed of overall project status and requirements for the joint scope of work,
 - e. Develop and provide a forum of regular progress updates by the Universität Bonn personnel, and
 - f. Abide by the rule that non-published PWA-results that are the result of this cooperation, are not to be made public without prior agreement.

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. Joint publications between Bonn-Gatchina-PWA team and the CLAS group at Jefferson Lab,
2. Exchange of scientists and other specialists for participating in project activities. Each Participant 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. INTELLECTUAL PROPERTY:

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

V. MECHANISMS OF COOPERATION:

A. Key Personnel

1. Key personnel from Universität Bonn include Professor Ulrike Thoma and Dr. Andrey Sarantsev. Prof. Thoma is to act as the liaison and primary point of contact for this collaboration.
2. Key personnel from Jefferson Lab include Dr. Volker Burkert and Dr. Michael Pennington. Dr. Pennington is to act as the liaison and primary point of contact for this collaboration.

VI. 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 written contractual agreement, or other reimbursable arrangement is to be concluded between JSA/Jefferson Lab and the participating organization to provide specific funding, obligation, and billing data.
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 contemplated by this MOU, except as provided in Section II, paragraph 2(b).
5. Any transfer or loan of equipment is to be implemented under a written agreement.
6. The Participants intend to acknowledge in publications all institutions that contribute to results achieved from activities contemplated by this MOU and in the manner customary

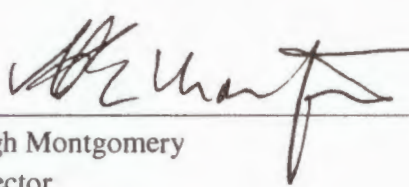
for scholarly publication. Each Participant intends to utilize its institutions' review procedures for all publications (to include presentations) developed under this MOU.

VII. COMMENCEMENT, MODIFICATION AND DISCONTINUATION:

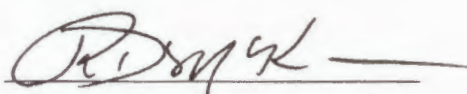
1. Cooperative activities contemplated by this MOU may commence upon signature by the Participants and continue for a five (5) year period unless discontinued in accordance with paragraph 2 of this Section VI.
2. The Participants may discontinue this MOU at any time in writing. A Participant that wishes 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.

Signed in duplicate.

For Thomas Jefferson National Accelerator
Facility:

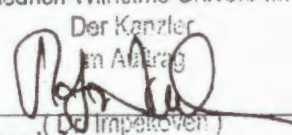

Hugh Montgomery
Director

Date: 4/23/2013


Robert McKeown
Deputy Director of Science

Date: 4/23/13

For Helmholtz-Institut für Strahlen
und Kernphysik Rheinische Friedrich-
Wilhelms Universität Bonn:

Rheinische
Friedrich-Wilhelms-Universität
Der Kanzler
im Auftrag
(Dr. Ingeborg)

Dr. Reinhardt Lutz
Chancellor

Date: 8.5.2013


Prof. Dr. Ulrike Thoma

Date: 14.5.2013