

LAT-MD-00610-02

26 June 2002

# **Memorandum of Agreement**

**Between**

**Stanford University - Stanford Linear Accelerator Center  
(SU-SLAC),**

**Naval Research Laboratory (NRL),**

**and**

**Commissariat à l'Energie Atomique / Direction des Sciences  
de la Matière (CEA/DSM),**

**Regarding**

**CEA/DSM Participation**

**in**

**The Large Area Telescope (LAT)**

**on**

**The Gamma-ray Large Area Space Telescope (GLAST) Mission**

## 1. Introduction

The purpose of this Memorandum of Agreement (MoA) is to establish the management policy and areas of responsibility for participation of the Commissariat a l'Energie Atomique / Direction des Sciences de la Matière / Département d'Astrophysique, de physique des Particules, de physique Nucléaire et de l'Instrumentation Associée (hereafter CEA/DSM/DAPNIA) in the definition, development, integration, and operation of the Large Area Telescope (LAT) instrument on the Gamma-ray Large Area Space Telescope (GLAST) Mission. This MoA is pursuant to implementation of the GLAST LAT Flight Proposal entitled "GLAST Large Area Telescope Flight Investigation: A Particle-Astrophysics Partnership to Explore the High-Energy Universe", selected by NASA on February 28, 2000.

GLAST is a NASA high-energy gamma-ray mission to be launched in September 2006. The Large Area Telescope (LAT), the primary instrument aboard GLAST, is being fabricated by a collaboration led by Stanford University. Peter F. Michelson is the LAT Instrument Principal Investigator, appointed by Stanford University, with the joint approval of the U.S. Department of Energy (DOE) and the National Aeronautics and Space Administration (NASA). It is recognized by all of the parties to this agreement that the research conducted under this agreement is fundamental research, the results of which are expected to be placed in the public domain.

The LAT instrument is subdivided into subsystems, which allows a clear definition of responsibilities in design, fabrication, integration and test. The main subsystems are the following (with the participating institutions in parenthesis):

- Tracker (Stanford University-Stanford Linear Accelerator Center (SU-SLAC), UC Santa Cruz (UCSC), Italian Institute for Nuclear Physics (INFN) and Hiroshima University (Japan)).
- Calorimeter (Naval Research Laboratory (NRL), CEA/DSM/DAPNIA (France) and Centre National de la Recherche Scientifique / Institut National de Physique Nucléaire et de Physique des Particules (CNRS/IN2P3, France), Royal Institute of Technology (Sweden), and SU-SLAC)
- Anti-Coincidence Detector (Goddard Space Flight Center (GSFC))
- LAT Electronics (SU-SLAC, SU-HEPL, NRL, and UCSC)

Instrument system engineering functions are being carried out by SU-SLAC.

This MoA covers work on the LAT Instrument Calorimeter Subsystem by CEA/DSM/DAPNIA. The calorimeter development is a collaborative effort among the parties listed above.

## 2. Parties and Their Representation

The institutions responsible for the research teams taking part in the GLAST LAT instrument and forming *the Collaboration*, are hereinafter collectively referred to as *the Collaborating Institutions*.

The parties concerned in this Memorandum include:

- a) The French institutions involved in the GLAST LAT: CEA/DSM/DAPNIA and CNRS/IN2P3 representing the three following laboratories: PCC of Collège de France, LLR of Ecole Polytechnique and CENBG of Université de Bordeaux.
- b) SU-SLAC, operated by Stanford University, under contract DE-AC03-76SF00515 with the U.S. Department of Energy (DOE), responsible for management and integration of the LAT instrument. SU-SLAC is the responsible party accountable to the U.S. Department of Energy for the program execution. Stanford University is responsible for the appropriate expenditure of U.S. Government funds.
- c) NRL, the lead institution for the LAT Calorimeter subsystem, with overall responsibility for the Calorimeter Subsystem. NRL's responsibility to NASA is identified, with management oversight and concurrence from P.F. Michelson, in NASA DPR S-15633-Y.
- d) The U.S. Government funding agencies: the Department of Energy (DOE) and the National Aeronautics and Space Administration (NASA).
- e) The French funding agencies providing support to the French institutions collaborating in the GLAST LAT instrument: Centre National d'Etudes Spatiales (CNES), CEA/DSM, and CNRS/IN2P3.

In the present Memorandum the parties considered (hereinafter, the Parties) are SU-SLAC, represented by the SLAC Director, the NRL, represented by the Superintendent of the Space Science Division, and CEA/DSM, represented by the Director de la Direction des Sciences de la Matière. Peter F. Michelson of Stanford University, as Instrument Principal Investigator (IPI), has overall responsibility for the investigation. W. Neil Johnson of NRL, Calorimeter Subsystem Manager, has overall responsibility for the Calorimeter Subsystem of the GLAST LAT instrument.

Isabelle Grenier is the CEA/DSM/DAPNIA Principal Investigator with overall responsibility for the LAT activities carried out by CEA/DSM/DAPNIA. The responsibilities of CEA/DSM/DAPNIA are listed in section 8.4 of this MoA.

NRL is responsible for managing the development of the calorimeter subsystem, including Calorimeter design, fabrications, test, and calibration. NRL is responsible for the delivery of the Calorimeter Modules to SU-SLAC. The Swedish groups are responsible for the procurement and acceptance testing of the CsI crystals for the calorimeter subsystem. IN2P3 is responsible for the mechanical design, qualification, and fabrication of the LAT calorimeter mechanical structural system.

### **3. Scope of This Memorandum of Agreement**

This MoA ratifies the GLAST LAT Flight Proposal and establishes the basic working agreement among SU-SLAC, NRL, and CEA/DSM/DAPNIA (France), regarding CEA/DSM/DAPNIA participation in the GLAST LAT Project, in particular in 1) the definition, development, fabrication, and integration of the GLAST LAT Calorimeter Subsystem; 2) calibration of the LAT calorimeter and the LAT instrument; and 3)

subsequent mission operations and data analysis activities for the GLAST mission. This MoA establishes the understanding between the signatories and is not legally binding.

It is acknowledged by the Parties that an International Agreement between the National Aeronautics and Space Administration (NASA) and the Centre National d'Etudes Spatiales (CNES) shall define the overall participation of France in the GLAST mission. This MoA shall not supersede the International Agreement between NASA and CNES. Reference is also made in this MoA to the role of KTH (Sweden) and IN2P3 (France). The roles and responsibilities of KTH, Stockholm University in Stockholm, Sweden, and IN2P3 in the LAT Project shall be ratified under separate MoAs with those parties, NRL, and SU-SLAC. Those agreements and this agreement shall be made available to all of the parties concerned.

#### **4. Authority**

Work on GLAST at SU-SLAC is authorized under DOE Project Number KA050102-EQU01CC and NASA Contract NAS 5-00147 with Stanford University. NASA DPR S-15633-Y with NASA/GSFC provides NRL authority for performance of work on GLAST as part of the overall program.

#### **5. Schedule**

The Collaborating Institutions shall prepare and maintain schedules for activities under their respective control. To ensure that such activities are coordinated with other elements of the project schedule, these schedules are subject to review and approval by the appropriate Subsystem Manager and the Instrument Project Manager (IPM), and are included in the LAT master schedule. All entities shall use all reasonable means to adhere to such approved schedules and shall report progress periodically. The Calorimeter Subsystem Manager, the CEA/DSM/DAPNIA Project Manager, and the IPM shall be immediately informed of any departure from the schedule.

#### **6. Funding**

NASA/GSFC will fund Stanford University and the Naval Research Laboratory for the LAT program incrementally at varying intervals. SU-SLAC will also receive funding from the Department of Energy at varying intervals. The Centre National d'Etudes Spatiales (CNES) will endorse responsibility for French participation with an International Agreement between CNES and NASA. CEA/DSM/DAPNIA and CNRS/IN2P3 will each be funded partly by CNES and partly by their own funding. The Swedish institutions will be funded by the Wallenberg Foundation and the Swedish Research Councils. The funding will cover primarily technical and management staff, and external activities, such as industrial contracts, equipment, and travel.

#### **7. International Exchange of Information and Materials**

The development, fabrication, and operation of the LAT investigation as defined by this agreement shall adhere to all applicable U.S. laws and regulations concerning the import and export of technical information and materials.

All exports of U.S. technical information and materials related to this MoA by the U.S. Naval Research Laboratory will be handled by the Naval Research Laboratory through its Security Office using procedures approved by the Navy International Programs Office.

CEA/DSM/DAPNIA will assure compliance with all applicable French laws and regulations concerning the import and export of technical information & materials related to this MoA.

## **8. Management and Technical Direction**

### **8.1 Project Structure**

The LAT program, as accepted by NASA, draws upon the resources of the consortium institutes to create a working group for the program. It is not intended that an autonomous project group be created, nor that the institutes relinquish control over their personnel. The main bodies of the organization are:

#### **8.1.1 Instrument Principal Investigator, Peter F. Michelson**

The Instrument Principal Investigator (IPI) is the ultimate authority within the LAT team for all decisions concerning the instrument development and is responsible for all scientific, technical, organizational and financial affairs of the collaboration. The management of the instrument project is led by the IPI, the Instrument Project Manager (IPM), and the Instrument Technical Manager (ITM). The IPM reports to the IPI and is responsible, by delegation from the IPI, for the day-to-day management of the instrument design, fabrication, testing, and delivery of the instrument to NASA for subsequent integration with the GLAST spacecraft and launch. These persons, co-located at SLAC, form the leadership of the LAT Instrument Project Office (IPO) at SU-SLAC. The subsystems will each have a subsystem manager, each responsible for the design and fabrication of the particular subsystem.

#### **8.1.2 Calorimeter Subsystem Management**

The Calorimeter Subsystem Manager is responsible for the design, fabrication, and testing of the LAT calorimeter subsystem. By delegation and authority of the Calorimeter Subsystem Manager, the Calorimeter Project Manager at NRL is responsible for the technical management of the NRL effort. The Calorimeter Subsystem Manager reports to the IPM.

#### **8.1.3 CEA/DSM/DAPNIA Program Management**

With concurrence of the appropriate management of the participating Parties, the CEA/DSM/DAPNIA Principal Investigator is responsible for the CEA/DSM/DAPNIA efforts on the LAT. With concurrence of the CEA/DSM/DAPNIA PI, the CEA/DSM/DAPNIA Project Manager, Didier Bédérède, is responsible for all day-to-day decision-making and authority with regard to management of technical, cost, and schedule issues for the design, fabrication, and testing in the areas specified in Section 8.4 of this MoA for which CEA/DAPNIA has responsibility. For matters concerning the LAT calorimeter development by CEA/DSM/DAPNIA, the CEA/DSM/DAPNIA Project Manager reports

to the Calorimeter Subsystem Manager. The CEA/DSM/DAPNIA PI is responsible for overall matters concerning science and programmatic issues (e.g. overall scope of funding and human resources) and for coordinating and representing the interests of all CEA scientists with respect to national funding agencies and the LAT collaboration.

#### 8.1.4 The Senior Scientist Advisory Committee

The Senior Scientist Advisory Committee (SSAC) is the body that advises the IPI on matters that concern the general and scientific policies of the collaboration. The SSAC consists of senior members from the collaborating institutions, with an elected Chairperson. The Calorimeter Subsystem Manager and the CEA/DSM/DAPNIA Principal Investigator are members of the SSAC.

#### 8.1.5 The Instrument Design Team

The technical coordination of the LAT instrument development is the responsibility of the ITM. The Instrument Design Team (IDT), chaired by the ITM, is the forum i) for exchange of information between all instrument subsystems, ii) to identify and discuss issues related to the instrument design with the objective of maintaining a coordinated design and, iii) to resolve issues, by consensus or by referral to the IPO for action. The IDT, through the ITM, reports to the IPM. The membership of the IDT includes all subsystem managers and key system engineering personnel. The CEA/DSM/DAPNIA Project Manager is a member of the IDT as well as the key technical scientists from NRL, CEA/DSM/DAPNIA, and CNRS/IN2P3 involved in the instrument development. Members of the IDT are obliged to attend IDT meetings as part of their responsibilities. Meetings of the IDT are open to the Collaboration.

### 8.2 General Guidelines

The general guidelines for access to the LAT scientific data and the rights to publication of the data have been established by NASA, the DOE, and the GLAST Facilities Science Team. This MoA ratifies those guidelines.

For safety reasons, Collaboration members involved in the development, integration, or testing of the LAT on the SLAC site shall participate in safety meetings and studies of the LAT experiment and accept the right of the SLAC Environment, Safety & Health (ES&H) Division to carry out safety inspections

All equipment and installations on the SLAC site shall comply with SLAC's safety practices and regulations.

#### 8.2.1 Data and Intellectual Properties

This Memorandum of Agreement shall not supersede the terms concerning Intellectual Property Rights contained in the International Agreement between NASA and CNES.

Each Party shall be entitled to use for its own purposes any acquired knowledge, whether patentable or not, as well as any expertise developed during the manufacture of the components.

Intellectual property rights conceived or developed solely by either Party shall be owned by such Party according to either Party's respective laws and regulations. In the event that intellectual property rights are jointly made or created by employees of the Parties, and both Parties own one or more ownership interests in such intellectual property, the Parties shall consult and agree as to future actions toward the establishment of intellectual property protection for such intellectual property and on the terms and conditions of any license or other rights to be exchanged or granted by or between the Parties.

All equipment and technical data transferred by the Parties under this Agreement shall remain the property of the originating Party unless specified otherwise in this Agreement.

All data obtained from the LAT for the collaboration shall be made accessible to all the collaborating institutions in a timely fashion to provide all equal opportunity to contribute to the analysis.

All members of the collaboration are entitled to be involved in the analysis and publication of data obtained by the collaboration in the course of the scientific program, according to the GLAST LAT Collaboration Publication Policy.

All data, correction algorithms and parameters, detector system analysis software, and physics reactions and detector simulation programs shall be made available to the entire Collaboration.

Subject to the Freedom of Information Act (5 U.S.C. 552), decisions on disclosure of information to the public regarding projects and programs referenced in this MoA shall be made by the IPI following consultation with the other parties' representatives. It is the general intent of the Parties to this MoA to place research and results in the public domain.

Press releases and press conferences concerning the analysis of experimental data will require the prior approval of the IPI. The IPI will inform, and where appropriate, obtain the approval of the funding agencies representatives.

The publication of results obtained with the LAT Instrument by the collaboration will follow the procedure described in the "GLAST LAT Collaboration Publication Policy".

The publication or other release of technical data and results from the LAT are subject to the international exchange of information restrictions described in section 7.

### 8.2.2 Cross-waiver of Liability

The Parties to this agreement agree that a comprehensive cross-waiver of liability between the Parties to this agreement and their related entities will further the objectives of the GLAST LAT Project. The cross-waiver of liability shall be broadly construed to achieve this objective.

Each Party to this agreement agrees to a cross-waiver of liability pursuant to which each party waives all claims against the other party, a related entity of the other party, or an employee of a related entity of the other party, for actions under this agreement. In

CEA/DSM/DAPNIA responsibilities in the LAT Program are described in the following sub-sections (whose titles are extracted directly from the applicable subsystem WBS), and specified in more detail in the Calorimeter Implementation Plan.

#### **8.4.1 System Engineering**

The CEA/DSM/DAPNIA management team shall be responsible for system engineering support for the CEA/DSM/DAPNIA tasks of the GLAST LAT calorimeter subsystem. This includes the development of requirements and specifications in collaboration with NRL and others for the Calorimeter. Responsibilities also include management and tracking of resources and margins, and system verification.

NRL is responsible for the overall Calorimeter system engineering. CEA/DSM/DAPNIA shall support the overall system engineering activities with efficient and timely exchange of technical details, schedules, processes and plans with NRL and IN2P3.

#### **8.4.2 Performance Assurance**

The CEA/DSM/DAPNIA management team shall be responsible for the reliability and quality assurance of the CDEs in cooperation with NRL and the IPO at SU-SLAC, in accord with the Mission Assurance Requirements document from the GLAST Project Office at NASA and the IPO-controlled LAT Performance Assurance Implementation Plan.

#### **8.4.3 CAL Csl Crystal Detector Element (CDE) Design**

NRL and CEA/DSM/DAPNIA shall equally share responsibility for the definition, specification and engineering design of the CAL CDEs. The CDE specifications shall be approved by NRL and CEA/DSM/DAPNIA. CEA/DSM/DAPNIA shall deliver design documentation, manufacturing plans and procedures, test plans and procedures and test data to NRL as required.

#### **8.4.4 Design Optimization and Scientific Performance Simulations**

NRL and French Institutes shall collaboratively develop simulations of the performance of the Calorimeter subsystem for the purpose of optimizing design details.

#### **8.4.5 PIN Photodiodes**

NRL and CEA/DSM/DAPNIA shall equally share responsibility for the definition and specification of the PIN photodiodes. CEA/DSM/DAPNIA shall qualify the PIN photodiodes. CEA/DSM/DAPNIA shall provide US\$200,000 equivalent of PIN photodiodes and the LAT Collaboration shall provide the remaining PIN photodiodes required for the production of the CDEs referenced in 8.4.7. A single specification (including acceptance plan) shall be used for the photodiode procurements by CEA/DSM/DAPNIA and by the LAT Project Office. Both procurement plans shall be discussed with the photodiode vendor(s) and approved during a specific contract review by NRL, CEA/DSM/DAPNIA and the LAT Project Office. Any subsequent changes shall be subject to similar mutual review and approval. All photodiodes shall be delivered to CEA/DSM/DAPNIA, which is responsible for the photodiode acceptance testing. The photodiode procurement contracts shall be administered by the respective parties. A

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coordinator for discussions with the photodiode vendor shall be designated by mutual agreement for each of the design and production phases.

NRL and CEA/DSM/DAPNIA shall equally share responsibility for the definition and specification of the flexible electrical interconnect cable which connects the photodiode and readout electronics. CEA/DSM/DAPNIA shall provide, test and assemble these cables to the PIN photodiodes.

#### **8.4.6 PIN Bonding Tests**

CEA/DSM/DAPNIA shall conduct evaluations of PIN photodiode bonding techniques and provide a PIN-CsI bonding procedure that meets performance and reliability requirements as specified in the Calorimeter Implementation Plan.

#### **8.4.7 Crystal Detector Element Assembly and Test**

CEA/DSM/DAPNIA shall manufacture and acceptance test the CAL crystal detector elements, consisting of CsI crystal elements (furnished and verified by the Swedish Institutes), wrapped in optically reflective materials, with bonded PIN photodiodes equipped with flexible electrical interconnect cables. These CDE shall be delivered to NRL for subsequent installation in the CAL mechanical structure. CEA/DSM/DAPNIA shall fabricate and deliver to NRL sufficient quantity of CDE to support the assembly of 19 CAL modules with 10% spare CDE (TBR). The 19 modules include one engineering model and 18 flight models. Of the 18 flight models, one will be used in CAL module qualification testing and the others represent the sixteen flight models and a flight spare module. CEA/DSM/DAPNIA shall fabricate other items as necessary to study and qualify the manufacturing process and qualify the design.

#### **8.4.8 Pre-Electronics Module**

NRL and French Institutes, including CEA/DSM/DAPNIA, will collaborate on the definition of procedures used to assemble the PEM.

#### **8.4.9 Calorimeter Integration, Test and Calibration**

NRL, CEA/DSM/DAPNIA and CNRS/IN2P3 will collaborate on developing Calorimeter integration, test and calibration procedures. CEA/DSM/DAPNIA will be involved in integration, test and calibration activities, including beam tests at SU-SLAC or other sites. This will include calibrations of a prototype module in electron, proton and heavy ion beams.

#### **8.4.10 Instrument Integration and Test**

CEA/DSM/DAPNIA will actively participate in the integration, test and calibration of the LAT instrument at SU-SLAC or other designated sites.

#### **8.4.11 Science Analysis Software**

CEA/DSM/DAPNIA will collaborate with other members of the LAT Collaboration on the development of requirements for scientific analysis of LAT flight data and the development of algorithms and software for generating high-level science data products to implement the LAT Collaboration's science program as specified in the LAT Flight

Proposal, particularly the preparation of the LAT source catalog and the galactic diffuse emission model. CEA/DSM/DAPNIA will contribute to Software Infrastructure. Documentation will be provided for all software code developed. A French mirror site for LAT data and software shall be developed and maintained, in coordination with the LAT Instrument Operations Center (IOC) activities.

#### **8.4.12 Mission Operations**

All members of the collaboration will collaborate on the planning of the scientific program for the LAT Flight Investigation, in accordance with the GLAST LAT flight proposal. CEA/DSM/DAPNIA scientists will be involved from the beginning in the major scientific investigations to be done with data from the LAT. SU-SLAC, NRL and the participating French institutions agree to have the level of responsibility of the participating institutions in the science activities commensurate, as much as possible, to the level of their commitment.

#### **8.5 Deliverable Items and Schedule**

The list of deliverable items and schedule for the Calorimeter shall be maintained as part of the Calorimeter Implementation Plan, developed collaboratively with the CEA/DSM/DAPNIA project management, and approved and maintained by the Calorimeter Subsystem Manager.

For reference, current scheduled dates for LAT PDR, CDR, and launch are:

- LAT PDR: January 7-10, 2002
- LAT Delta-PDR/Baseline Review: July 30 – August 1, 2002
- LAT CDR: April, 2003
- LAT CAL CDR: December 2002 (TBR)
- Launch: September 2006

The table below lists deliverable items. Estimated delivery dates and delivery rates are given for information in five categories:

- hardware;
- design, documentation, and programmatic support;
- software;
- LAT integration and test support;
- LAT calibration support.

The dates in the table are only representative of the actual program schedule. Relative dates are given relative to CDE specification approval and the completion of LAT CAL CDR. The actual delivery dates are negotiated with all Parties and maintained in the project schedule controlled by the LAT project office.

Table 1. CEA/DSM/DAPNIA Deliverables

Deliverable	First Delivery	Last Delivery
<p><b>1. Hardware</b></p> <p>1.1 Crystal Detector Elements (CDE)</p> <p>1.1.1 CDE Design (design description, test procedures, test reports)</p> <p>1.1.2 Engineering Model CDE (hardware and design data) totaling <math>16 \leq x \leq 96</math> CDE And the rest, up to 96 CDE + 10 (TBR) spares</p> <p>1.1.3 Flight CDE (18 units, including Qualification Unit) totaling 1728 CDE + 172 (TBR) spares</p>	<p>Mar 02</p> <p>Aug 02 Sept 02</p> <p>LAT CAL CDR + 1 month</p>	<p>Sept 02</p> <p>Sept 02 Oct 02</p> <p>LAT CAL CDR + 10 months</p>
<p>1.2 Ground Support Equipment &lt;TBD&gt;</p> <p>1.2.1 Shipping containers</p>	<p>LAT CAL CDR + 1 month</p>	<p>LAT CAL CDR + 10 months</p>
<p><b>2. Design, Documentation, and Programmatic Support</b> includes component and subsystem development plans, specifications, and schedules; design, analysis, and interface data as needed; acceptance and performance test reports; integration and test procedures as needed; handling and maintenance procedures as needed; hardware schematics, design data, and drawings for all delivered hardware and GSE; Verification Plan; Reliability, Quality Assurance, and Parts Assurance Plan</p>	<p>As needed during program and specified in the relevant Implementation Plan</p>	
<p><b>3. CAL Integration, Test and Calibration Support</b></p> <p>3.1 EM Integration, Test and Calibration</p> <p>3.2 Flight Module Integration and Test</p>	<p>Aug 02 as needed in the implemen- tation plan</p>	<p>as needed in the implemen- tation plan</p>
<p><b>4. Software</b></p> <p>4.1 Simulation software and analyses</p> <p>4.2 Science analysis software</p>	<p>On-going</p>	
<p><b>5. LAT Integration and Test Support</b></p>	<p>Apr 04 (TBC)</p>	<p>Sep 05 (TBC)</p>

<b>6. LAT Calibration Support</b>	Apr 04 (TBC)	Sep 04 (TBC)
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### 8.6 Technical Management, Reporting, and Reviews

Calorimeter Subsystem and component development plans will be generated by the element lead (see Statement of Work, section 8.4), and submitted to NRL by the CEA/DSM/DAPNIA project manager for review and approval. These plans will be compatible with the overall Calorimeter Implementation Plan, and will address the entire development cycle, from design through fabrication, and integration and test. Detailed schedules will be included in these plans and will be utilized to monitor the technical performance.

Technical work will be monitored via the following activities:

- Instrument Project Office (IPO) level
  - Quarterly joint NASA/DOE Reviews
  - Quarterly reports to the GLAST Project Office (GSFC) and all funding agencies
  - Weekly reports to IDT
  - IDT meetings
  - Subsystem peer reviews
- Calorimeter Internal
  - Monthly Progress Reviews (in person or teleconference)
  - Weekly reports (to be merged with the other organizations' reports and forwarded to IPO)
  - Routine telephone/video conferences as needed

The IPO shall submit quarterly reports to NASA and DOE showing accomplishments, plans for the next period, problems and concerns, disposition of action items, schedule events, staffing changes, contract actions, and financial/schedule status and performance. Subsystem managers shall provide this information to the IPO. In that activity, NRL shall report on the calorimeter subsystem. The CEA/DSM/DAPNIA Project Manager shall submit reports on the calorimeter subsystem activities to NRL showing accomplishments during the past period, plans for the next period, problems and concerns, and other items as needed such as the disposition of action items, schedule events, staffing changes, contract actions, and schedule performance. NRL shall require the same reports from its contractors. NRL shall assemble these reports with its own input into a LAT calorimeter subsystem report. NRL may add a summary of questions and actions items. NRL keeps track of all action items and attaches to the monthly report a list of all items together with their status of disposition. NRL shall also provide informal weekly reports to the IPO, including inputs from the Collaborating Institutions.

The monthly Calorimeter Reviews will be informal reviews chaired by the Calorimeter Subsystem Manager and with participation of all organizations involved, addressing programmatic, design status, action items, issues, and schedule.

## **9. International Finance Committee**

The International Finance Committee, chaired by the Associate Director of SLAC for Research, will meet as needed to review the status of commitments of all partners (U.S. and foreign) in the GLAST LAT Project. The committee membership will be representative of all funding agencies involved in the GLAST LAT Project. The IPI is an ex-officio member of the International Finance Committee. The IPI and IPM will attend committee meetings.

## **10. Final Provisions**

### **10.1 Modifications and Formal Amendments**

The IPO will settle and duly announce to MoA Parties any modification or addition to the instrument and its development plan which affects the terms of the MoA. Major modifications shall be approved as formal amendments to the MoA and, consequently, be accepted and signed by the representatives of the funding agencies.

### **10.2 Disagreement**

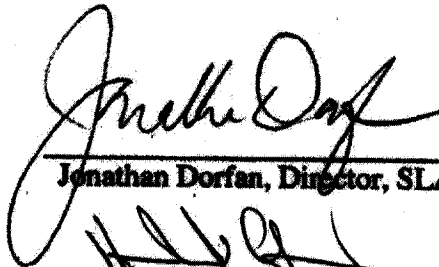
All questions relating to the interpretation or application of this MoA that arise during the period it is in force shall be settled by mutual agreement between the appropriate representatives of NRL, CEA/DSM/DAPNIA and the LAT Project Office. Failure to reach agreement will be referred to the Dean of Research of Stanford University, the Director of SLAC, the Director of Research at NRL, and the representative(s) of the appropriate funding agency(ies) for joint resolution.

## **11. Effective Date**

This Memorandum of Agreement shall become effective upon the later date of the effective date of the International Agreement between NASA and CNES concerning GLAST and the later date of signature of the Parties to this MoA. It shall remain in effect until October 1, 2010.

**12. Approvals**

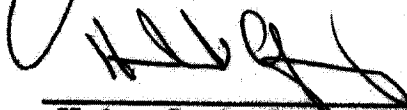
SU-SLAC



Date: Dec 17, 2002

Jonathan Dorfan, Director, SLAC

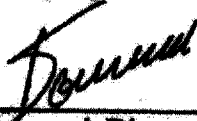
NRL



Date: 10 Jan 2003

Herbert Gursky, Space Science Division Superintendent

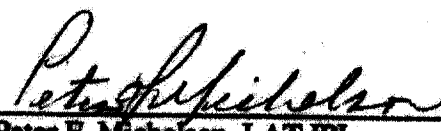
CEA/DSM



Date: - 3 JUN. 2002

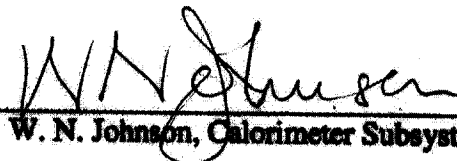
François Gounand, Directeur de la DSM, CEA

LAT Team:



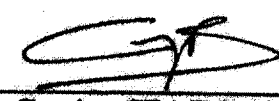
Date: 17 December 2002

Peter F. Michelson, LAT IPI



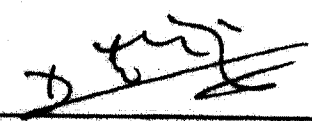
Date: 17 Dec 2002

W. N. Johnson, Calorimeter Subsystem Mgr



Date: 3/7/2002

Isabelle Grenier, CEA/DSM/DAPNIA PI



Date: 03/07/2002

Didier Bederode, CEA/DSM/DAPNIA Project Manager