

**Memorandum of Understanding
between
University of Puerto Rico at Mayaguez
and
Shandong University
for
A Collaborative Project in High Energy Physics
Related to
Compact Muon Solenoid Experiment (CMS) at CERN**

1. Introduction

This Memorandum of Understanding (MOU) is made to provide the yearly details of the work agreed to between the University of Puerto Rico at Mayaguez and the High Energy Physics group at Shandong University. It covers activities for the specific period of performance from July 1, 2008 through June 30, 2009.

2. Personnel

The Leader of the High Energy Physics Group at the University of Puerto Rico (UPR) is Angel Lopez. The institution contact person for CMS activities at Shandong University is Xingtao Huang. Two PhD graduate students from Shandong University will also participate in this project.

During the period of performance Dr. Huang will dedicate 50% of his research time to CMS activities in collaboration projects with the HEP group at UPR.

3. Responsibilities for this Period of Performance

During this period of performance the HEP group at Shandong University agrees to supply the following effort at a cost not to exceed the amount stipulated in this MOU.

| Project | Description |
|---|---|
| Forward Pixel Service Cylinder Simulation | A simulation of the geometry and material properties of the CMS forward pixel service cylinder by using GEANT in the official CMS software framework. |
| Pixel System Simulation Validation | A systematic evaluation of the validity of changes made to the pixel simulation code by comparing results from new versions with results from old versions. |
| Pixel System Upgrade Studies | The use of fast simulation code in order to study possible designs for an upgraded pixel detector for CMS which would be used in order to handle a ten-fold increase in luminosity. |

3.1. Coordination and Reporting -

Dr. Huang will be responsible for directing the activities of the Shandong University personnel and coordinating with Dr. Lopez so that these activities contribute to the progress of the CMS projects of the UPR/Mayaguez HEP group. Dr. Huang and Dr. Lopez will maintain continuous electronic contact during the performance period. Dr. Huang will provide periodic technical reports electronically summarizing the progress that Shandong has made in these projects.

4. **Costs and Funding**

A total amount of \$12,397 will be provided by the University of Puerto Rico to Shandong University to cover costs related to the CMS activities for the full fiscal year. No expenditures above this amount will be paid by the UPR-RUM. Account to be charged 539354.

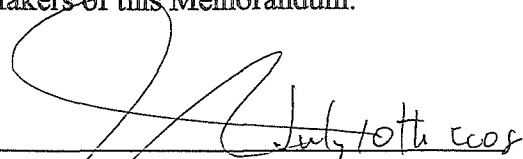
5. **Schedules and Milestones**

The CMS HEP group at Shandong University will make every effort to carry out their institutional responsibilities consistent with the overall CMS schedule.

6. Makers and Concurrence

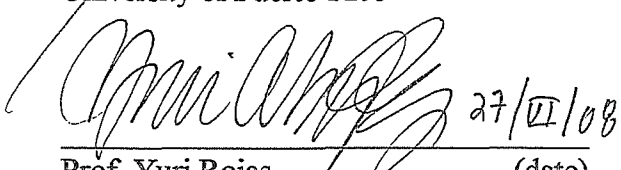
The following persons concur in the terms of this Memorandum of Understanding.

Makers of this Memorandum:


July 10th 2008

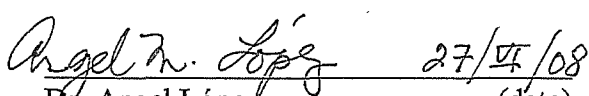
Dr. Jorge Iván Velez Arocho (date)
Chancellor, Mayaguez Campus
University of Puerto Rico

Dr. Tao Zhan (date)
President
Shandong University


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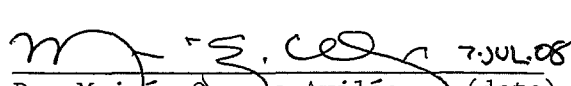
Prof. Yuri Rojas (date)
Director, R&D Center
University of Puerto Rico

Dr. Zuotang Liang (date)
Dean of the School of Physics
Shandong University

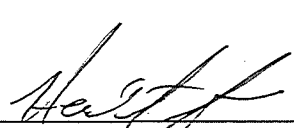

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Dr. Angel López (date)
Leader, HEP Group, Physics Dept.
University of Puerto Rico

Dr. Xingtao Huang (date)
Leader, CMS Group
Shandong University


7-JUL-08

Dr. Moisés Orengo Avilés (date)
Dean of Arts & Sciences
University of Puerto Rico



Dr. Héctor Jiménez (date)
Director, Physics Dept.
University of Puerto Rico