**IceCube Institutional Memorandum Of Understanding (MOU)**

**Scope of Work**

 **Massachusetts Institute of Technology**

**Janet M. Conrad**

**Ph.D Scientists** (Faculty Scientist/Post Doc Grads): **2** (1 1 2)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Labor Cat.** | **Names** | **WBS Level 3** | **Tasks** | **WBS 2.1** | **WBS 2.2** | **WBS 2.3** | **WBS 2.4** | **WBS 2.5** | **Grand Total** |
| Program Management | Detector Maintenance & Operations | Computing & Data Management | Triggering & Filtering | Data Quality, Reconstruction & Simulation Tools |
| KE | Janet M. Conrad | Engineering and R&D support  | Test beam development | 0.05 |   |   |   |   | 0.05 |
|  | Engineering and R&D support | mTOM development | 0.05 |   |   |   |   | 0.05 |
|   | **Janet M. Conrad Total** |  | **0.10** |  |  |  |  | **0.10** |
| PO | Carlos Arguelles Delgado | Simulation programs | NuSQuIDS, NuSFGen, and MC reweighting development |   |  |   |   |  0.30 | 0.30 |
|   | **Postdoc Total** |  |  |  |  |  | **0.30** | **0.30** |
| GR | Gabriel H. Collin | Detector Calibration | Flasher code development |   | 0.10 |    |  |   | 0.10 |
|   |   | Simulation Programs | NuSQUIDs model update |   |   |   |  | 0.50  | 0.50 |
|   | **Gabriel H. Collin Total**  |  |  | **0.10** |  |  |  **0.50** | **0.60** |
| GR | Spencer Axani | Simulation Programs  | Earth & Atmos simulations for systematic error studies |    |  |  |  |  0.10 | 0.10 |
|  |  | Engineering and R&D Support  | mTOM development and expertise in CAD |  | 0.20 |  |  |  | 0.20 |
|   | **Spencer Axani Total**  |  |  | **0.20** |  |  | **0.10** | **0.30** |
| **Institution Name Total** |  | **0.10** | **0.30** | **0.0** | **0.0** | **0.90** | **1.30** |

**Faculty:**

Janet M. Conrad – Institution lead, M&O responsibilities in R&D (2.1.2) including proposing a FNAL testbeam run at to constrain particle simulations for IceCube and PINGU and studying isolated optical modules (IOMs) for PINGU.

**Scientists and Post Docs:**

Carlos Arguelles -- M&O responsibility is in maintaining and improving his simulation code for use in the 5 year IC86 analysis. Specific projects are 1) speeding up NuSQUiDS, 2) updating NuFSGen to represent the 5 year data set and 3) speeding up the analysis by improving the reweighting algorithm for MC events.

Analysis Topics: Bring the 1-year IC86 sterile neutrino analysis to publication, and start organizing the 5-year IC86 analysis. Develop the neutrino decay analysis. Begin outlining the NSI-using-TeV-neutrinos analysis.

**Grad Students:**

Spencer Axani – M&O responsibility is in Data Quality, Reconstruction and Simulation (2.5.1), presently concentrating on taking over the systematics error code from Ben Jones who has graduated. Simulation work focuses largely on the 1 to 100 TeV range of data. M&O responsibilities in R&D (2.1.2) consist of developing the mTOM prototypes.

Analysis Topic: IC86 sterile neutrino analysis using 5-year data set.

Gabriel Collin – M&O responsibility in detector maintenance and operations (2.2.8) TBD in coordination with Dawn Williams began June 1, 2015 and will continue through next summer. He is working on the single pe calibration of the DOMs. M&O responsibility in Data Quality, Reconstruction and Simulation (2.5.1.) is on 1) expanding the flux model of A. Fedynitch to include more atmospheric density data sets and 2) determining atmospheric systematics using errors on these data sets. Focus is in the 1-100 TeV range.

Analysis Topics: IC86 sterile analysis using 5-year data set and neutrino decay analysis.