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

**Pennsylvania State University**

**Doug Cowen**

**Ph.D Scientists** (Faculty Scientist/Post Doc Grads): **6** (3 3 2)

**Scope of Work**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Labor Cat.** | **Names** | **WBS L3** | **Tasks** | **Funds Source** | **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 | COWEN, DOUG | Administration | ExecCom member | Inst. In-Kind | 0.20 |  |  |  |  | **0.20** |
|  | Education & Outreach | Education & Outreach | Inst. In-Kind | 0.05 |  |  |  |  | **0.05** |
|  | Administration | PINGU Co-Lead | Inst. In-Kind | 0.25 |  |  |  |  | **0.25** |
|  | **COWEN, DOUG Total** | |  |  | **0.50** |  |  |  |  | **0.50** |
|  | DEYOUNG, TYCE | Education & Outreach | Education & Outreach | Inst. In-Kind | 0.05 |  |  |  |  | **0.05** |
|  | Physics Filters | Oscillations WG - Co Chair | Inst. In-Kind |  |  |  | 0.15 |  | **0.15** |
|  |  | Administration | Deputy Spokesperson | Inst. In-Kind | 0.20 |  |  |  |  | **0.20** |
|  | **DEYOUNG, TYCE Total** | |  |  | **0.25** |  |  | **0.15** |  | **040** |
| PO | KOSKINEN, JASON | Simulation Production | Simulation Production | Base Grants |  |  | 0.08 |  |  | **0.08** |  |
|  |  | Reconstruction/ Analysis tools | Coordinate reconstruction scripts for production | Base Grants |  |  |  |  | 0.10 | **0.10** |
|  |  | Detector Monitoring | Monitoring Shifts | Base Grants |  | 0.03 |  |  |  | **0.03** |
|  | **KOSKINEN, JASON Total** | |  |  |  | **0.03** | **0.08** |  | **0.10** | **0.21** |
|  | CLARK,  KEN | Computing Resources | Coordination and Support Grid distributed computing | NSF M&O Core |  |  | 0.25 |  |  | **0.25** |
|  |  | Simulation Production | Simulation Production | Base Grants |  |  | 0.08 |  |  | **0.08** |
|  |  | Reconstruction/ Analysis tools | Integrating the GENIE Monte Carlo software into IceCube software | Base Grants |  |  |  |  | 0.10 | **0.10** |
|  | **CLARK, KEN Total** | | | |  |  | **0.33** |  | **0.10** | **0.43** |
|  | TESIC, GORDANA | Reconstruction/ Analysis tools | Integrate IceCube into AMON | Inst. In-Kind |  |  |  |  | 0.50 | **0.50** |
|  | **TESIC, GORDANA Total** | | |  |  |  |  |  | 0.50 | **0.50** |
| GR | DUNKMAN, MATT | Reconstruction/ Analysis tools | develop starting track reconstruction - hybrid reco | Base Grants |  |  |  |  | 0.47 | **0.47** |
|  |  | Detector Monitoring | Monitoring Shifts | Base Grants |  | 0.03 |  |  |  | **0.03** |
|  | **DUNKMAN, MATT Total** | |  |  |  | **0.03** |  |  | **0.47** | **0.50** |
| **PSU Total** | |  |  |  | **0.75** | **0.06** | **0.42** | **0.15** | **1.17** | **2.55** |

**Summary:**

Penn State contributions to the maintenance and operations of IceCube include:

**Faculty:**

Doug Cowen (L,+) - ExecComm member, PINGU co-lead, outreach, 100% IceCube

Peter Mészáros - theory, 10% IceCube

Tyce DeYoung – Oscillations WG Co-Chair, outreach, 40% IceCube

**Scientists and Post Docs:**

Jason Koskinen –Low-En production L2/L3 scripts, and monitoring, 100% IceCube

*Reconstruction modules: DeepCoreVeto*

Ken Clark – (arrived on March 5, 2012) Responsibility for simprod, distributed computing, GENIE MC software maintenance, 100% IceCube

Gordana Tesic – (arriving Oct. 2012) Integrating IceCube into AMON, 50% IceCube (on internal PSU funds, not PSU base grant)

**Students:**

Matt Dunkman – Starting track reconstruction development, 100% IceCube

*Reconstruction modules: HybridReco*

Huang -

**Computing Resources:**

The Penn State IceCube group has access to several large computing clusters maintained and administered by the Penn State High Performance Computing group, comprising a total of approximately 8,000 computing cores, including several GPUs. Since September 2012, the Penn State group has had priority access to 260 cores. Our historical average utilization has been around 120% of the cores to which we have priority access, with peak usage levels around 600%.

With these clusters Penn State has contributed substantially to simulation production, including the entire collaboration-wide simulation of low energy neutrinos with GENIE, all PINGU simulations, and around 10% of all simprod jobs run collaboration-wide. Substantial amounts of reconstruction development work have also been conducted using these resources.

**Note:** The activities and staffing levels in this MoU are appropriate for the period beginning April 1, 2013.