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

**Scope of Work**

**South Dakota School of Mines and Technology**

**Xinhua Bai**

**Ph.D. Scientists** (Faculty Scientist/Post Doc Grads): **1** (1 0 1)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Labor Cat.** | **Names** | **WBS Level 3** | **Tasks** | **WBS 2.1** | **WBS 2.2** | **WBS 2.3** | **WBS 2.4** | **WBS 2.5** | **WBS 2.6** | **Grand Total** |
| Program Coordination | Detector Maintenance & Operations | Computing & Data Management  | Data Processing & Simulation  | Software | Calibration |
| KE | Xinhua Bai | 2.1.1 Administration | SDSMT Inst. Lead | 0.10 |  |  |  |  |  | 0.10 |
|  | 2.1.4 E&O | Education & Outreach for neutrino astronomy and IceCube | 0.08 |  |  |  |  |  | 0.08 |
|  | 2.2.4 Detector Monitoring | IceCube operation monitoring |  | 0.02 |  |  |  |  | 0.02 |
|  | 2.5.3 Reconstruction  | High energy cosmic rays, prompt muon, and muon bundle reconstruction basis and new methods  |  |  |  |  | 0.60 |  | 0.60 |
|  |  | 2.1.2 Engineering and R&D Support | Detector development and testing  | 0.20 |  |  |  |  |  | 0.20 |
|   | **Bai, Xinhua Total** |  | **0.38** | **0.02** |  |  | **0.60** |  | **1.00** |
| Post doc | To be hired | 2.4 Science analysis: Data processing and simulation  | For the proposed study of prompt muon in UHE cosmic rays and neutrino flavor study  |  |  |  |  |  |  |  |
|  |  | 2.4.2 Simulation production  | For the proposed study of prompt muon in UHE cosmic rays and neutrino flavor study  |  |  |  |  |  |  |  |
|  | 2.5.3 Reconstruction  | For the proposed study of prompt muon in UHE cosmic rays and neutrino flavor study  |  |  |  |  |  |  |  |
| **Scientist Total**  |  |  |  |  |  |  |  |  |
| GR | Emily Dvorak  | 2.4.2 Simulation production  | Filter/pre-processing MC and real data for the IceTop-InIce combined reconstruction tools development  |  |  |  | 0.15 |  |  | 0.15 |
|  | 2.5.3 Reconstruction  | IceTop-InIce combined reconstruction development and apply it to data analysis  |  |  |  |  | 0.85 |  | 0.85 |
| **Dvorak, Emily Total**  |  |  |  |  | **0.15** | **0.85** |  | **1.00** |
| **South Dakota School of Mines & Technology Total** | **0.18** | **0.02** |  | **0.15** | **1.45** |  | **1.80** |

**Note: Gen-2 contributions not relevant to IceCube M&O are highlighted in blue (Total: 0.20 FTE)**

**Faculty:** not funded

Xinhua Bai (100% effort) – Institution lead, study of new reconstruction techniques, mentoring the Ph.D. student and postdoc, education/outreach, improve high energy EAS energy and composition reconstruction, IceCube-Gen2 R&D.

**Postdoc:** not funded

He/she will measure prompt muon yield in ultra-high energy cosmic ray showers and study neutrino flavors with a new method based on the stochastic energy loss by muon bundles, which includes analysis tools development, simulation, data processing, and physics analysis.

**Grad Students:** Funded

Emily Dvorak (100% effort) –The two foci of her work are: (1) Continue on developing IceTop-InIce combined reconstruction tools; (2) Apply the new tolls in cosmic ray analysis. She will also serve on the IceCube software “Strike” team.