**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 | 0.05 |  |  |  |  |  | 0.05 |
|  | 2.1.4 E&O | Education & Outreach in SD/China for neutrino astronomy and IceCube | 0.05 |  |  |  |  |  | 0.05 |
|  | 2.5.3 Reconstruction  | High energy EAS and muon bundle reconstruction |  |  |  |  | 0.10 |  | 0.10 |
|   | **Bai, Xinhua Total** |  | **0.10** |  |  |  | **0.10** |  | **0.20** |
| GR | Emily Dvorak  | 2.2.4 Detector Monitoring | IceCube operation monitoring  |  | 0.02 |  |  |  |  | 0.02 |
|  | 2.4.2 Simulation production  | Filter or re-produce MC events for the IceTop and in-ice combined reconstruction tools development  |  |  |  | 0.10 |  |  | 0.10 |
|  | 2.5.3 Reconstruction  | Improve HE cosmic ray direction reconstruction resolution at higher energies: diagnosing and fixing  |  |  |  |  | 0.45 |  | 0.45 |
| **Dvorak, Emily Total**  |  |  | **0.02** |  | **0.10** | **0.45** |  | **0.57** |
| **South Dakota School of Mines & Technology Total** | **0.10** | **0.02** | **0.00** | **0.10** | **0.55** |  | **0.77** |

**Faculty:**

Xinhua Bai – institution lead, education & outreach, improve high energy EAS and muon bundle reconstruction, mentoring Ph.D. student

**Grad Students:**

Emily Dvorak (Ph.D. student) –The three foci of her work are: (1) To study the cause of the angular resolution problem in IceTop air shower reconstruction and find out a solution so that the angular resolution, after reaching its minimal value at tens of PeVs, does not degrade at higher energies up to EeV; (2) To develop software tools, jointly with researchers in the IceCube Cosmic-Ray Working Group, for the reconstruction of air shower events that trigger both the IceTop and in-ice array but with the shower core landing outside the IceTop array; (3) To search and measure prompt muon yield in high energy cosmic ray induced showers with a new method based on the stochastic energy loss by muon bundles.

Emily has passed the Ph.D. qualifying exam in August 2015. She is working 100% on IceCube starting from August 25, 2015. Support for the rest of her effort on IceCube currently comes from SD physics Ph.D. program.