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

**Scope of Work**

**RWTH Aachen**

**Christopher Wiebusch**

**Ph.D Scientists** (Faculty Scientist/Post Doc Grads Master): **2** (1 1 9 10)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Labor Cat.** | **Names** | **WBS L3** | **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 | WIEBUSCH, CHRISTOPHER | Administration | ExecCom member | 0.20 |  |  |  |  | 0.20 |
|  | Administration | PubCom member | 0.10 |  |  |  |  | 0.10 |
|   | **WIEBUSCH, CHRISTOPHER Total** |  | **0.30** |  |  |  |  | **0.30** |
|  | AUFFENBERG, JAN | Detector Calibration | IceAct coordination/Analysis |  | 0.30 |  |  |  | 0.30 |
| Engineering and R&D Support | Surface detectors Performance & Simulation **(Gen-2)** | 0.10  |  |  |  |  | 0.10 |
|   | **AUFFENBERG, JAN Total** | **0.10** | **0.30** |  |  |  | **0.40** |
| GR | HAACK, CHRISTIAN | Simulation Programs | Maintenance / Addition of seasons weights to nuflux module |  |  |  |  | 0.05 | 0.05 |
|  | Simulation Production | Simulation production on cluster/grid |  |  | 0.30  |  |  | 0.30 |
|  | Simulation Production | Simulation Tools **(Gen-2)** |  |  | 0.10 |  |  | 0.10 |
|  |  | Reconstruction/ Analysis tools | Diffuse fit tool |  |  |  |  | 0.20 | 0.20 |
|  | WALLRAFF, MARIUS | Reconstruction/ Analysis tools | nuCraft |  |  |  |  | 0.05 | 0.05 |
|   | VEHRING, MARKUS | Simulation Programs | CLSIM Hybrid maintenance |  |  |  |  | 0.05 | 0.05 |
|  |  | Simulation Production | IC-59 Simulation Production  |  |  | 0.10 |  |  | 0.10 |
|  | Leif, Rädel | Detector Calibration | IceAct data stream/commissioning |  | 0.20 |  |  |  | 0.20 |
|  |  | Physics Filters | L3 IC86-x muon data stream, Skripts & Monitoring |  |  |  | 0.20 |  | 0.20 |
|  | SCHOENEN, SEBASTIAN | Simulation Programs | KDE Tools KDE and multi-llh |  |  |  |  | 0.10 | 0.10 |
|  |  | Reconstruction/ Analysis tools | Diffuse fit tool |  |  |  |  | 0.10 | 0.10 |
|  | REIMAN, RENE | Simulation Production | AC-RZ GPU/CPU cluster maint. iceprod and mass production |  |  | 0.30 |  |  | 0.30 |
|  |  | Reconstruction/analysis tools | Point-source search methods |  |  |  |  | 0.10 | 0.10 |
|  | RONGEN, MARTIN | Detector Calibration | Hole Ice calibration |  | 0.20 |  |  |  | 0.20 |
|  | Detector Calibration | DOM Calibration and R&D |  | 0.10 |  |  |  | 0.10 |
|  | Detector Calibration | IceAct calibration |  | 0.10 |  |  |  | 0.10 |
|  | Detector Monitoring | Detector monitoring shifts |  | 0.05 |  |  |  | 0.05 |
|  | LEUERMANN, MARTIN | Reconstruction/ Analysis tools | PegLeg Reconstruction |  |  |  |  | 0.30 | 0.30 |
|  |  | Reconstruction/ Analysis tools | OscFit extension |  |  |  |  | 0.10 | 0.10 |
|  | GR | Detector Monitoring |  |  | 0.12 |  |  |  | 0.12 |
|  | **GR Total** |  |  | **0.00** | **0.77** | **0.80** | **0.20** | **1.05** | **2.82** |
|  | **RWTH Total:** |  |  | **0.40** | **1.07** | **0.80** | **0.20** | **1.05** | **3.52** |

**Diplom/Master Students M&O Contribution:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Labor Cat.** | **Names** | **WBS L3** | **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 |
| Master | Bengt Hansmann | Simulation Production | IceAct Simulation |  |  | 0.05 |  |  |  |
| Stefan Wickmann | Engineering and R&D Support | Development acoustic positioning sensors(Gen2) |  | 0.20 |  |  |  |  |
| Richard Konietz | Engineering and R&D Support |  InIce Geometry Optimisation (Gen-2) |  |  |  |  | 0.05 |  |
| Tim Hansmann | Reconstruction/ Analysis tools | Surface veto Simulation (Gen-2) |  |  |  |  | 0.05 |  |
| Merlin Schaufel | Engineering and R&D Support | IceAct DAQ |  |  |  | 0.05 |  |  |
|  | Jöran Stettner |  | DM profile for diffuse fit |  |  |  |  | 0.05 |  |
|  | **Diploma/Master Students Total** |  |  | **0.20** | **0.05** | **0.05** |  | **0.50** |

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

**Faculty:**

Christopher Wiebusch

**Scientists and Post Docs:**

Jan Auffenberg - High energy surface extension, (IceVeto, IceAct).

**Ph.D. Students:**

Marius Wallraff Thesis topic: Sterile neutrinos

Markus Vehring Thesis topic: Atm. Neutrino oscillations

Larissa Paul Thesis topic RASTA

Leif Rädel Thesis topic: Multi year diffuse muon neutrino analysis

Sebastian Schönen Mag.Monopole Thesis topic: Multi year muon neutrino diffuse analysis

Rene Reimann Multipole analysis, Thesis topic : Cosmic neutrino sources

Martin Leuermann Ang.Korrelation, Thesis topic: Neutrino mass hierarchy analysis with DeepCore

Martin Rongen IceCube Gen2 R&D, Thesis Topic: Gen 2 DOMs

Christian Haack IceCube-gen2. Thesis Topic: Cosmic neutrino sources, Galactic Plane

**Diploma/Master Students**

Stefan Wickmann Acoustic transducers for Gen 2 doms

Lisa Schumacher Angular correlation analysis

Richard Konietz Gen-2 Simulations

Jacob Leuner Gen-2 Simulations

Bengt Hansmann IceAct Simulations

Tim Hansmann IceVeto Simulations

Oemer Penek Cherenkov light yield

Jöran Stettner Large scale diffuse fit for dark matter

Eric Vogel Point source fits

Theo Glauch Angular correlation analysis

**Computing Resources**

|  |  |  |
| --- | --- | --- |
|  | **2016** | **2017** |
|  | **CPU Cores**  | **GPU Cards** | **CPU Cores** | **GPU Cards** |
| **IceCube**  | ~27700 (shared resources, guaranteed 0.3% usage) | 58 (shared resources, 50% usage) | ~27700 (shared resources) | 58 (shared resources) |
| **PINGU** | --- | --- | --- | --- |
| **Gen2**  | Same as for IceCube | Same as for IceCube | Same as for IceCube | Same as for IceCube |

GPU Cards: Bullx R425-E2, 2 x NVIDIA Quadro 6000, CPU: X5650 @ 2.67 GHz

CPU Cores: X5675 @ 3.0GHz and X7550 @ 2.0GHz