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

**Universität Mainz**

**Lutz Köpke/Sebastian Böser/Peter Peiffer**

**Ph.D Scientists** (Faculty Scientist/Post Doc Grads): **3** (2 1 8)

**Scope of Work**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Labor Cat.** | **Names** | | **WBS L3** | **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 | Köpke, Lutz | | Administration | SN WG chair | |  | 0.25 |  |  |  |  | 0.25 |
|  | **Köpke, Lutz Total** | | |  | |  | **0.25** |  |  |  |  | **0.25** |
|  | BÖSER, SEBASTIAN | | Administration | LE/osc WG co-chair | |  | 0.25 |  |  |  |  | 0.25 |
|  | **BÖSER; SEBASTIAN Total** | | |  | |  | **0.25** |  |  |  |  | **0.25** |
| GR | EHRHARD, THOMAS | | Software | PISA | |  |  |  |  | 0.25 |  | 0.25 |
|  | **EHRHARD, THOMAS Total** | | | | |  |  |  |  |  |  | **0.25** |
|  | KRUECKL, GERALD | | Detector Monitoring | | Moni 2.0, monitoring websites |  | 0.20 |  |  |  |  | 0.20 |
|  | **KRÜCKL, GERALD** | | | | |  | **0.20** |  |  |  |  | **0.20** |
|  | STEUER, ANNA | | Online Filter (Pnf) | HESE filter /Hitspooling | |  | 0.30 |  |  |  |  | 0.30 |
|  | **STEUER, ANNA Total** | | |  | |  | **0.30** |  |  |  |  | **0.30** |
|  | SANDROOS, JOAKIM | | Online Filter (Pnf) | DeepCore filter /HiveSplitter | |  | 0.20 |  |  |  |  | 0.20 |
|  | **SANDROOS, JOAKIM Total** | | |  | |  | **0.20** |  |  |  |  | **0.20** |
|  | MOMENTE, GIULIO | | Detector Monitoring | | SuperNova Operations |  | 0.50 |  |  |  |  | 0.50 |
|  | **MOMENTE, GIULIO Total** | | | | |  | **0.50** |  |  |  |  | **0.50** |
|  | UM GR | Detector Monitoring | | Detector Monitoring | |  | 0.05 |  |  |  |  | 0.05 |  |
|  | UM PD | Detector Monitoring | | Detector Monitoring | |  | 0.05 |  |  |  |  | 0.05 |  |
|  | **UM Monitoring Total** | | |  | |  | **0.10** |  |  |  |  | **0.10** |
|  | **UM GR** | E&O | | I3 virtual reality | | 0.25 |  |  |  |  |  | 0.25 |
|  | **UM Education and Outreach total** | | |  | | **0.25** |  |  |  |  |  | **0.25** |
| **UM Total** | | |  |  | | **0.25** | **2.05** |  |  |  |  | **2.30** |

**Gen-2 tasks:**

|  |  |  |
| --- | --- | --- |
| **Name** | **Task** | **FTE** |
| Peter Peiffer | WOM development | 0.8 |
| Sebastian Böser | WOM development | 0.2 |
| Lutz Köpke | WOM development | 0.05 |

**Faculty:**

Lutz Köpke – SN working group coordinator

Sebastian Böser – LowEn/Oscillation working group coordinator

**Postdoc:**

Peter Peiffer – IceCube Gen2 (WOM development)

**Ph.D. Students:**

Volker Baum – SN DAQ

Thesis/Analysis topics: Search for Low-Energy GRBs

Benjamin Eberhardt – SN DAQ

Thesis/Analysis topics: SN Position and Energy

Anna Steuer – HESE filter /Hitspooling

Thesis/Analysis topic:

Gerald Krückl - SN SNEWS monitoring and Moni-2

Thesis/Analysis topic: Starting upgoing events in IceCube

Giulio Momente - SNDAQ development

Thesis/Analysis topic: Search for hidden supernovae

Thomas Ehrhard - PISA development

Thesis/Analysis topic: Sensitivity to the mass hierarchy of the PINGU

detector

Joakim Sandroos - Neutrino cross section systematics, low energy filter

Thesis/Analysis topic: Measurement of the atmospheric neutrino flux

with DeepCore

Vincenzo Di Lorenzo- Gen2 R&D Hardware Development

Thesis/Analysis topic: Development of the Wavelength shifting optical module

**Diploma/Master Students:**

Elisa Lohfink Muon-induced spallation in DeepCore/PINGU/MICA

David Kappesser Neutrino-Antineutrino flux ratio using starting track events

Maike Lauf Neutrino mass limits from extragalactic supernovae in MICA

Alexander Fritz Combined analysis of gravitational wave and IceCube neutrino data

**Computing Resources**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **2017** | | **2018** | |
|  | CPU Cores | GPU Cards | CPU Cores | GPU Cards |
| **IceCube** | Minimal: 24  Typical: 300 Maximal:10000 |  | Cluster upgrade  expectation:  ~ 1000 Cores for IceCube-Gen2 | Cluster upgrade  expectation:  ~ 300 GPUs for IceCube-Gen2 |
| **PINGU** |  | Minimal: 8  Typical: 20  Maximal: 85 |
| **HEA** |  |  |

While the resources exclusively allocated for IceCube are small, a very large pool of shared resources can and are being used, mostly for IceCube analysis (CPUs) and PINGU analysis (GPUs). With the coming upgrade of the computing cluster (Mogon-II), a significant increase in resources (both dedicated to IceCube as well as shared) is expected.

Currently available GPU types:

* GTX680
* GTX Titan
* Tesla K20
* GTX480

Currently available CPU types

* Intel Xeon E5-2620
* Intel Xeon 5530