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

**Scope of Work**

**DESY-Zeuthen**

**Markus Ackermann (PI)**

**Ph.D Scientists** (Faculty (incl. retired) Scientist/Post Doc Grads): **10** (5 5 10)

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| **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 | KOWALSKI, MAREK | | Administration | ExecCom member | | 0.10 |  |  |  |  |  | 0.10 |
| **KOWALSKI, MAREK total** | | | | | **0.10** |  |  |  |  |  | **0.10** |
| ACKERMANN, MARKUS | | Administration | PubCom chair | | 0.25 |  |  |  |  |  | 0.25 |
| Central Computing Resources | DESY TIER-1 coordination | |  |  | 0.10 |  |  |  | 0.10 |
|  | | Administration | ExecCom member | | 0.1 |  |  |  |  |  | 0.10 |
| **ACKERMANN, MARKUS Total** | | | | | **0.35** |  | **0.10** |  |  |  | **0.45** |
| KARG, TIMO | | Engineering and R&D Support | Surface electronics, Optical detector R&D. | | 0.20 |  |  |  |  |  | 0.10 |
| Online Filter (PNF) | TFT Board Member | |  | 0.10 |  |  |  |  | 0.10 |
|  | **KARG, TIMO** **Total** | |  |  | | **0.20** | **0.10** |  |  |  |  | **0.30** |
|  | FRANCKOWIAK, ANNA | | Real-time Alerts | Realtime oversight committee member | |  | 0.10 |  |  |  |  | 0.10 |
|  | **FRANCKOWIAK, ANNA Total** | | |  | |  | **0.10** |  |  |  |  | **0.10** |
| SC | BLOT, SUMMER | | Detector Calibration | Calibration co-chair | |  |  |  |  |  | 0.30 | 0.30 |
|  |  | | Administration | Member of ICC | | 0.1 |  |  |  |  |  | 0.10 |
|  | **BLOT, SUMMER Total** | | | | | **0.1** |  |  |  |  | **0.30** | **0.40** |
|  | VAN SANTEN, JAKOB | | Administration | Member of ICC | | 0.1 |  |  |  |  |  | 0.10 |
|  |  | | Simulation Soft­ware | Software package maintenance | |  |  |  |  | 0.20 |  | 0.20 |
|  |  | | Online Filter (PNF) | Cascade WG co-chair | |  | 0.25 |  |  |  |  | 0.25 |
|  | **VAN SANTEN, JAKOB Total** | | | | | **0.10** | **0.25** |  |  | **0.20** |  | **0.55** |
|  | MA, WING YAN | Reconstruction | | | Low-energy reconstruction (incl. new sensor designs) | 0.1 |  |  |  |  |  | 0.1 |
|  | **MA, WING YAN Total** | | | | | **0.1** |  |  |  |  |  | **0.1** |
|  | RAUCH, LUDWIG | | Real-time Alerts | Optical follow-up program maintenance | |  | 0.1 |  |  |  |  | 0.1 |
|  | **RAUCH, LUDWIG Total** | | | | |  | **0.1** |  |  |  |  | **0.1** |
|  | DESY SC | | Detector Monitoring | Detector Monitoring | |  | 0.05 |  |  |  |  | 0.05 |
|  | **DESY SC** **Total** | | |  | | **0.3** | **0.40** |  |  | **0.2** | **0.3** | **1.20** |

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| GR | KINTSCHER, THOMAS | Real-time Alerts | Online data stream maintenance |  | 0.10 |  |  |  |  | 0.10 |
| Education and Outreach | Organization of IceCube master classes at DESY | 0.1 |  |  |  |  |  | 0.1 |
| HUBER, THOMAS | Engineering and R&D Support | Surface detectors | 0.5 |  |  |  |  |  | 0.50 |
| BRADASCIO, FEDERICA | Reconstruction | Spline MPE improvements |  |  |  |  | 0.2 |  | 0.20 |
| STEIN, ROBERT | Reconstruction | Collaboration toolkit for stacking analysis |  | 0.2 |  |  |  |  | 0.20 |
|  | STACHURSKA, JULIANA | Education and Outreach | Organization of IceCube master classes at DESY | 0.1 |  |  |  |  |  | 0.1 |
|  | DESY GR | Detector Monitoring | Detector Monitoring |  | 0.12 |  |  |  |  | 0.12 |
|  | **DESY GR Total** | |  | **0.7** | **0.42** |  |  | **0.2** |  | **1.32** |
| TE | DESY IT | Central Computing Resources | European Data Center -Distributed Computing, Labor |  |  | 1.00 |  |  |  | 1.00 |
|  | **DESY IT Total** | |  |  |  | **1.00** |  |  |  | **1.00** |
| **DESY Total** | |  |  | **1.55** | **0.82** | **1.10** |  | **0.70** | **0.30** | **4.47** |

**Faculty:**

Marek Kowalski – DESY Group lead, neutrino oscillations, high-energy neutrinos from SNe (counted under Humboldt MoU)

Markus Ackermann – Properties and origin of cosmic neutrinos

Elisa Bernardini – Gamma-ray follow-up of neutrino transients

Anna Franckowiak – Neutrino transients, multi-wavelength follow-up programs

Timo Karg – Cosmic ray physics, optical module and surface detector R&D

**Retired Faculty:**

Christian Spiering – GNN board member (honorary member, no M&O fee)

Hermann Kolanoski – Cosmic ray physics (honorary member, no M&O fee)

**Scientists and Post Docs:**

Summer Blot – Deep Core/Neutrino oscillation

Analysis topics: Constraints on oscillation parameters

Ma, Wing Yan – Deep Core/IceCube upgrade

Analysis topics: Low-energy reconstruction

Jakob van Santen – Simulation production, Software maintenance

Analysis topics: Neutrinos from SNe

Konstancja Satalecka – IceCube / MAGIC joint science

Analysis topics: TBD

Ludwig Rauch – Optical follow-up with ZTF

Analysis topics: Observations with ZTF and IceCube

**Ph.D. Students:**

Federica Bradascio – Origin of astrophysical neutrinos

Thesis/analysis topics: Correlation searches for neutrinos from AGN

Thomas Kintscher – Gamma-ray follow-up program, transient neutrino sources.

Thesis/analysis topics: Search for coincidences between neutrino and gamma-ray transients

Juliana Stachurska – Identification of tau neutrinos, Neutrino spectrum and flavor fits

Thesis/Analysis topics: Flavor ratio constraints from tau neutrino identification

Robert Stein – Neutrinos from SNe

Thesis/Analysis topics: Search for high-energy neutrinos from a sample of SNe

Nora Linn Strotjohann - Neutrino transients

Thesis/Analysis topics: Multiwavelength searches for counterparts of neutrino transients

Andrii Terliyuk – Fundamental neutrino properties

Thesis/Analysis topics: Sterile neutrinos with DeepCore

Marcel Usner – Identification of tau neutrinos

Thesis/Analysis topics: Tau neutrino identification in high-energy starting events

Brostean-Kaiser Jannes – Optical sensor R&D, calibration

Thesis/Analysis topics: Probe for SPICE hole to measure UV optical properties

Huber Thomas – Scintillator prototypes for IceTop

Thesis/Analysis topics: Development of a prototype scintillator station for IceTop

Garappa Simone – Neutrino transients

Thesis/Analysis topics: Correlation of neutrinos with Fermi LAT sources