

**IceCube Neutrino Observatory
Maintenance & Operations
Common Fund Status Report**

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Introduction

The IceCube M&O Common Fund was created in April 2007, the start of formal operations, to enable collaborating institutions to contribute to the costs of maintaining the computing hardware and software required to manage experimental data prior to processing for analysis. Each institution contributes to the Common Fund based on the total number of the institution's Ph.D. authors.

The Collaboration updates the Ph.D. author count twice a year at the collaboration meetings in conjunction with the update to the IceCube M&O Scope Of Work and responsibilities in the Institutional Memorandum of Understanding. Effective April 1, 2010, the annual established rate per Ph.D. author is \$13,650.

The M&O activities identified as appropriate for support from the Common Fund are those core activities that are agreed to be of common necessity for reliable operation of the IceCube detector and computing infrastructure. The activities directly support the functions of winterover technical support at the South Pole, hardware and software systems for acquiring and filtering data at the South Pole, hardware and software systems for transmitting data via satellite and tape to the UW data center, systems for archiving the data in the central data warehouse at UW and UW Data Center Operations as listed in the Cooperative Agreement with NSF.

Section I: Initial Three Years of M&O Common Fund

Common Fund Contributions

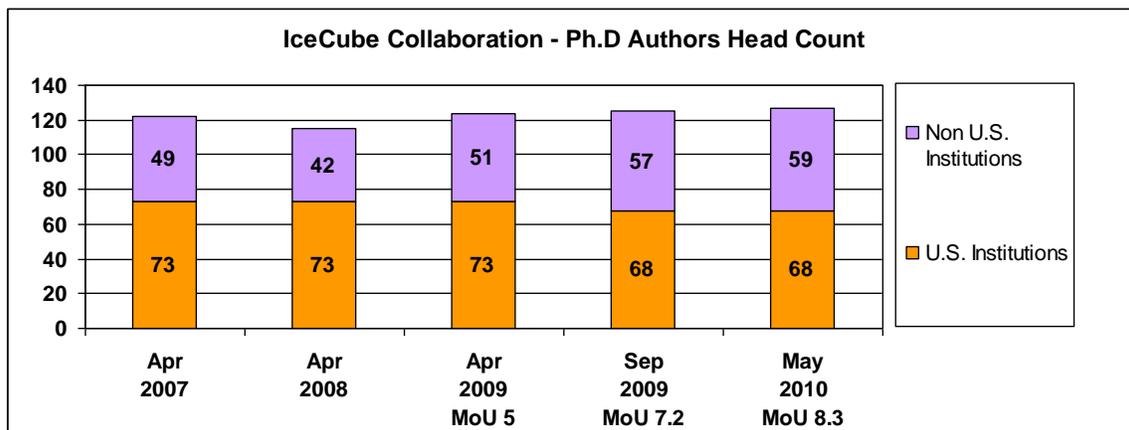
The following table summarizes the Common Fund (CF) contributions for the first three years of IceCube Maintenance and Operations:

**Table 1. Planned and Actual CF Contributions (\$000)
For the Initial Three Years of M&O – April 2007 - March 2010**

	PhD. authors Apr. '07	Year1 2007 Planned	PhD. authors Apr. '08	Year2 2008 Planned	PhD. authors Apr. '09	Year3 2009 Planned
Total CF Planned	122	\$1,110	115	\$1,046	124	\$1,128
U.S. Contribution	73	\$664	73	\$664	73	\$664
Non-U.S. Contribution	49	\$446	42	\$382	51	\$464
		Actual		Actual		Actual
Total CF Contributions		\$1,110		\$1,046		\$1,128
U.S. Cash Transfer		\$664		\$664		\$664
Non-U.S. Cash Transfer		\$360		\$343		\$426
Non-U.S. In-Kind		\$86		\$39		\$38
Balance		\$0		\$0		\$0

All expected contributions for the initial three years of IceCube M&O were fulfilled.

The following bar chart presents the Ph.D. authors head count profile over the initial three years of IceCube M&O. The total number of Ph.D. authors has increased from 122 in April 2007 to 127 in May 2010 (U.S. decreased from 73 to 68 while Non U.S. increased from 49 to 59).



**Figure 1: Ph.D. Authors Head Count Profile
for the Initial Three Years of M&O**

Section II: Years 4-6 of M&O Common Fund

Common Fund Contributions

The actual contribution during these years of IceCube operations is larger than in preceding years primarily due to the 50% increase to the Ph.D. author fee. The following table summarizes the planned vs. actual received contribution in 2010-2012.

**Table 2. Planned and Actual CF Contributions (\$000)
For Years 4-6 of M&O, April 1st, 2010 – March 31st, 2013**

	PhD. authors May '10	Year4 2010 Planned	PhD. authors Apr. '11	Year5 2011 Planned	PhD. authors Mar. '12	Year6 2012 Planned
Total CF Planned	127	\$1,734	126	\$1,720	124	\$1,693
U.S. Contribution	68	\$928	69	\$942	67	\$915
Non-U.S. Contribution	59	\$805	57	\$778	57	\$778
		Actual		Actual		Actual
Total CF Contributions		\$1,726		\$1,723		\$1,626
U.S. Cash Transfer		\$928		\$942		\$915
Non-U.S. Cash Transfer		\$744		\$733		\$636
Non-U.S. In-Kind		\$54		\$47		\$75
Difference (Planned - Actual)		\$8		\$3		\$67

Actual Common Fund contributions were \$8k less than planned in 2010 and \$3k higher in 2011, and are currently \$67k less in 2012. The final 2012 contributions are underway, and it is anticipated that all of the planned contributions will be fulfilled. The following bar chart presents the Ph.D. authors head count profile since the beginning of IceCube M&O.

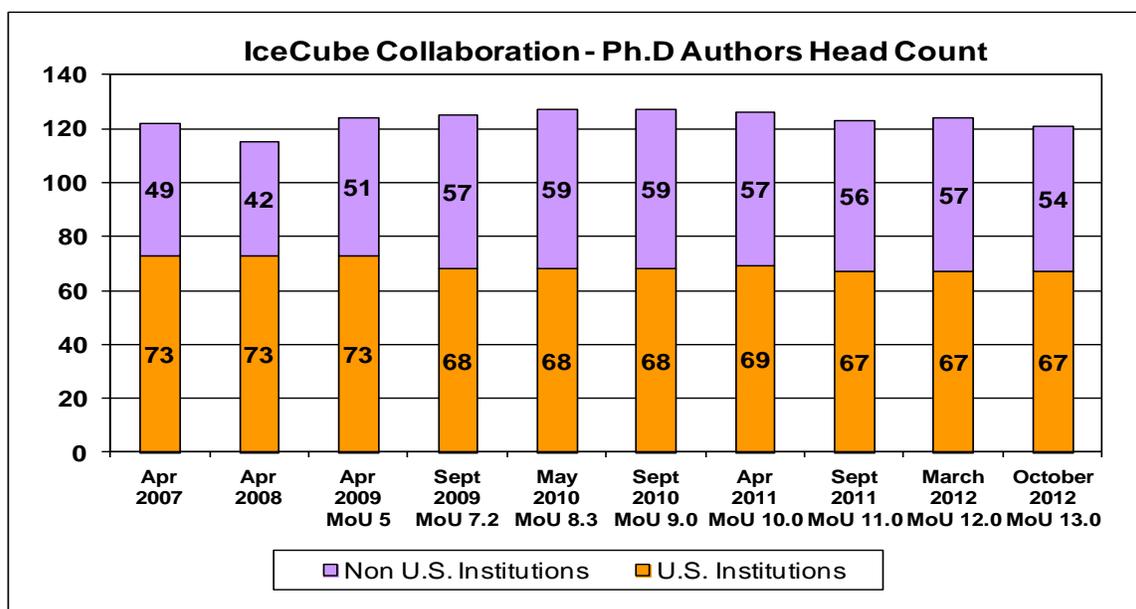


Figure 2: Ph.D. Authors Head Count Profile as of October 2012

The following table provides a more detailed breakdown of the authors head count including faculty, scientists and postdocs, and Ph.D. students.

**Table 3. IceCube Collaboration – Authors Head Count
Based on Institutional MoUs-SOW v13.1 (October 2012)**

	Total Ph.D. Authors	Faculty	Scientists / Post Docs	Ph.D. Students
U.S. Institutions Subtotal	67	35	32	28
Non-U.S. Institutions Subtotal	54	33	21	71
Total U.S. & Non-U.S.	121	68	53	99

IceCube M&O Computing Infrastructure Upgrade - 2011/2012

The following list includes the major purchases for the 2011/2012 upgrades of the South Pole System (SPS), South Pole Test System (SPTS), UW Data Center, UW Data Warehouse and networking equipment that are funded by IceCube M&O Common Fund and final investments of IceCube MREFC Pre-Operations.

Table 4: Computing Infrastructure Upgrade - 2011/2012

System Upgrade	Item	Vendor	Description	Cost Category	Total
South Pole System	Networking	Cores BTS	48 qty CISCO 3750-X 24 Port Switches	Capital Equipment	\$146k
			22 qty CATALYST 3K-X 10G network modules	Capital Equipment	\$26k
			8 qty 10G BASE-LR SFP module	Capital Equipment	\$20k
	Servers	Dell	2 qty Powervault MD3200I RKMNT; 3 qty Poweredge R710 24 GB dual XEON X5670, 8 Qty single channel ultra 320 SCSI	Capital Equipment	\$30k
			2 qty Service for Powervault MD3200I; 3 qty Service for Poweredge R710	Service Agreements	\$11k
	Tapes	Dell	50 qty LTO-4 20 Pack Barcode Media	M&S	\$34k
South Pole System Total					\$268k
South Pole Test System	Servers	Dell	2 qty Powervault MD3200I; 1 qty Poweredge 4322DS; 1 qty console	Capital Equipment	\$24k
			2 qty Service for Powervault MD3200I	Service Agreements	\$8k
	Storage	Dell	36 qty 4GB DELL memory for R710; 40 qty USB2 virtual media card	Capital Equipment	\$12k
South Pole Test System Total					\$44k
Data Warehouse	Servers	Dell	9 qty Poweredge R510	Capital Equipment	\$49k
			9 qty Service for Poweredge R510	Service Agreements	\$13k
	Storage	Transource	336 qty Modular 3TB SATA 7.2K RPM HDD for dense expansion2	Capital Equipment	\$351k
			7 qty DF-F800 AMS2000 high density storage expansion unit	Capital Equipment	\$81k
			8 qty DF-F800 module; 1 qty HDF800 chassis; 4 qty DF-F800 interface adapter; 1 qty storage navigator	Capital Equipment	\$31k
			288 qty AMS 2000 installation service premium upgrade	Service Agreements	\$50k
			36 qty Dynamic Provisioning License	Licenses	\$2k
		Dell	1 qty GB-7007 google search appliance; 10 qty 10 GBPS dual port FCOE/ISCSI	Capital Equipment	\$58k
Data Warehouse Total					\$636k

System Upgrade	Item	Vendor	Description	Cost Category	Total
Networking Equipment	Networking	Cores BTS	1 qty 8X5XNBD Smartnet Maintenance; 1 qty 24X7X4 Smartnet Maintenance	Service Agreements	\$34k
			55 qty 10GBASE-CU SFP+ cable; 5 qty active twinax cable assembly	Capital Equipment	\$8k
		HP	17 qty HP R5500 VA extended runtime module	M&S	\$18k
		Dell	6 qty Powerconnect B-8000 10GBE Twinax	Capital Equipment	\$9k
		MNJ Tech	4 qty AXIOM SFP-10G+ transceiver; 3 qty 10 GB XENPAK module SMF for Cisco network	Capital Equipment	\$5k
Networking Equipment Total					\$75k
UW Data Center	Software	Dell	8 qty data/media agent for Linux server; 1 qty commserve master server; 1 qty consolidated client per host; 1 qty MS SQL database	Capital Equipment	\$21k
			Std. maintenance of: 24 qty data/media agent for Linux server; 3 qty commserve master server; 3 qty consolidated client per host;	Service Agreements	\$19k
			21 qty Std. maintenance shared storage option	Service Agreements	\$17k
			7 qty shared storage option WIRJ intelligent dynamic drive sharing	Capital Equipment	\$17k
			5 qty unit of instructor-led training	Services	\$7k
	Networking	NETech Corporation	4 qty Cisco MDS 9148 with 32 ports enabled	Capital Equipment	\$45k
		Dell	10 qty 10 GBPS PCIE X8 dual port FCOE/ISCSI	Capital Equipment	\$10k
	Servers	Dell	48 qty PowerEdge M620 Blade Servers	Capital Equipment	\$244k
			6 qty PowerEdge C6145 Chassis w/ 2 System Boards	Capital Equipment	\$95k
			48 qty NVIDIA M2070 PCIe x16 GPGPU Card	Capital Equipment	\$90k
			6 qty PowerEdge R620 Comp System	Capital Equipment	\$37k
			3 qty Blade Servers Enclosures	Capital Equipment	\$18k
			3 Qty PowerEdge R610, 2x Xeon E5649; 10 qty Brocade 1020 Dal port 10GE CAN	Capital Equipment	\$17k
			3 qty PowerEdge C410x, PCIe Expansion Chassis	Capital Equipment	\$12k
			6 qty DELL Powerededge R610 servers; 6 qty dual in-line memory module	Capital Equipment	\$20k
6 qty service for R610 server			Service Agreements	\$10k	
12 qty Host Interface Controller; 1 infiniscale iv qdr infiniband switch	Capital Equipment	\$16k			
Storage	Dell	2 qty DELL/EqualLogic PS6100XV 14.4TB SAS Array	Capital Equipment	\$64k	
UW Data Center Total					\$759k
Total					\$1,781k