

**IceCube Neutrino Observatory  
Maintenance & Operations  
Common Fund Status Report and 2011 plans**

**Adi Peles, Resource Coordinator**

**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.

**Section I: Initial 3 years of M&O Common Fund**

**Common Fund Contributions**

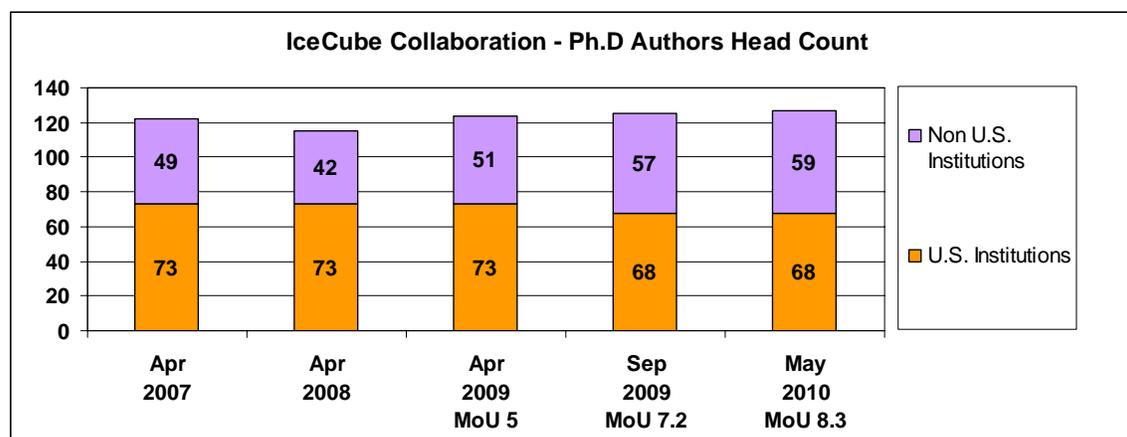
The following table summarizes the Common Fund (CF) contributions for the first three years of IceCube Maintenance and Operations:

**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
<b>Total CF Planned</b>	<b>122</b>	<b>\$1,110</b>	<b>115</b>	<b>\$1,046</b>	<b>124</b>	<b>\$1,128</b>
U.S. Contribution	73	\$664	73	\$664	73	\$664
Non-U.S. Contribution	49	\$446	42	\$382	51	\$464
		Actual		Actual		Actual
<b>Total CF Contributions</b>		<b>\$1,110</b>		<b>\$1,046</b>		<b>\$1,128</b>
U.S. Cash Transfer		\$664		\$664		\$664
Non-U.S. Cash Transfer		\$360		\$343		\$426
Non-U.S. In-Kind		\$86		\$39		\$38
<b>Balance</b>		<b>\$0</b>		<b>\$0</b>		<b>\$0</b>

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

The following bar chart presents the Ph.D. Authors headcount 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 Headcount Profile  
For the Initial Three Years of M&O**

### Common Fund Expenditures

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 winter over technical support at 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.

The Common Fund expenditures are divided into two categories: U.S. Common Fund and Non-U.S. Common Fund. The cumulative status of funding available and expenditures is provided in the following table:

**Table 2. Status of Common Fund Expenditures (\$000)  
For the Initial Three Years of M&O – April 2007 - June 2010**

	U.S. Common Fund	Non-U.S. Common Fund
Funds Available	\$1,993	\$1,129
Expenditures	\$1,897	\$1,003
Balance	\$96	\$126

A detailed list of the Common Fund expenditures under both U.S. and Non U.S. accounts, for the period of April 1, 2007 – June 30, 2010, is included in *Attachment 1*.

## Section II: Year 4 and 5 of M&O Common Funds and Expenditures

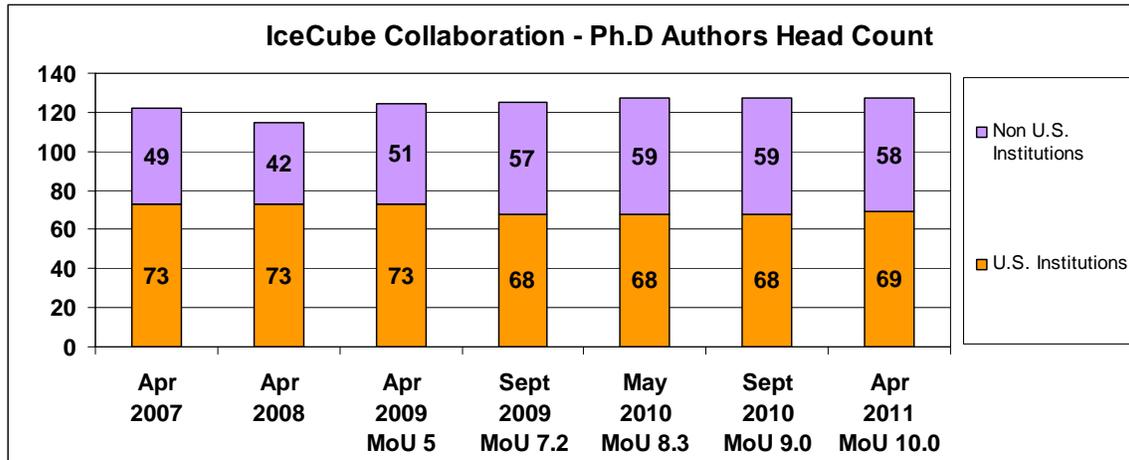
### Common Fund Contributions

The actual contribution during the fourth year of IceCube operations is larger than in preceding years primarily due to the 50% increase to the annual rate per each Ph.D. author. The following table summarizes the Planned vs. Actual received contribution in 2010 and the anticipated contribution in 2011.

**Table 3. Planned and Actual CF Contributions (\$000)  
For Years 4-6 of M&O, April 1<sup>st</sup>, 2010 – March 31<sup>st</sup>, 2013**

	PhD. authors May '10	Year4 2010 Planned	PhD. authors Apr. '11	Year5 2011 Planned	PhD. authors Apr. '12	Year6 2012 Planned
<b>Total CF Planned</b>	127	\$1,734	127	\$1,734		
U.S. Contribution	68	\$928	69	\$942		
Non-U.S. Contribution	59	\$805	58	\$792		
		<b>Actual</b>		<b>Actual</b>		<b>Actual</b>
<b>Total CF Contributions</b>		\$1,726				
U.S. Cash Transfer		\$928				
Non-U.S. Cash Transfer		\$744				
Non-U.S. In-Kind		\$54				
<b>Balance</b>		<b>-\$6</b>				

Actual Common Fund contribution for 2010 is only \$6k less than planned. Invoices for 2011 were recently submitted. The following bar chart presents the Ph.D. Authors headcount profile since the beginning of IceCube M&O. No major changes over the last 18 months.



**Figure 2: Ph.D. Authors Headcount Profile  
Since the beginning of IceCube M&O**

The following table provides a more detailed breakdown of the authors' headcount including Faculty, Scientists and Postdocs, and Ph.D. Students.

**Table 4. IceCube Collaboration – Authors Head Count  
Based on Institutional MoUs-SOW v10.0 (April 2011)**

	<b>Total Ph.D. Authors</b>	<b>Faculty</b>	<b>Scientists / Post Docs</b>	<b>PhD. Students</b>
U.S. Institutions Subtotal	<b>69</b>	35	34	28
Non-U.S. Institutions Subtotal	<b>58</b>	35	23	52
<b>Total U.S. &amp; Non-U.S.</b>	<b>127</b>	<b>70</b>	<b>57</b>	<b>80</b>

### **IceCube M&O Computing Infrastructure Upgrade - 2010/2011**

A list of major purchases for the 2010/2011 South Pole System (SPS) upgrade and for the 2011 UW Data Center and network upgrade is provided in *Attachment 2*. This upgrade is funded by both M&O Common Fund and MREFC Pre-Operations.

## Attachment 1: Initial three years of M&O - Common Fund Expenditures

### U.S. Common Fund Expenditures through June 30, 2010

Category	Line Description	Vendor	Quantity	Amount
Equipment	SUN X2270-H1-AA	SUN MICROSYSTEMS	50	\$186,689
	HP PROLIANT DL380	HEWLETT PACKARD	11	\$53,439
	PROMISE ARRAY PACKAGE	CAMBRIDGE COMPUTING	1	\$11,160
	HP 300-330GB 10-15K ULTRA	HEWLETT PACKARD	17	\$9,466
	HP LTO-4 ULTARIUM 1.6 TB	HEWLETT PACKARD	2	\$5,000
	HP OTHER	HEWLETT PACKARD	11	\$4,498
	OTHER EQUIPMENT	OTHER VENDORS	1	\$3,099
<b>Equipment Total</b>				<b>\$273,351</b>
Computers Supplies	HP ULTRIUM 800 GB	HEWLETT PACKARD	61	\$62,540
	HP LTO-4 ULTARIUM 1.6 TB	HEWLETT PACKARD	27	\$39,214
	LTO-3 400GB/800GB - tape media	CAMBRIDGE COMPUTING	700	\$38,096
	POWER & COOLING	5NINES DATA, LLC	1	\$30,982
	HP R5500 VA SYSTEMS	HEWLETT PACKARD	4	\$13,843
	HP MANAGEMENT CARD	HEWLETT PACKARD	37	\$9,632
	SYS. 2801CT CONFIGURED T400S	LENOVO DIRECT	2	\$5,054
	IRIDIUM MODEM	NAL RESEARCH	4	\$3,719
	HP OTHER	HEWLETT PACKARD	21	\$6,187
	OTHER SUPPLIES	OTHER VENDORS	1	\$9,468
<b>Computers Supplies Total</b>				<b>\$218,734</b>
Wages	WINTER OVERS, SPS and SPTS SUPPORT	UW – Madison	1	\$1,215,632
<b>WAGES Total</b>				<b>\$1,215,632</b>
Service Agreement	CISCO SMARTNET MAINTENANCE	INACOM INFORMATION	1	\$73,461
	CISCO SMARTNET ANNUAL MAINTENA	CORES BTS INC	1	\$37,760
	AEMPO BASIC SOFTWARE RENEWAL	CAMBRIDGE COMPUTING	3	\$25,059
	SPECTRA LOGIC SUPPORT RENEWAL	CAMBRIDGE COMPUTING	1	\$19,958
	HP R5500 VA SYSTEMS	HEWLETT PACKARD	10	\$10,511
	OTHER SERVICE	OTHER VENDORS	6	\$3,320
<b>Service Agreement Total</b>				<b>\$170,069</b>
License	REDHAT SATELLITE SERVER ACADEM	DLT SOLUTIONS	1	\$11,025
	REDHAT ENTERPRISE LINUX SITE L	DLT SOLUTIONS	500	\$7,350
	ILO ADVPACK NONBL SW	HEWLETT PACKARD	4	\$1,074
<b>License Total</b>				<b>\$19,449</b>
<b>Total U.S. Common Fund Expenditures</b>				<b>\$1,897,235</b>

### Non-U.S. Common Fund Expenditures through June 30, 2010

Category	Line Description	Vendor	Quantity	Amount
Equipment	AMS2000 2TB SATA 7.2K RPM HDD	TRANSOURCE COMPUTERS	200	\$187,686
	DELL R710 STORAGE SERVERS	DELL	20	\$126,100
	SATABEAST FC-SATA 42 BAY 42X50	CAMBRIDGE COMPUTERS	2	\$63,742
	AMS200 HI DENS STOR EXP UNIT	TRANSOURCE COMPUTERS	5	\$62,304
	CONFIGURATION: X2270-H1-AA	SUN MICRO	1	\$59,743
	XSERVE RAID W 14X750GB DRIVES	DOIT (MAC)	4	\$52,643
	STORM T3000 1TB RAID DUAL	CAMBRIDGE COMPUTERS	1	\$40,700
	HP STORAGEWORKS	HEWLETT PACKARD	24	\$31,908
		MNJ TECHNOLOGIES	10	\$14,400
	LTO-3 DRIVE, SUPPLIES	CAMBRIDGE COMPUTERS	2	\$29,000
	HP PROLIANT DL380 G6 SERVER	HEWLETT PACKARD	6	\$28,460
	DELL R610 SERVERS	DELL	5	\$24,589
	SPECTRA T950 STORAGE	CAMBRIDGE COMPUTERS	18	\$18,947
	HITACHI CHASSIS	TRANSOURCE COMPUTERS	1	\$14,282
	HP XW6600 WORKSTATION	HEWLETT PACKARD	6	\$13,764
	SAIT1-500 SONY S-AIT 1-500 GB	DISYS	100	\$13,600
	CATALYST 4948, IPB S/W, 48-POR,	INACOM INFORMATION	2	\$13,194
	IBM X3650 M2 SERVER	IBM CORP	2	\$12,204
	NETWORK SWITCHES AND TRANSCEIVERS	CORES BTS SERVER TEC	2 1	\$11,400 \$1,551
	DELL POWEREDGE R805 /710	MDS	2	\$10,717
	QUANTUM SUPERLOAD	MNJ TECHNOLOGIES	2	\$9,660
	HP R5500 VA UPS NA/JPN	HEWLETT PACKARD	4	\$8,928
	NETCLOCK GPS RECEIVER	SPECTRACOM	2	\$8,160
	SANBOX 5602 16X4GB FC RPS	CAMBRIDGE COMPUTERS	1	\$7,692
	SECOND FIBRE RAID CONTROLLER	CAMBRIDGE COMPUTERS	1	\$7,575
	PROMISE VTRAK E610FD	MNJ TECHNOLOGIES	1	\$7,164
HP LCD MONITORS	HEWLETT PACKARD	7	\$6,331	
OTHER	OTHER VENDORS	26	\$24,714	
<b>Equipment Total</b>				<b>\$911,159</b>
Computing Supplies	RED HAT SATELLITE SE	DLT SOLUTION	3	\$17,980
	LTO ULTRIUM 3 - 400 GB	MNJ TECHNOLOGIES	190	\$7,695
	OTHER	OTHER VENDORS	25	\$17,078
<b>Computing Supplies Total</b>				<b>\$42,753</b>
Service Agreement	SMARTNET MAINTAINENCE	INACOM INFORMATION	1	\$23,848
	SERVICE CONTRACT MAINTENANCE	CAMBRIDGE COMPUTERS	2	\$15,421
	SLV-HSM-66TP/200TP-LNX ANNUAL	CAMBRIDGE COMPUTERS	1	\$9,781
<b>Service Agreement Total</b>				<b>\$49,050</b>
<b>Total Non U.S. Common Fund Expenditures</b>				<b>\$1,002,962</b>

## Attachment 2: Computing Infrastructure Upgrade - 2010/2011

The following list includes the major IceCube purchases for the 2010/2011 South Pole System (SPS) upgrade and for the 2011 UW Data Center and Network upgrade, funded by both M&O Common Fund (\$848 k) and MREFC Pre-Ops (\$878 k).

System upgrade	Item	Vendor	Line Items	Cost Category	Amount
South Pole System	Servers	DELL	81 DELL R710 Servers	Capital Equipment	\$438 k
South Pole System	Servers	DELL	5 DELL R610 Servers	Capital Equipment	\$25 k
South Pole System	Servers	DELL	Service for DELL R610/R710	Service Agreements	\$79 k
South Pole System	Servers	DELL	Spare parts for DELL servers	M&S	\$30 k
South Pole System	Storage	HP	8 HP Storage Works LTO-4 Ultrium 1840	Capital Equipment	\$28 k
South Pole System	Storage	HP	2 HP Storage Works LTO-4 Ultrium 1840 - (spare)	M&S	\$10 k
South Pole System	Storage	DELL	70 146 GB SCSI 2.5inch Hard Drive	M&S	\$21 k
South Pole System	Tapes	MNJ	2 Quantum SUPERLOADER 3 LTO5 TAPE IDR	Capital Equipment	\$10 k
South Pole System	Media	DELL	Tape Media for LTO4-120, 100 Pack	M&S	\$45 k
South Pole System	Media	DELL	Tape Media for LTO5 Cus 100 Pack	M&S	\$45 k
Network	HW	Core BTS	CISCO Switches and Hardware	Capital Equipment	\$129 k
Network	SW	Core BTS	CISCO Software Licenses	M&S	\$18 k
Network	Service	Core BTS	SMARTNET (Service)	Service Agreements	\$14 k
Network	Service	Core BTS	Cisco SMARTNet Annual Maintenance Contract	Service Agreements	\$33 k
Network	Cooling	H & H	Daikin Air Mini split cooling system	M&S	\$15 k
Network	HW	Core BTS	2 CISCO N2K GE, 2PS, 1Fan Module,	Capital Equipment	\$11 k
UW Data Center	Storage	Transour ce	Storage extension AMS2000.7 Tray HD expansion units, 336 2TB disks	Capital Equipment	\$385 k
UW Data Center	UPS	HP	5 HP R5500 XR UPS	M&S	\$17 k
UW Data Center	Servers	DELL	48 PowerEdge M610 BladeServer 2xx5670 Processor, 48GB	Capital Equipment	\$200 k
UW Data Center	Servers	DELL	3 Blade Server Enclosure M1000E	Capital Equipment	\$11 k
UW Data Center	Servers	DELL	Service Support for 51 Blade Servers and 12 PowerConnect switches	Service Agreements	\$43 k
UW Data Center	Servers	DELL	6 Dell PowerEdge R710 server 48GB Memory, dual Xeon X5670	Capital Equipment	\$31 k
UW Data Center	Servers	DELL	ProSupport for 6 Dell PowerEdge R710 servers	Service Agreements	\$12 k
UW Data Center	Storage	DELL	PowerVault MD3200i 12*2TB Disks	Capital Equipment	\$10 k
UW Data Center	Servers	DELL	4 PowerEdge R610, and 3 RowerEdge R510, 12GB Memory, single Xeon E5630	Capital Equipment	\$33 k
UW Data Center	Network	DELL	20 Brocade 1020 Dual-Port 10 Gbps FCoE CAN	Capital Equipment	\$15 k
UW Data Center	Servers	DELL	4 PowerEdge R710, 24GB Memory, dual Xeon X5670, 8 146GB Drives	Capital Equipment	\$19 k
<b>Total</b>					<b>\$1,726k</b>