

# IceCube Collaboration

Ignacio Taboada  
Spokesperson

NSF Mid-Term Review  
29 April 2024



# Presenter Background

Professor of Physics at the Georgia Institute of Technology  
Spokesperson of the IceCube collaboration

Active in IceCube (and AMANDA) since 1998; have served multiple roles

- Former chair of Speakers Committee
- Former WG co-leader (GRB, transients, neutrino sources)
- Former TFT board chair
- Former Analysis Coordinator

# Outline

- IceCube collaboration and MnO
- IceCube collaboration leadership
- IceCube collaboration and the Upgrade
- Data Releases
- Notable activities
- Collaboration response to NSF/USAP "Sexual Assault and Harrassment Prevention and Response" report
- Collaboration statistics

# IceCube collaboration: what is it?

International team of scientists who use IceCube Neutrino Observatory (ICNO) data to conduct research

Responsibilities:

- Define access to data
- Set science policy
- Set analysis goals
- Publish
- Present in conferences
- Get engaged in education & outreach

Collaborators participate in IceCube operations (monitoring, data processing, calibration, software, etc.)

IceCube's success hinges on a close partnership with IceCube operations (MnO)

# IceCube Collaboration



## THE ICECUBE COLLABORATION

**AUSTRALIA**  
University of Adelaide

**BELGIUM**  
UCLouvain  
Université libre de Bruxelles  
Universiteit Gent  
Vrije Universiteit Brussel

**CANADA**  
Queen's University  
University of Alberta–Edmonton

**DENMARK**  
University of Copenhagen

**GERMANY**  
Deutsches Elektronen-Synchrotron  
ECAP, Universität Erlangen–Nürnberg  
Humboldt–Universität zu Berlin  
Karlsruhe Institute of Technology  
Ruhr-Universität Bochum  
RWTH Aachen University  
Technische Universität Dortmund  
Technische Universität München  
Universität Mainz  
Universität Wuppertal  
Westfälische Wilhelms-Universität  
Münster

**ITALY**  
University of Padova

**JAPAN**  
Chiba University

**NEW ZEALAND**  
University of Canterbury

**REPUBLIC OF KOREA**  
Chung-Ang University  
Sungkyunkwan University

**SWEDEN**  
Stockholms universitet  
Uppsala universitet

**SWITZERLAND**  
Université de Genève

**TAIWAN**  
Academia Sinica

**UNITED KINGDOM**  
University of Oxford

**UNITED STATES**  
Clark Atlanta University  
Columbia University  
Drexel University  
Georgia Institute of Technology  
Harvard University  
Lawrence Berkeley National Lab  
Loyola University Chicago  
Marquette University

Massachusetts Institute of Technology  
Mercer University  
Michigan State University  
Ohio State University  
Pennsylvania State University  
South Dakota School of Mines and Technology  
Southern University and A&M College  
Stony Brook University  
University of Alabama  
University of Alaska Anchorage  
University of California, Berkeley  
University of California, Irvine  
University of Delaware  
University of Kansas

University of Maryland  
University of Nevada, Las Vegas  
University of Rochester  
University of Texas at Arlington  
University of Utah  
University of Wisconsin–Madison  
University of Wisconsin–River Falls  
Yale University

**FUNDING AGENCIES**

Fonds de la Recherche Scientifique (FRS-FNRS)  
Fonds Wetenschappelijk Onderzoek-Vlaanderen (FWO-Vlaanderen)

Federal Ministry of Education and Research (BMBF)  
German Research Foundation (DFG)  
Deutsches Elektronen-Synchrotron (DESY)

Japan Society for the Promotion of Science (JSPS)  
Knut and Alice Wallenberg Foundation  
Swedish Polar Research Secretariat

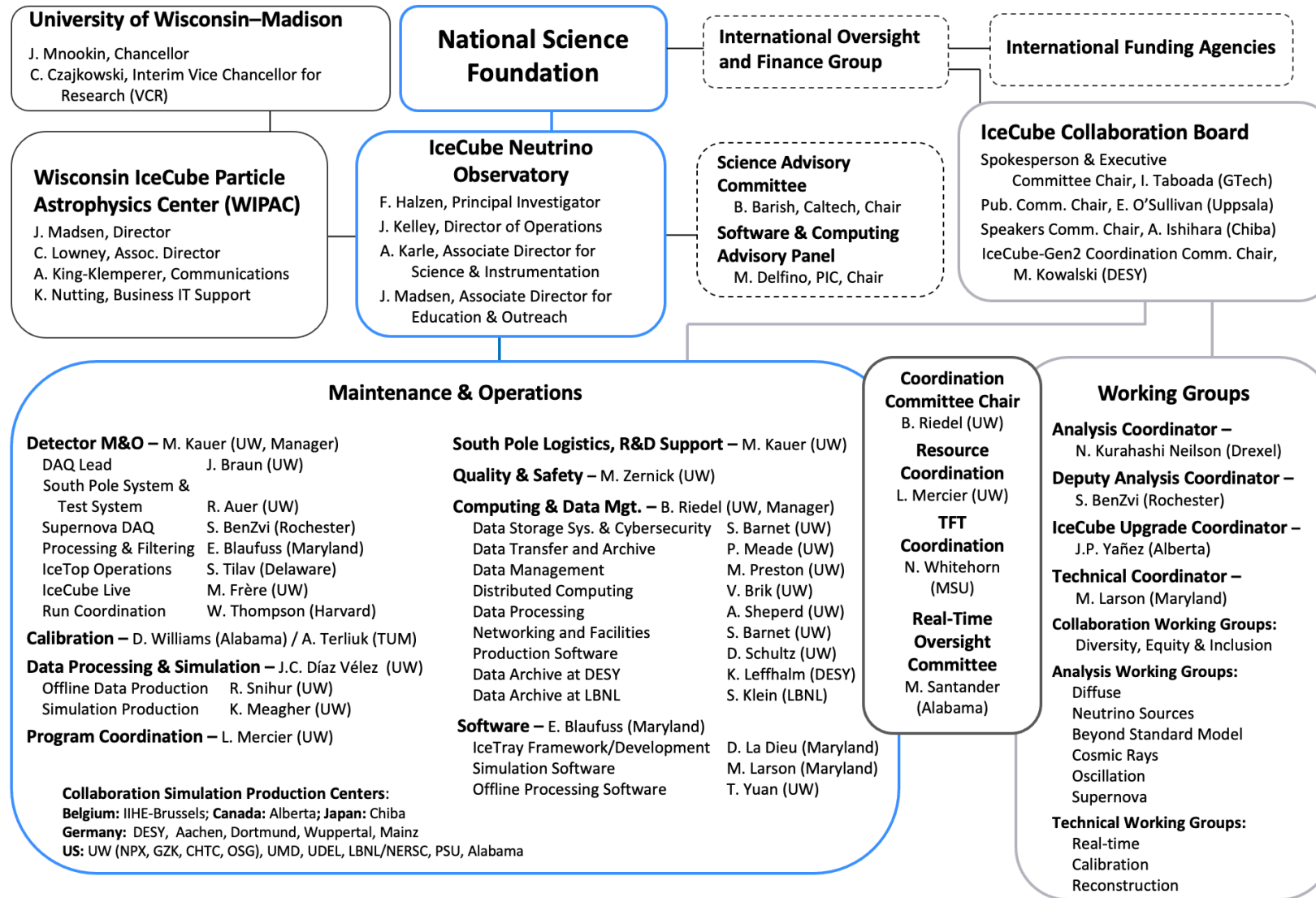
The Swedish Research Council (VR)  
University of Wisconsin Alumni Research Foundation (WARF)  
US National Science Foundation (NSF)

icecube.wisc.edu

59 institutions  
14 countries.  
Over 420 authors



# IceCube organization chart



April 15, 2024



# IceCube Collaboration Leadership



Spokesperson:

Ignacio Taboada (2021 – 2025)  
Georgia Tech [itaboada@gatech.edu](mailto:itaboada@gatech.edu)

Analysis Coordinator

Naoko Kurahashi Neilson (2023-2024)  
Drexel University [naoko.kurahashi@icecube.wisc.edu](mailto:naoko.kurahashi@icecube.wisc.edu)

Publications Committee

Erin O'Sullivan (2023 – )  
Uppsala University [erin.osullivan@physics.uu.se](mailto:erin.osullivan@physics.uu.se)

Speakers Committee

Aya Ishihara (2021 – 2025)  
Chiba University [aya@hepburn.s.chiba-u.ac.jp](mailto:aya@hepburn.s.chiba-u.ac.jp)



# Collaboration and the Upgrade

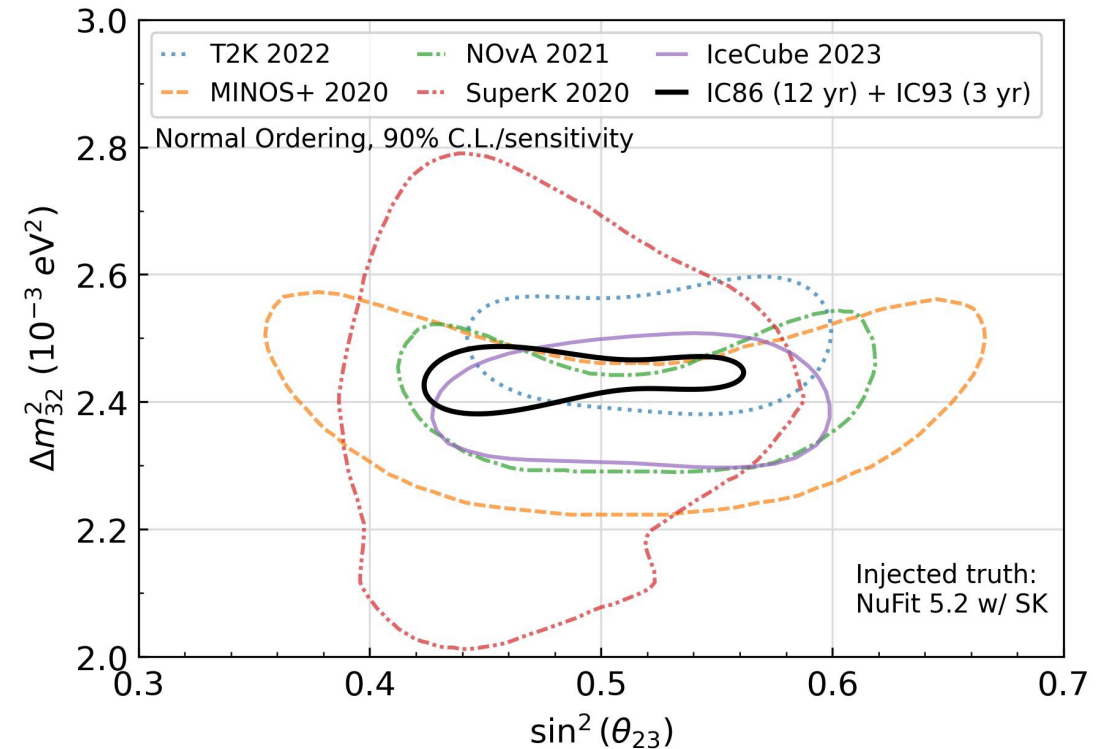
Upgrade Coordinator: Juan Pablo Yañez.

U. Alberta. (Fall 2022 – )

Since Upgrade was proposed we have  
Better control of systematics  
Better methods

Three publications planned (2024)

- Potential of the IceCube Upgrade with respect to neutrino oscillations
- Expected impact of the IceCube Upgrade on neutrino astrophysics
- Potential of the IceCube Upgrade in the search for Dark Matter





# Data releases

Linked to a centralized location: <https://icecube.wisc.edu/science/data-releases/>

Starting in 2024 stored in the [Dataverse](#)

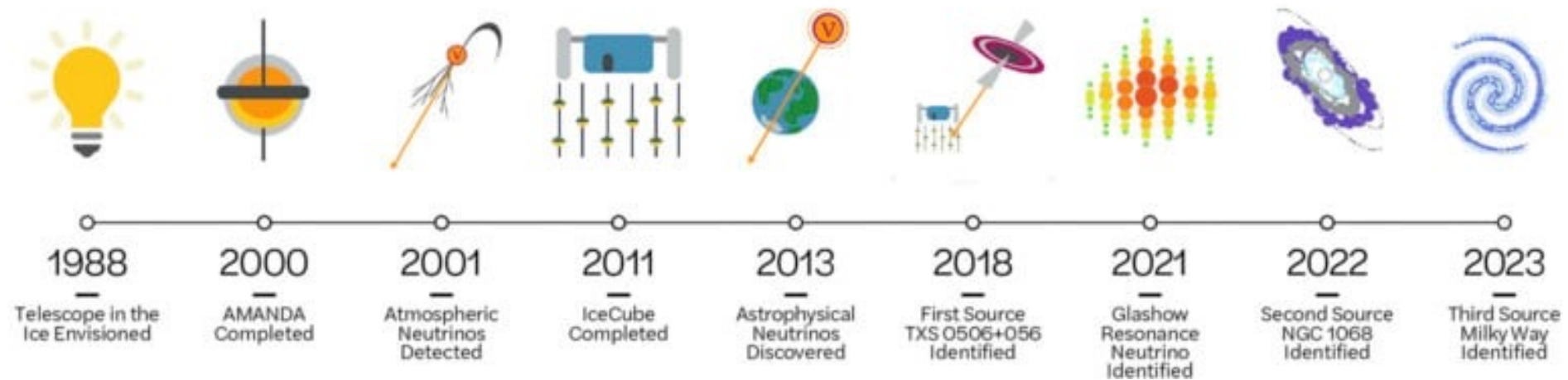
Some notable data releases:

IceCat-1	"Historical" and realtime astrophysical singlet alerts
HESE 12 years	High-energy starting events
Point source 10 years	All track events

IceCube data releases have been used for many external publications.

See presentation by Juan Carlos Díaz Velez.

## A History of Neutrino Astronomy in Antarctica



Data reprocessing/recalibration. Better understanding of systematics. Machine learning.

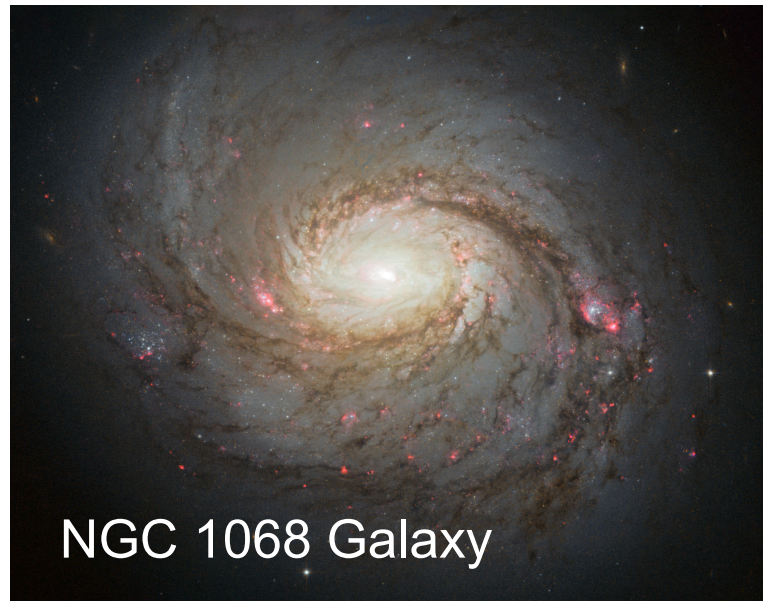
We continue to improve our sensitivity faster than  $\sqrt{\text{time}}$

# Webinars

NGC 1068 (November 2022) and Galactic Plane (June 2023). Hundreds of online connections – often a connection was a seminar room full of scientists

10k YouTube views for NGC 1068

27k YouTube views for the Galactic plane



# Kaggle challenge

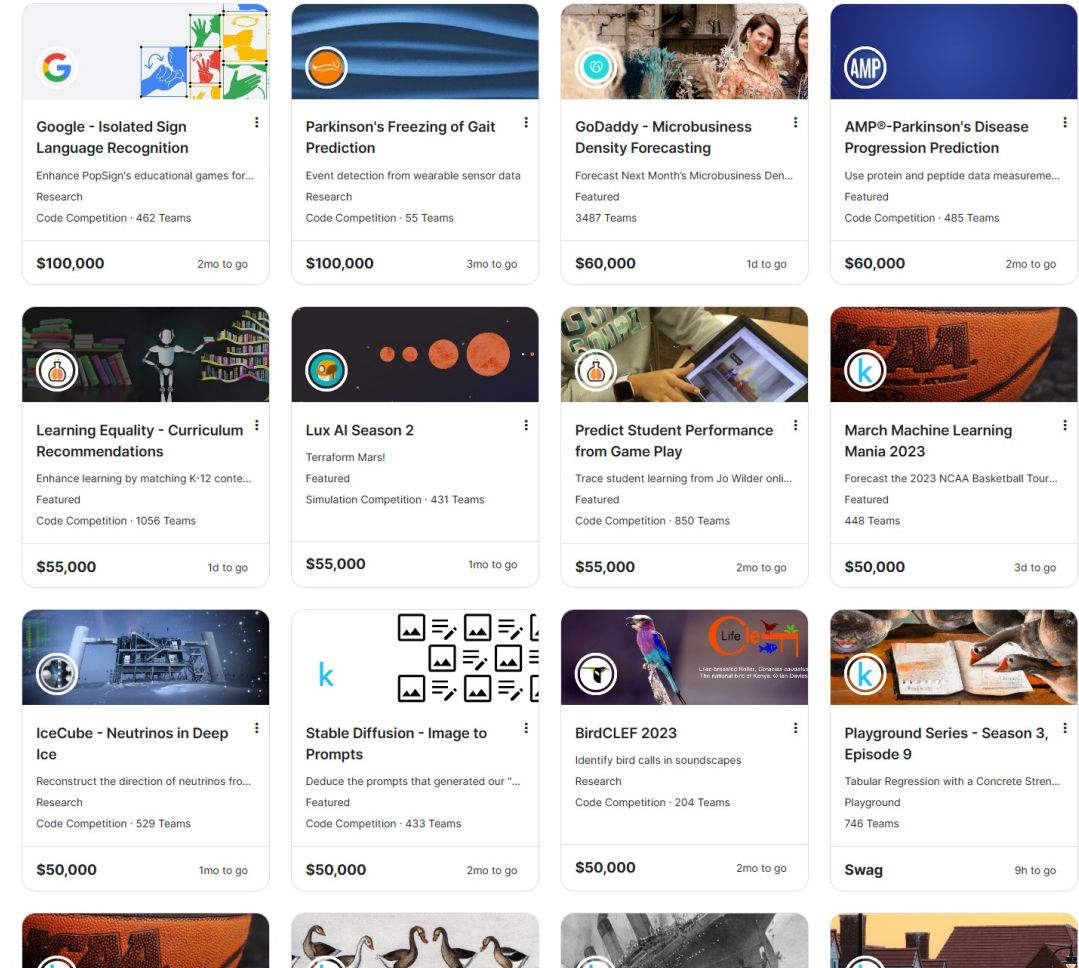
Public data challenge to get best “angular resolution”

Contest ended April 19, 2023. >500 teams participating

50 k\$ on prizes (Donations. IceCube members not allowed to win cash award)

Winning entry has influenced methods used by the collaboration. (non-IceCube) publication written by top 4 contributions)

Effort led by Philipp Eller (TUM)



# “Sexual Assault and Harassment Prevention and Response” report.

Listening session during Fall 2022 IceCube collaboration meeting

Established ad hoc committee to make policy recommendations

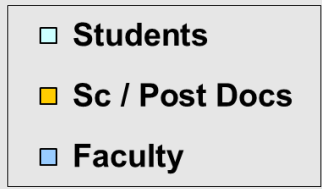
Recommendations shown to NSF program managers in Summer 2023

Adopted collaboration policy in Fall 2023

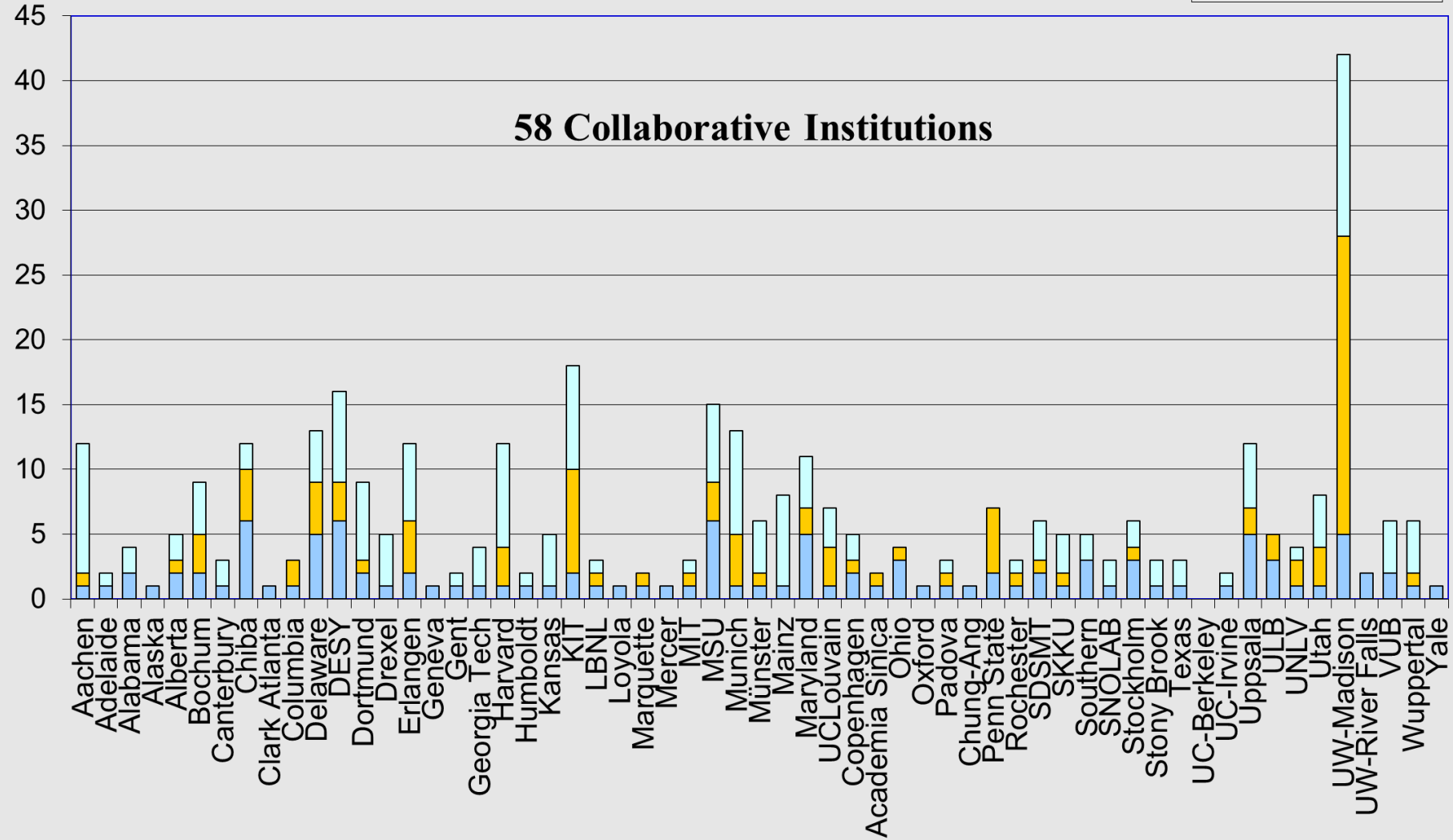
- There will always be a designated On-Ice Lead during the summer polar season
- In-Ice Lead will serve as an additional point of contact
- Prior to season, IceCube members going to the ice will participate in a Q&A.
- Run an exit survey for every summer polar season. Reviewed by MnO PI and Spokesperson
- The On-ice leads will report yearly to the Collaboration Board
- The policy will be reviewed yearly by the Collaboration Board

# IceCube M&O MoU Summary v 35.0, March 2024

Head count



**58 Collaborative Institutions**



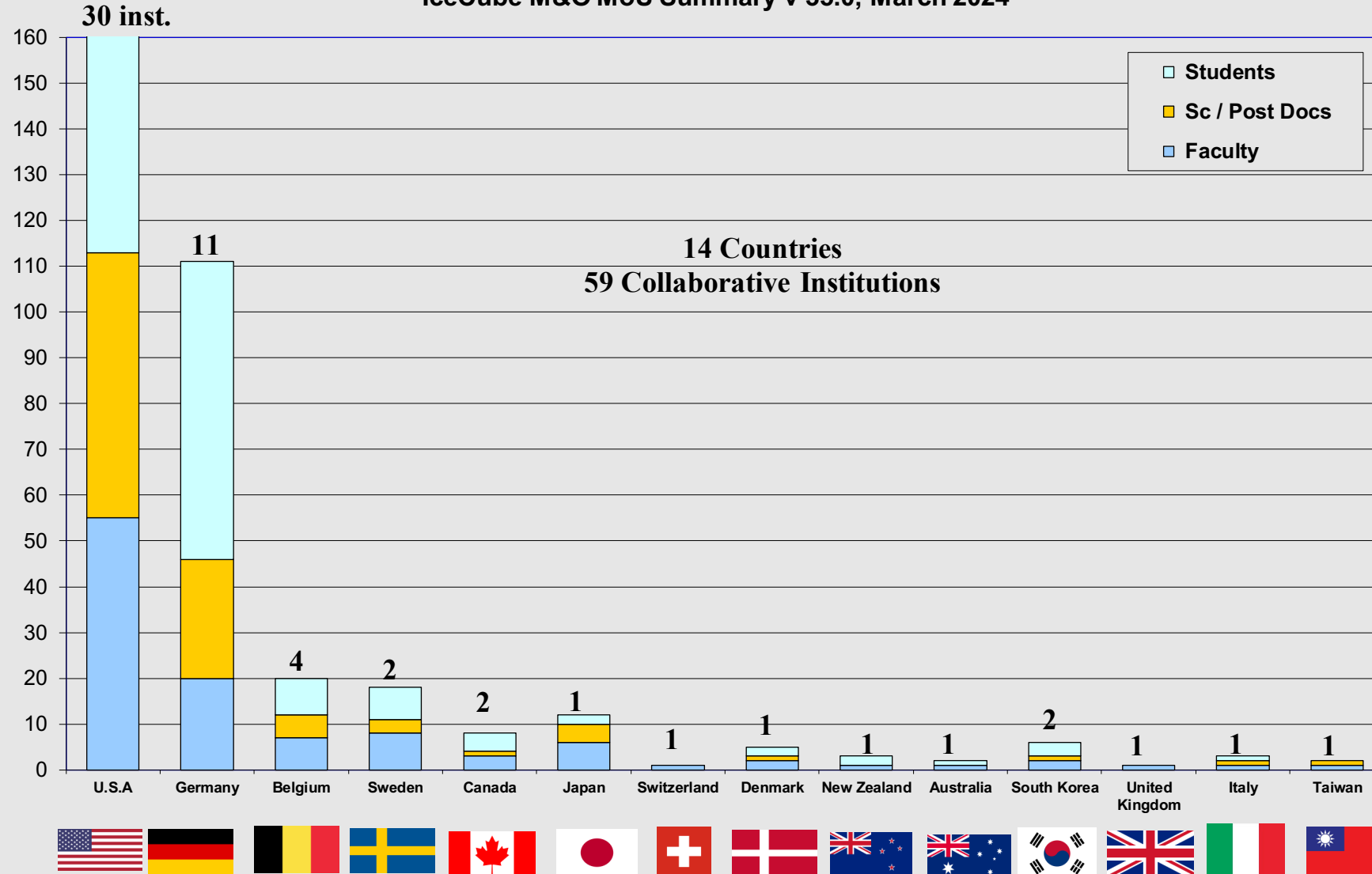
Remarkable continued growth in a mature collaboration.  
 Strong participation in collaboration meetings.  
 Many academically junior members.

## Ph. D. Authors Head Count

March 2024



### IceCube M&O MoU Summary v 35.0, March 2024





### Head Count Summary

<b>V34.0 October 2023</b>	<b>Head Count</b>				
	<b>Ph.D. Authors</b>	<b>Faculty</b>	<b>Scientists/ Post Docs</b>	<b>Ph.D. Students</b>	<b>Total</b>
U.S. Institutions Subtotal	109	57	55	64	176
Non-U.S. Institutions Subtotal	96	53	44	92	189
<b>Total U.S. &amp; Non-U.S.</b>	<b>205</b>	<b>110</b>	<b>99</b>	<b>156</b>	<b>365</b>

<b>V35.0 March 2024</b>	<b>Head Count</b>				
	<b>Ph.D. Authors</b>	<b>Faculty</b>	<b>Scientists/ Post Docs</b>	<b>Ph.D. Students</b>	<b>Total</b>
U.S. Institutions Subtotal	116	55	53	67	175
Non-U.S. Institutions Subtotal	99	54	43	95	192
<b>Total U.S. &amp; Non-U.S.</b>	<b>215</b>	<b>109</b>	<b>96</b>	<b>162</b>	<b>367</b>

### Summary of Changes

<b>U.S. Institutions</b>	<b>Non-U.S. Institutions</b>
<p>*Faculty -2: <b>Southern -1, UW-Madison -1</b></p> <p>*Scientists/Postdocs: -2: <b>LBNL +1, Rochester +1, Utah +1, UW-Madison -5</b></p> <p>*Students +3: <b>Kansas +2, Utah +1, UW-Mad +1, Columbia -1</b></p>	<p>*Faculty +1: <b>Chung-Ang +1</b></p> <p>*Scientists/Postdocs -1: <b>SKKU -1</b></p> <p>*Students +3: <b>RWTH +1, Erlangen-Nürnberg +3, SKKU -1</b></p>



# Thank you

