

IceCube Collaboration

Ignacio Taboada
Spokesperson

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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

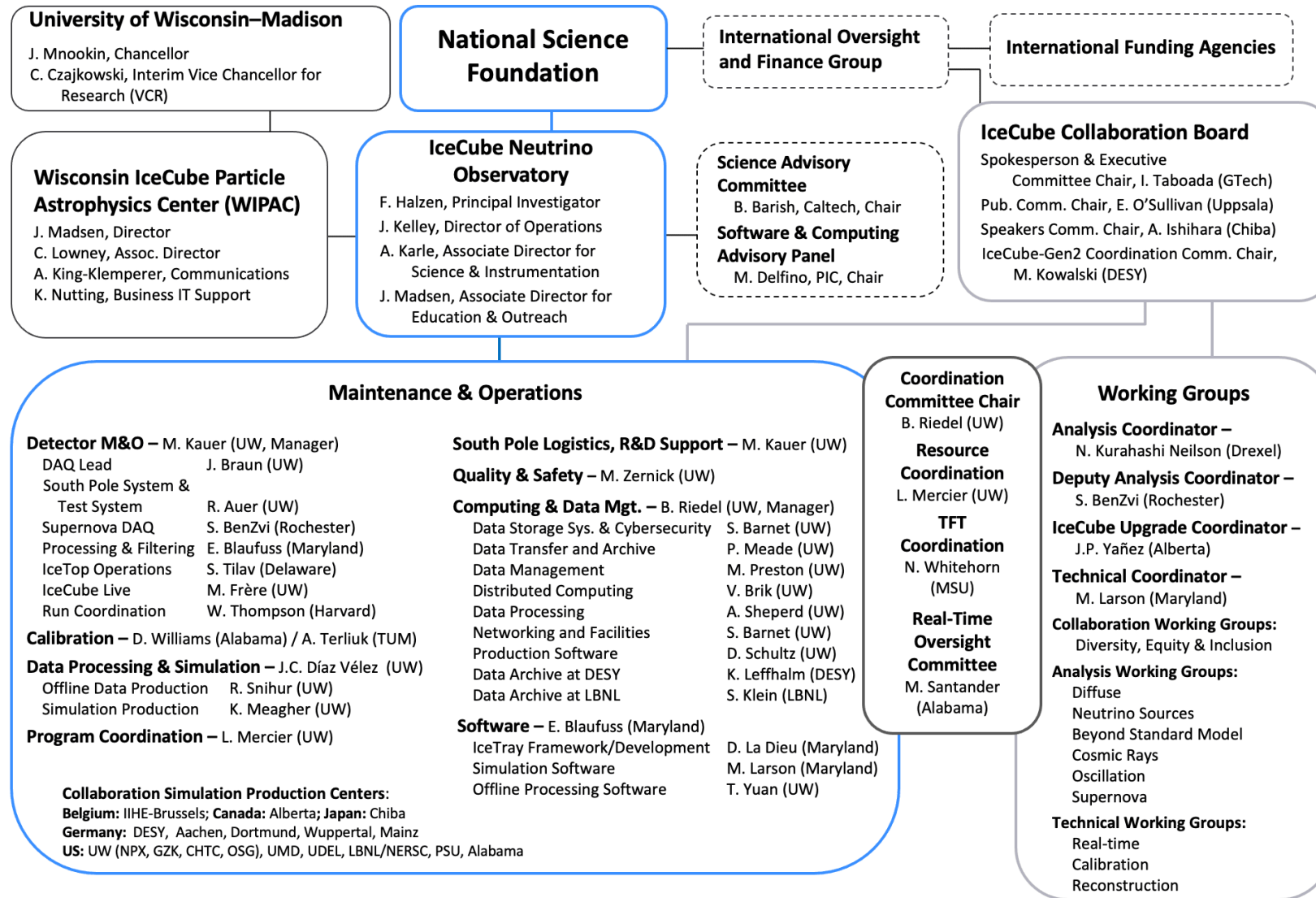
The Swedish Research Council (VR)
University of Wisconsin Alumni Research Foundation (WARF)
US National Science Foundation (NSF)

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

Analysis Coordinator

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

Publications Committee

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

Speakers Committee

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



Collaboration and the Upgrade

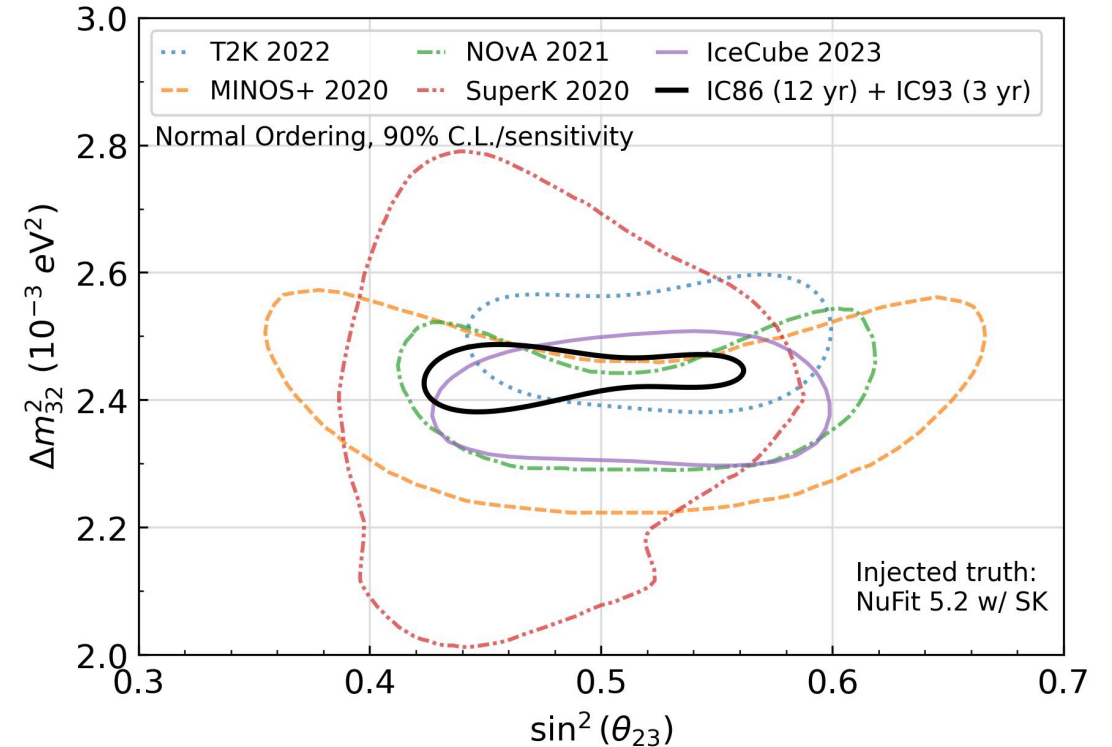
Upgrade Coordinator: Juan Pablo Yañez.

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](#)

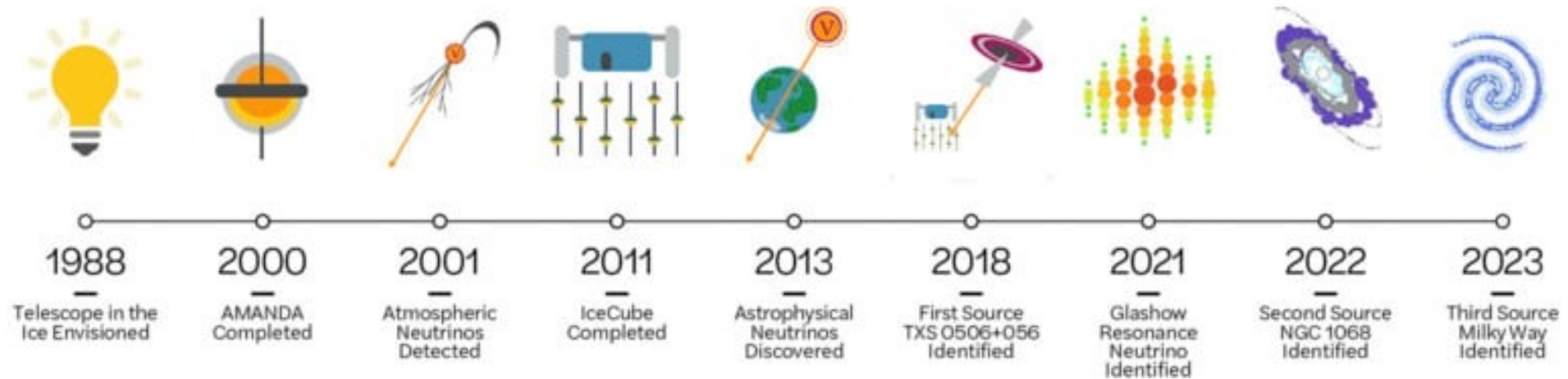
Some notable data releases:

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.

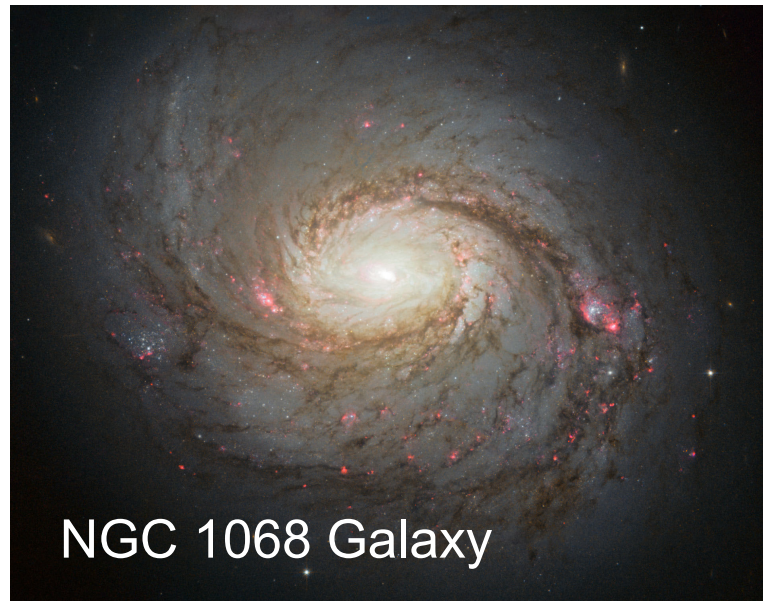
We continue to improve our sensitivity faster than $\sqrt{\text{time}}$

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

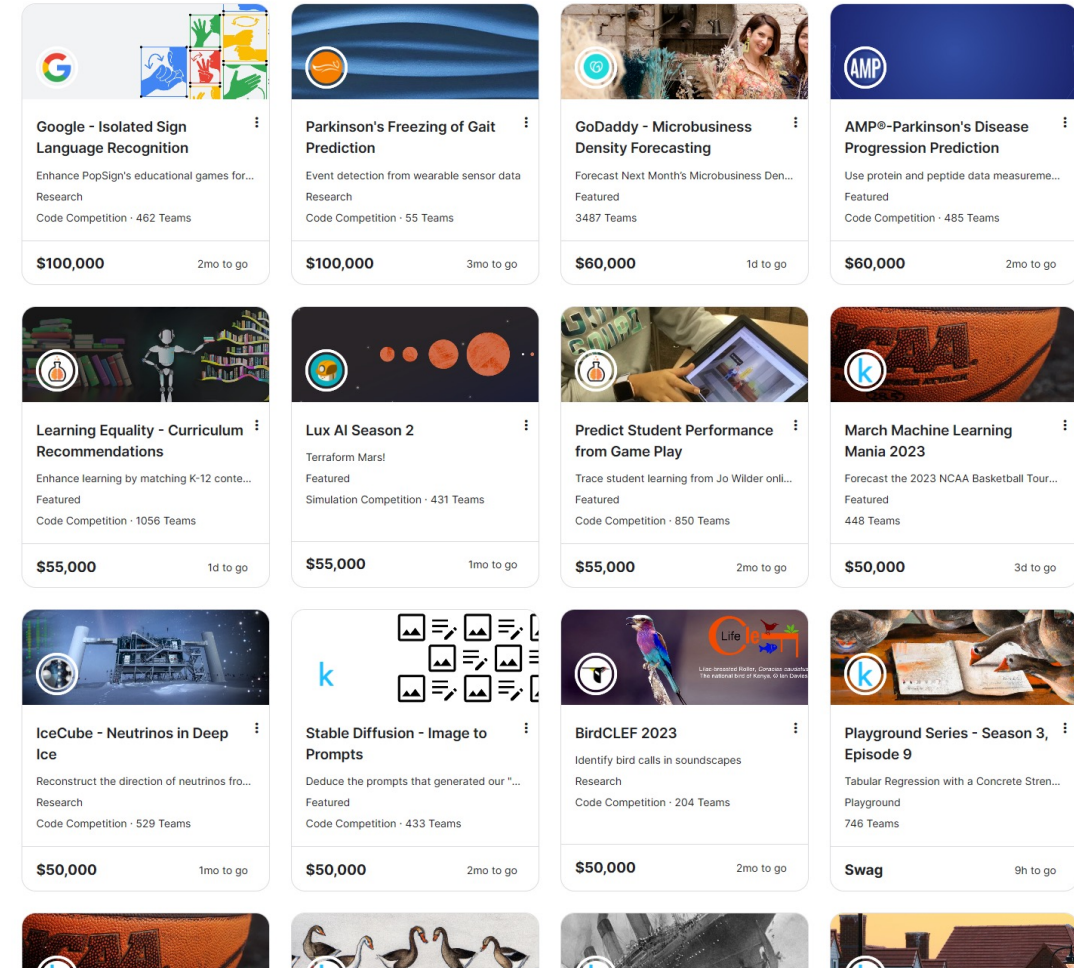
Public data challenge to get best “angular resolution”

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

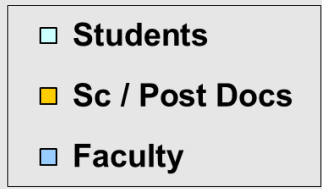
Recommendations shown to NSF program managers in Summer 2023

Adopted collaboration policy in Fall 2023

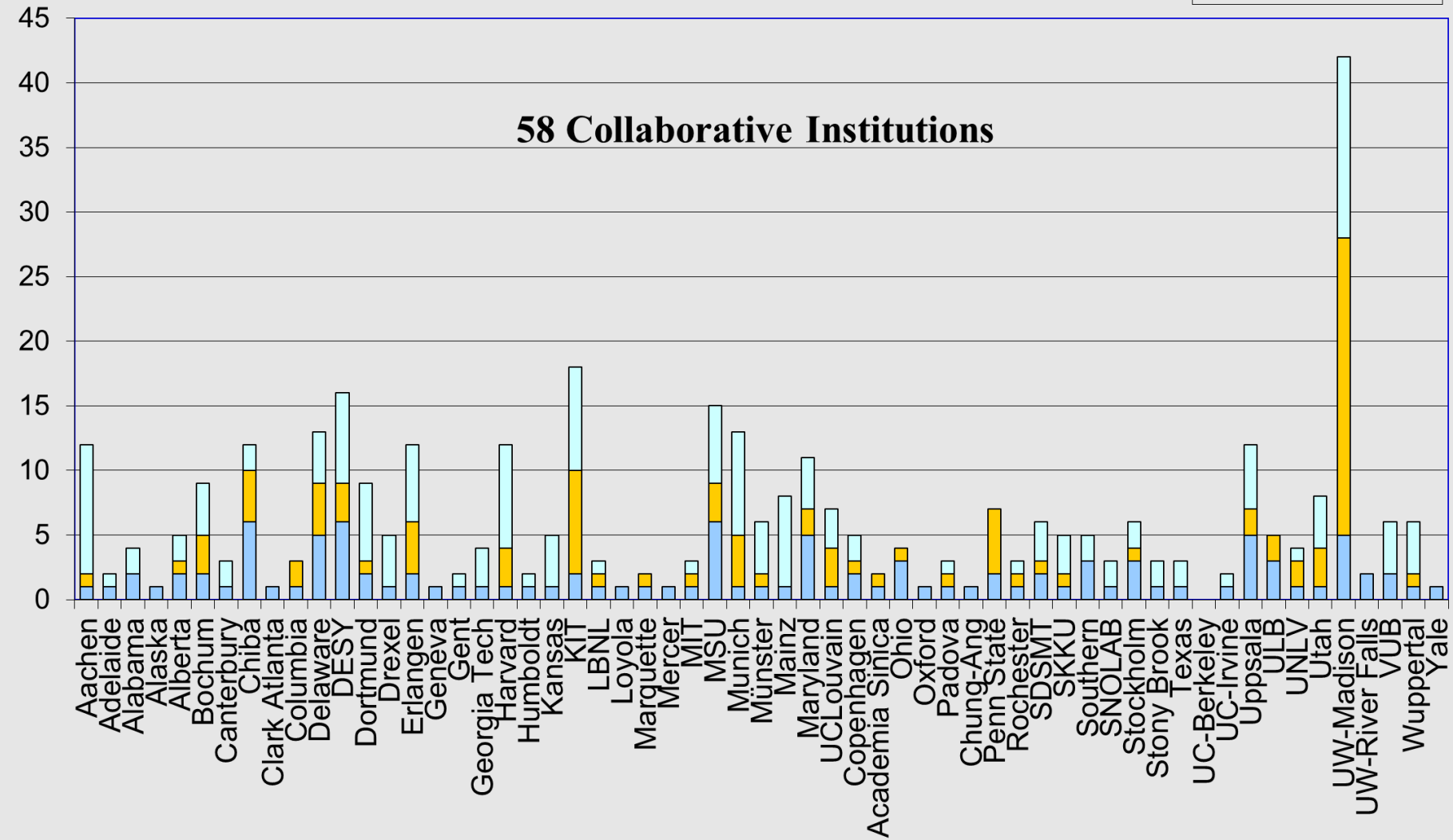
- There will always be a designated On-Ice Lead during the summer polar season
- In-Ice Lead will serve as an additional point of contact
- Prior to season, IceCube members going to the ice will participate in a Q&A.
- Run an exit survey for every summer polar season. Reviewed by MnO PI and Spokesperson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



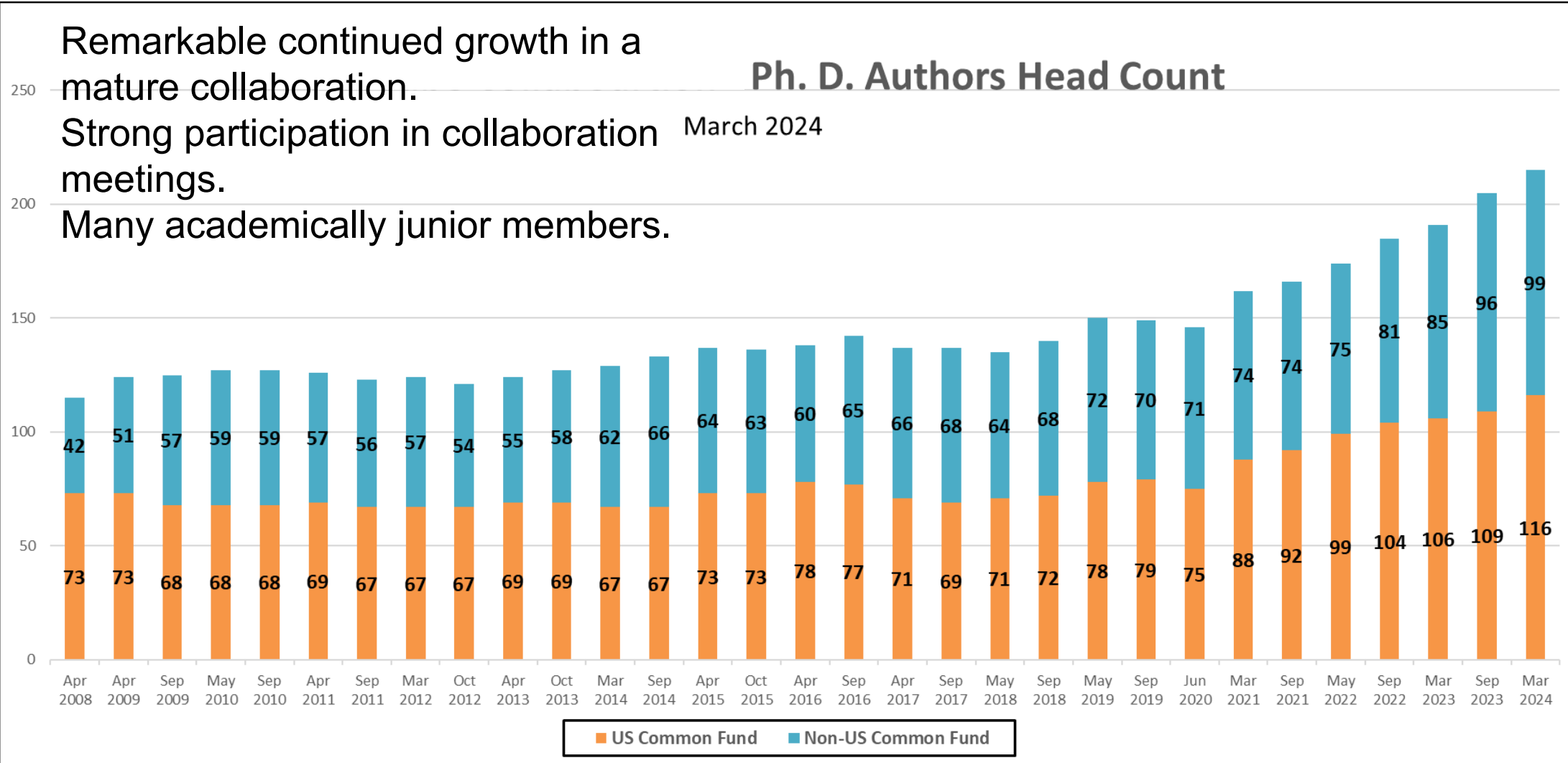
58 Collaborative Institutions



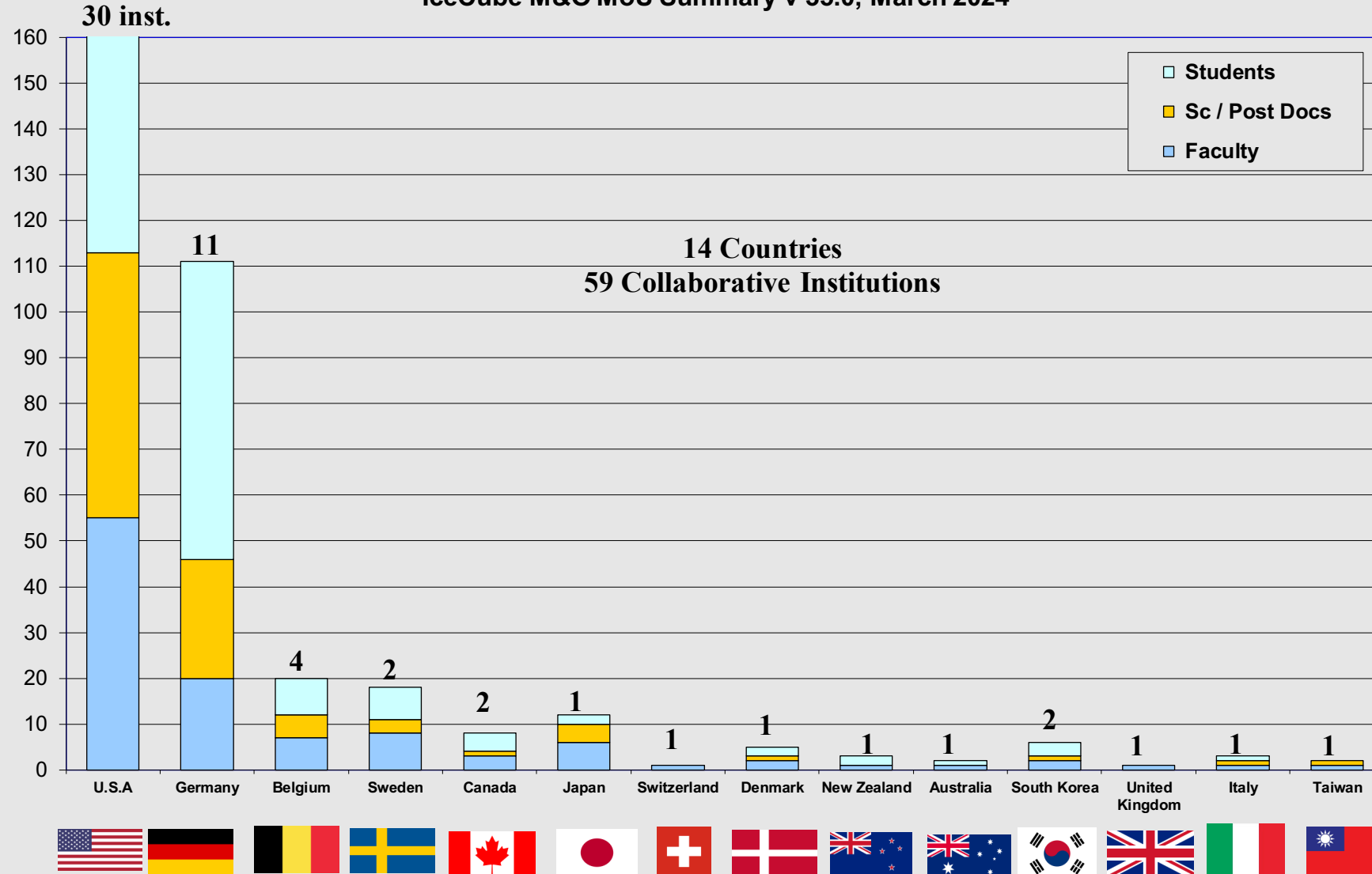
Remarkable continued growth in a mature collaboration.
 Strong participation in collaboration meetings.
 Many academically junior members.

Ph. D. Authors Head Count

March 2024



IceCube M&O MoU Summary v 35.0, March 2024



Head Count Summary

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

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

Summary of Changes

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



Thank you

