Collaboration Report

Autumn 2019

IceCube

IceCube Collaboration - Chiba 2019

IceCube by the numbers*

*many thanks Catherine!

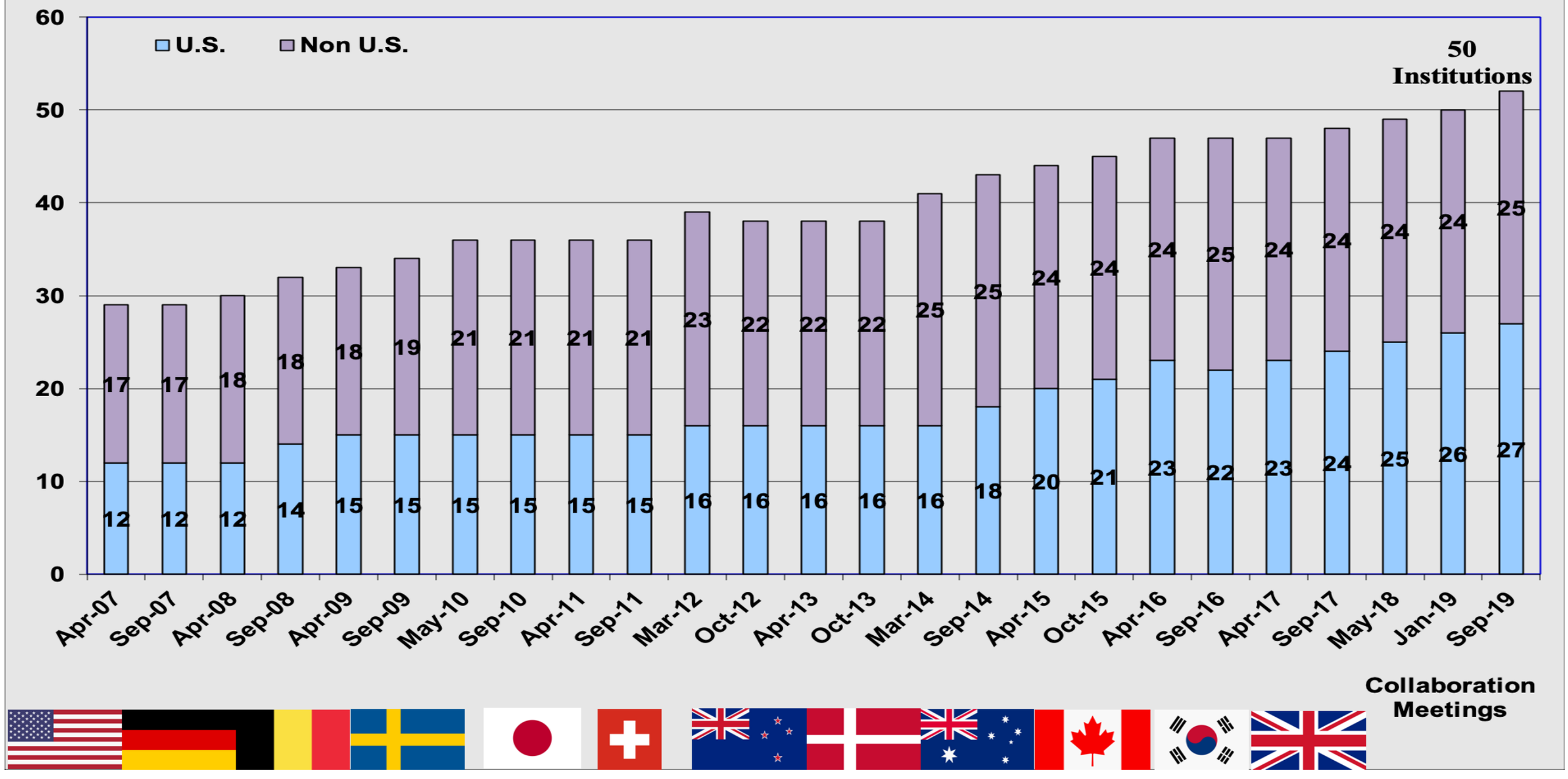
IceCube Collaborative Insitutions

Joined IceCube:

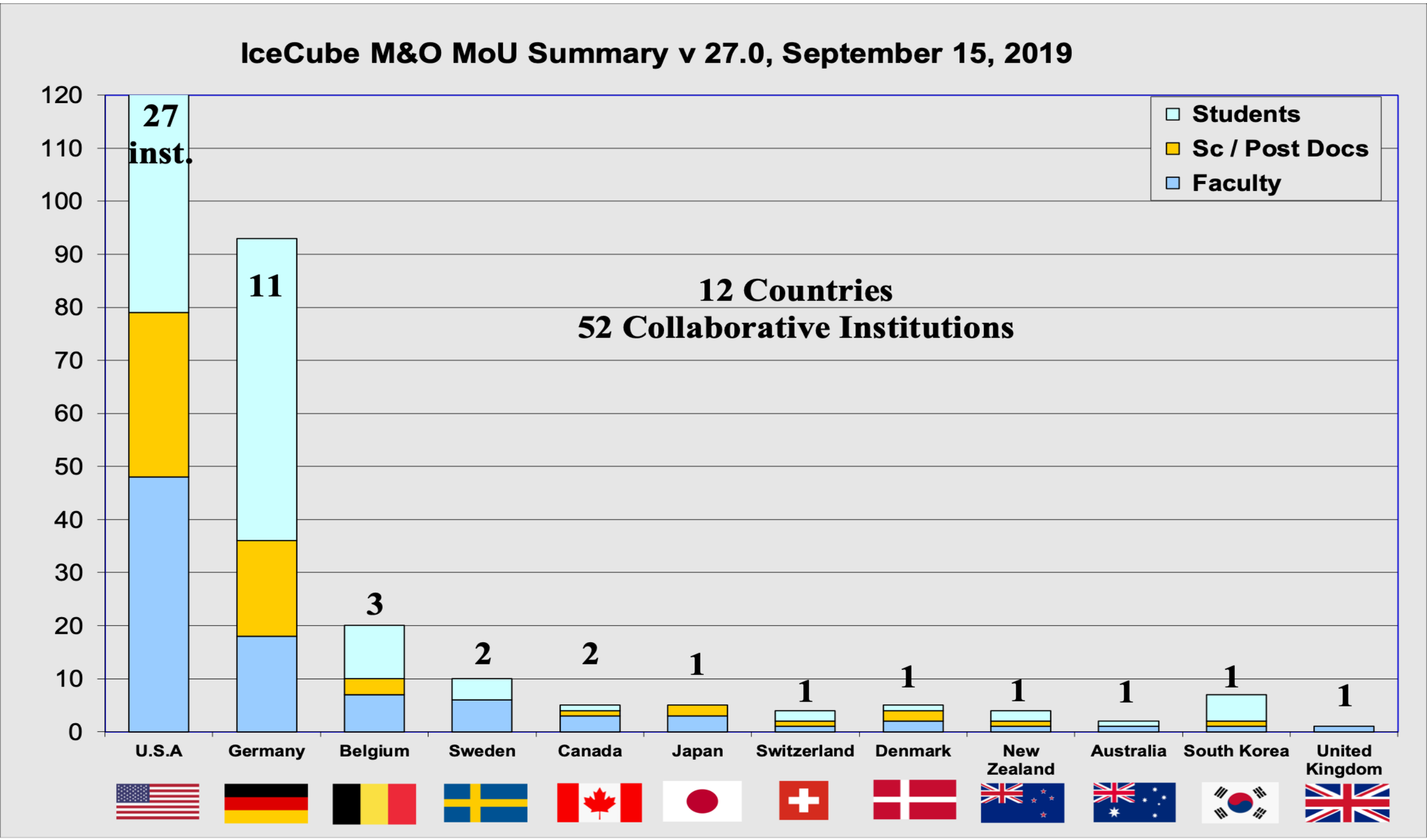
EPFL, Alabama, G. Tech, Ohio State, Bochum, Bonn, Alberta, Barbados, Adelaide, Geneva, Stony Brook, Munich, SKKU, Toronto, NBI, Erlangen, Yale, SDSMT, Drexel, MSU, MIT, Marquette, Rochester, Münster, Queen's, Texas, UCLA, Mercer, KIT, Loyola

Left IceCube:

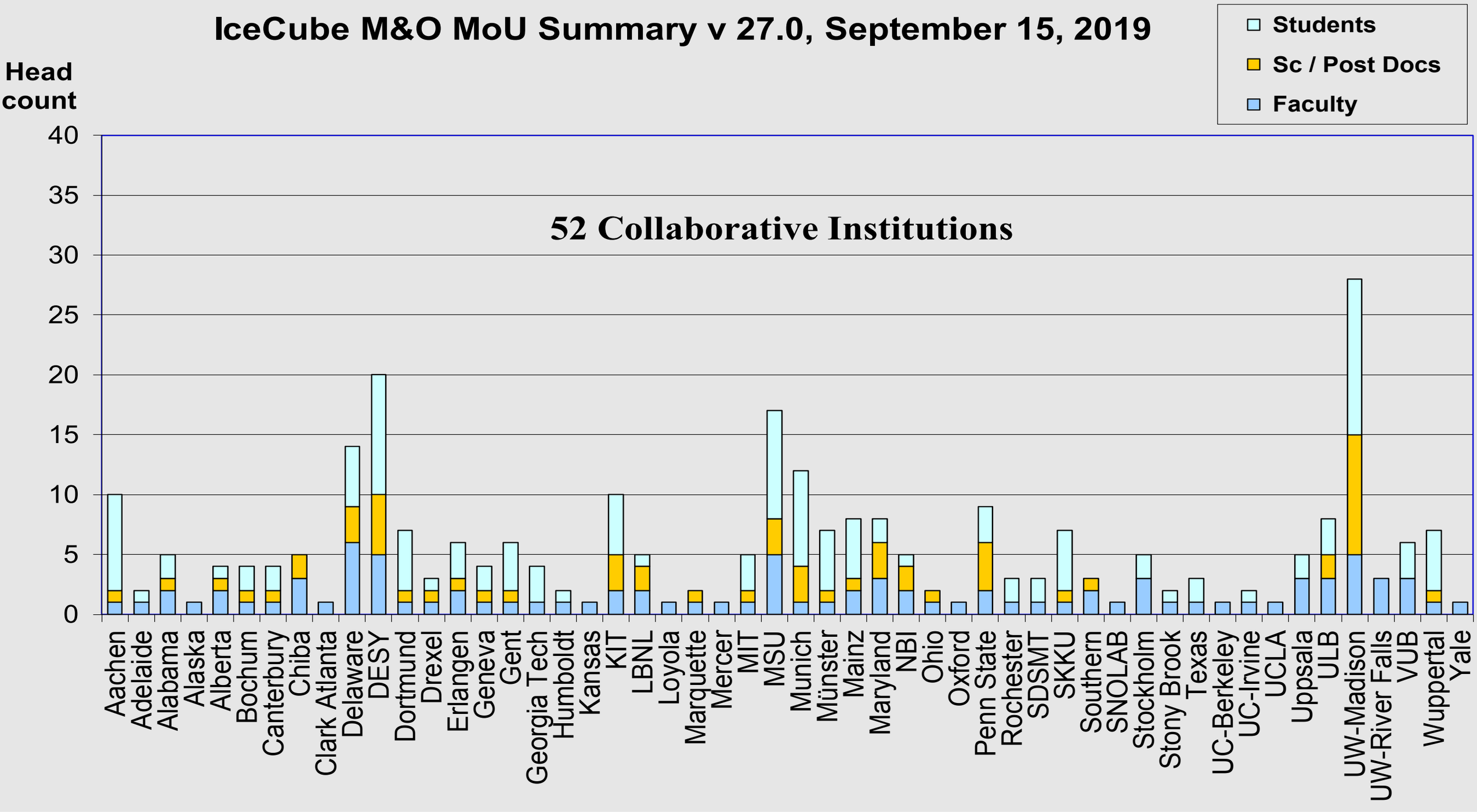
Utrecht, Heidelberg, Barbados, EPFL, Bonn, Toronto, Mons



IceCube Collaborative Instituions



IceCube Collaborative Instituions



IceCube M&O MoU Head Count Summary

v25.0, September 2018

	Head Count				
	Ph.D. Authors	**Faculty**	**Scientists / Post Docs**	**Students**	**Total**
U.S. Institutions Subtotal	**70**	42	28	43	**113**
Non-U.S. Institutions Subtotal	**71**	45	26	82	**153**
Total U.S. & Non-U.S.	**141**	**87**	**54**	**125**	**266**
	a + b	(a)	(b)	(c)	a + b + c

V27.0, September 2019

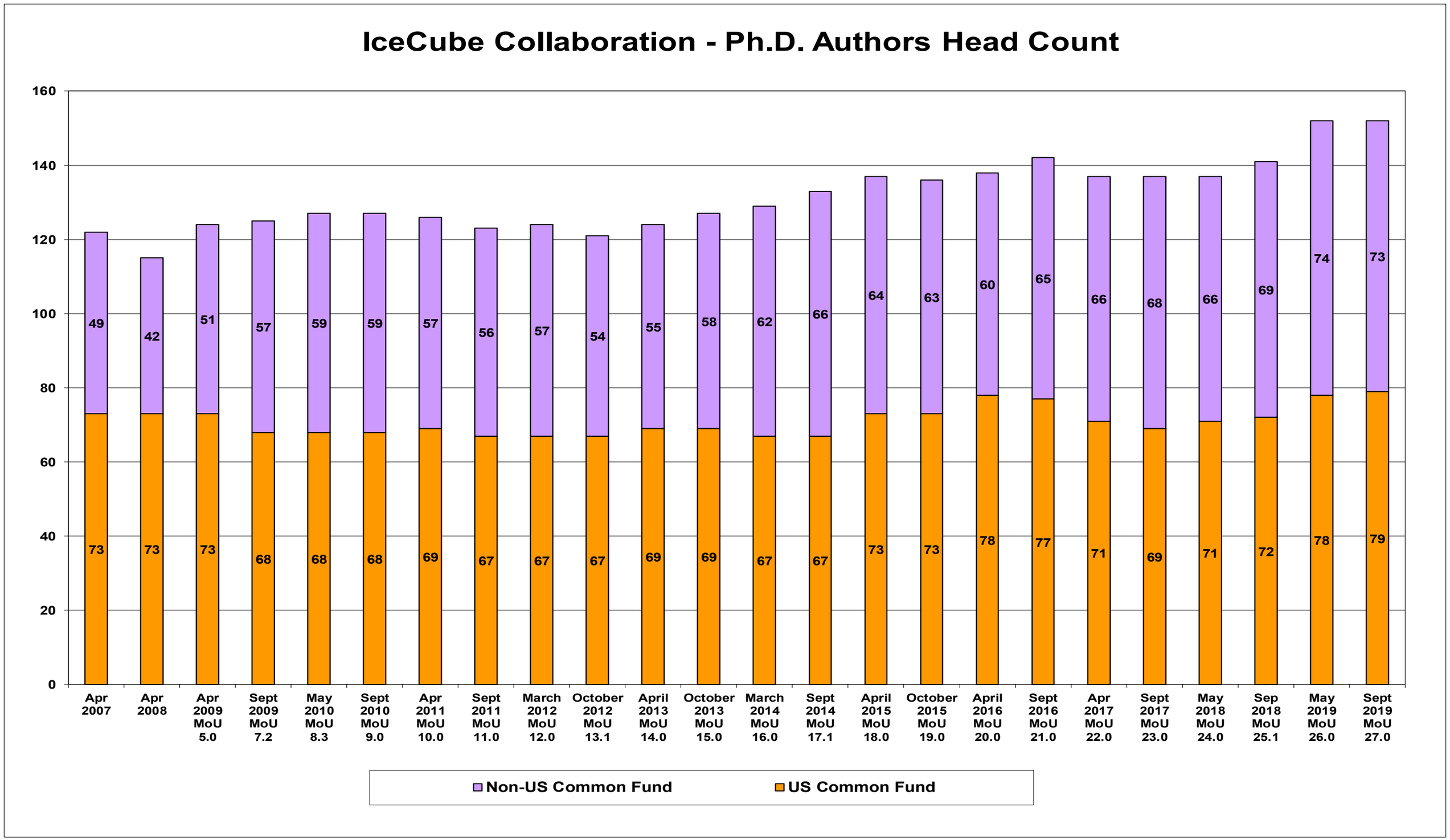
	Head Count				
	Ph.D. Authors	**Faculty**	**Scientists / Post Docs**	**Students**	**Total**
U.S. Institutions Subtotal	**79**	48	31	50	**129**
Non-U.S. Institutions Subtotal	**73**	44	29	83	**156**
Total U.S. & Non-U.S.	**152**	**92**	**60**	**133**	**285**
	a + b	(a)	(b)	(c)	a + b + c

Summary of changes over the last year:

•US Institutions: the number of Faculty increased by 6, Scientists / Post Docs increased by 3, and the number of Students increased by 7.

•Non-US Institutions: number of Faculty decreased by 1, Scientists / Post Docs increased by 3, Students increased by 1.

IceCube Ph.D. Authors Head Count



Membership changes since Fall 2018

Rasha Abbasi/Loyola University-Chicago (full institute member request — passed)

Andreas Haungs and Ralph Engel/KIT (full institute member request — passed)

Columbia University (full institute member request — on-going discussions)

Teppei Katori/King's College London (associate member transition request; vote pending)

Donini et al. (associate member request; on-going discussion) — measurements of Earth Tomography

Changes to the working group leadership

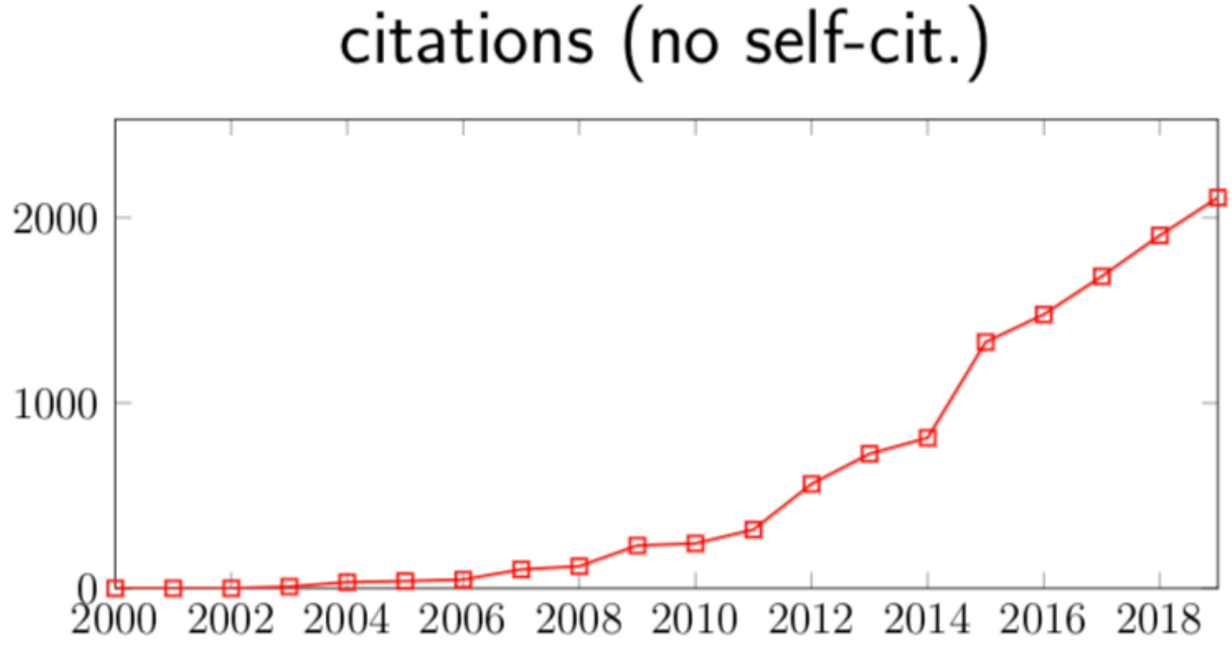
Analysis Coordinator — Anna Franckowiak (DESY) replaced Dawn Williams (U.Alabama)

Calibration — Allan Hallgren (Uppsala) replaced Keiichi Mase (Chiba)

Cosmic-rays — Andreas Haungs (KIT) replaced Katherine Rawlins (Alaska)

Neutrino Sources — Justin Vandenbroucke (UW-Madison) replaced Ignacio Taboada (Georgia Tech)

Publications:



Top 10 in none self-citations in 2018/2019:

Title	Journal	# cit.
Multi-messenger Observations of a Binary Neutron Star Merger	Astrophys.J. (2017)	924
Evidence for High-Energy Extraterrestrial Neutrinos at the IceCube Detector	Science (2013)	227
Observation of High-Energy Astrophysical Neutrinos in Three Years of IceCube Data	Phys.Rev.Lett. (2014)	204
Neutrino emission from the direction of the blazar TXS 0506+056 prior to the IceCube-170922A alert	Science (2018)	147
Observation and Characterization of a Cosmic Muon Neutrino Flux from the Northern Hemisphere using six years of IceCube data	Astrophys.J. (2016)	136
Multimessenger observations of a flaring blazar coincident with high-energy neutrino IceCube-170922A	Science (2018)	131
First observation of PeV-energy neutrinos with IceCube	Phys.Rev.Lett. (2013)	115

Report from the IceCube Board

Relevant documents on docushare (https://docushare.icecube.wisc.edu/dsweb/View/Collection-15951)

- Membership discussions:

  Columbia University (full institute member request — tabled until Spring Collaboration meeting for further information and discussion)

  King's College London/Katori (associate member institution transition - voting to take place September 2019

  Donini/Palomares-Ruiz/Salvado (associate member request for Earth tomography analysis - tabled pending further information and discussion)

Report on MOU updates

Update on the progress to improve tracking of service contributions and new computing funding support

Report from the Analysis Coordinator

Discussion of the analysis call times (both Europe/Asia and US/Asia friendly calls will be initiated; approximately 1 per month)

Initial planning to create a deputy Analysis Coordinator

Discussion of Governance Document updates

Language update re. approval of member senior scientists at IceCube constituent institutes

IceCube Upgrade and Gen2 status

Updates on resource needs for the Upgrade

Discussion of integration of current and future radio array activities within IceCube and Gen2

Starting the development of the framework that facilitates a future transition from IceCube to Gen2

Report from the ECS representatives

Upcoming ECS representative election this Fall - participation is important!

Internal reports in the public domain — PubComm proposes to create a public website that would list the titles and authors of internal reports (IceCube Technical Reports - ITRs).

Survey on topic talks - please be proactive with your PIs in identifying speaking opportunities of interest. Reach out to the Speakers Committee and Spokesperson with any questions you may have at any time.

Report from the PubComm

See Segev’s talk

IceCube spring 2020 meeting in Brussels

- **Dates : 9-15 (incl.) may 2020**

  Pre-meetings : 9 and 10 may

  Main meeting : 11-15 may

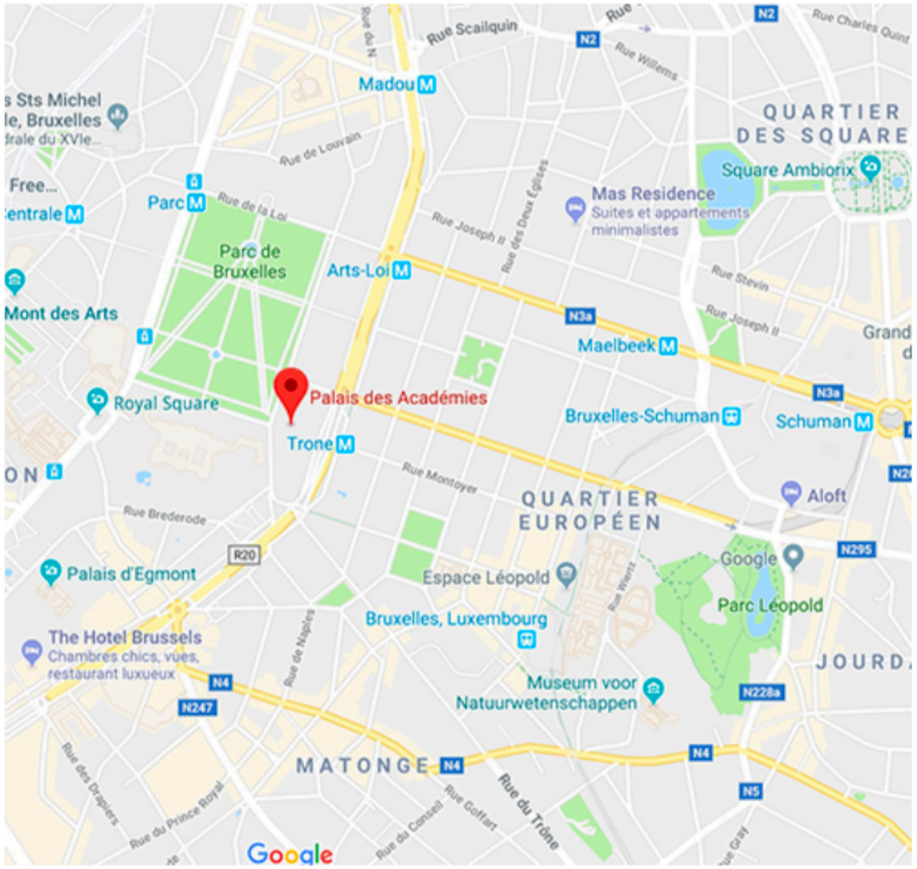
  Ends on the 15th around 12:30h

- **Meeting venue :**

  Royal Academy of Sciences and Arts

- **Located at the city center**

  Next to the central train station
  Many nearby hotels / metro stations



- **Easy to reach Brussels**

  Plane : Zaventem Intl. Airport
  Train : Amsterdam, Paris, Frankfurt

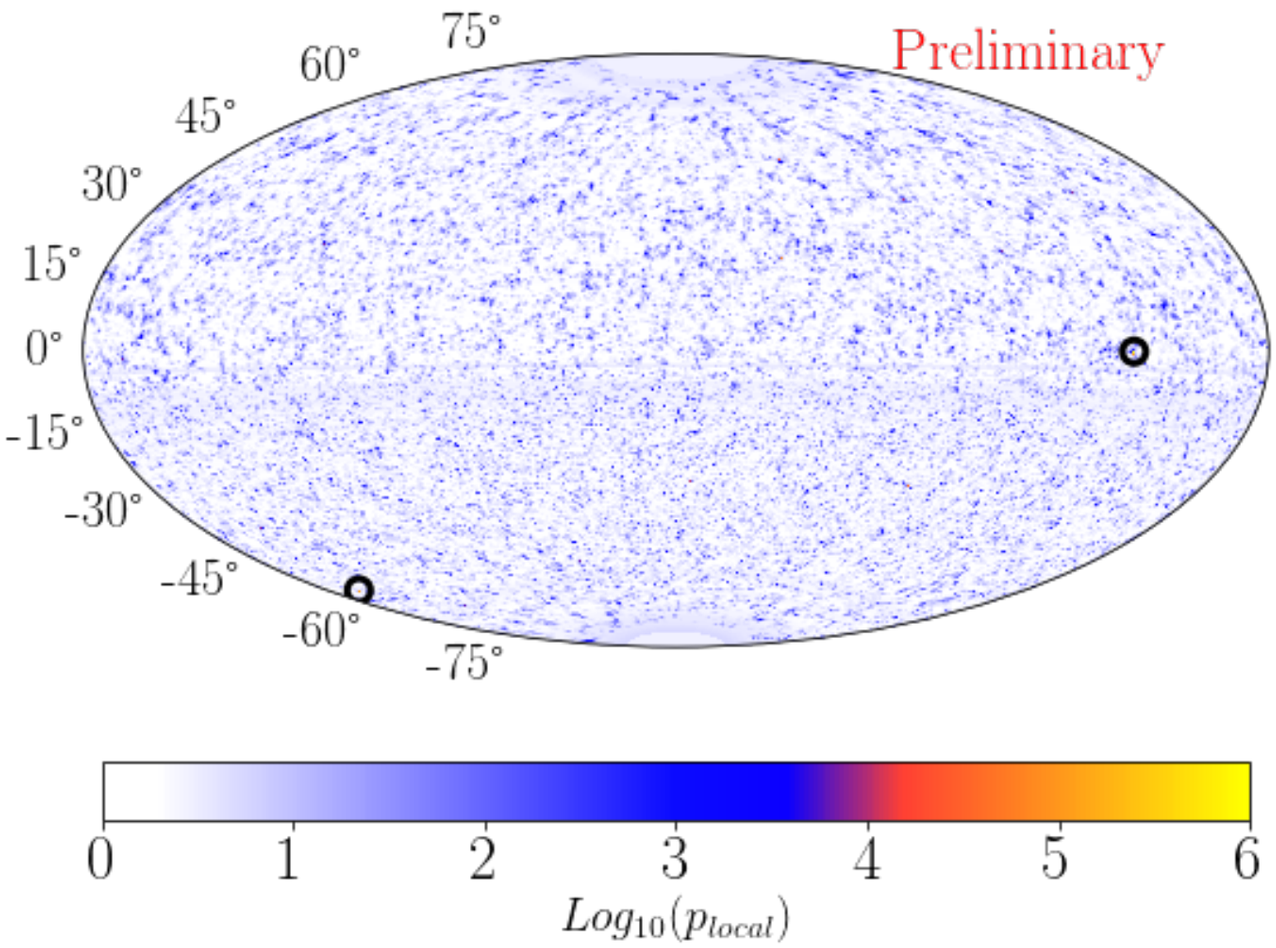
Further future collaboration meetings

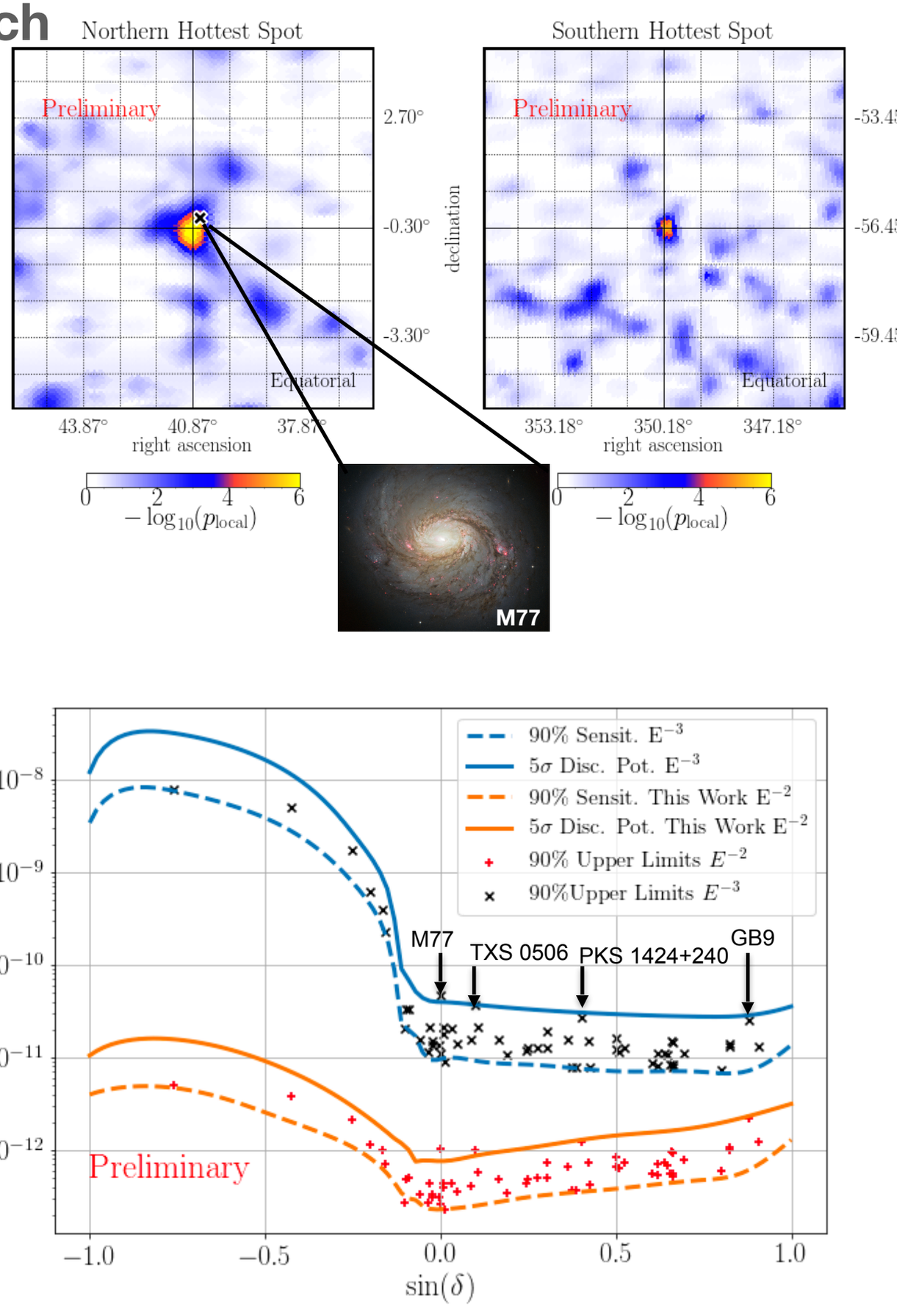
Fall 2020 - Madison WI USA (premeetings likely starting September 19, formal meeting September 22 - 26. Meeting will be followed by IceCube Particle Astrophysics Symposium that celebrates 10 years of IceCube (September 28-30).

Spring 2021 - Aachen Germany

A few science highlights

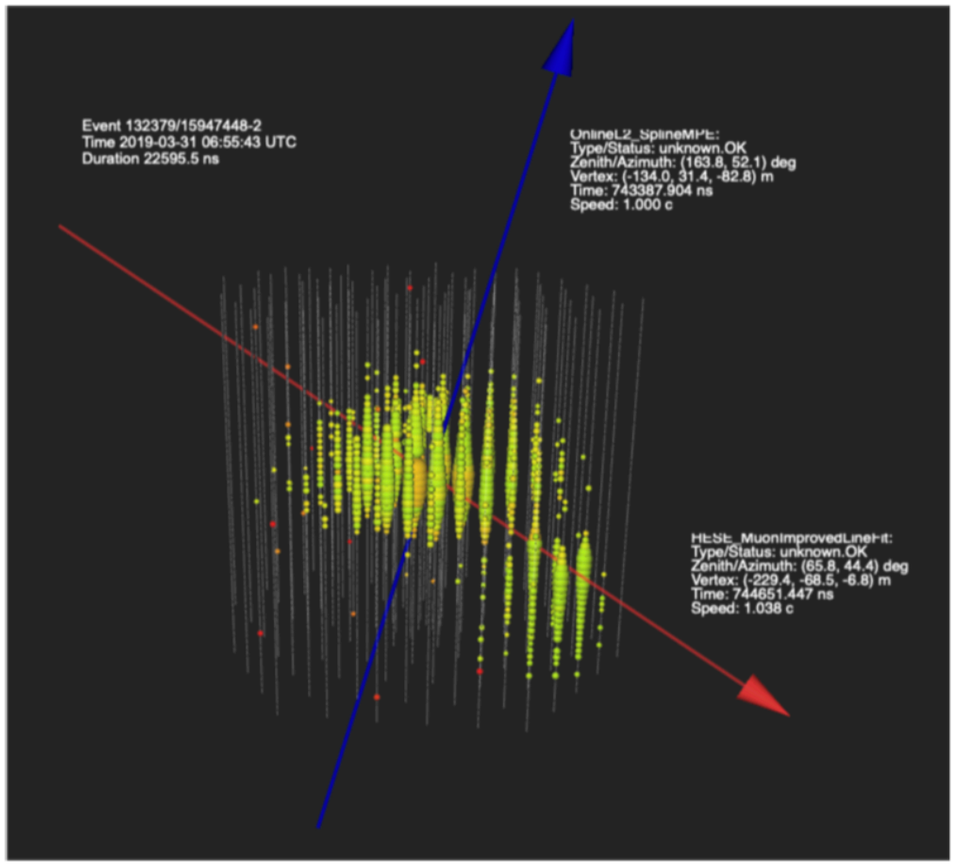
10 year integrated point source search

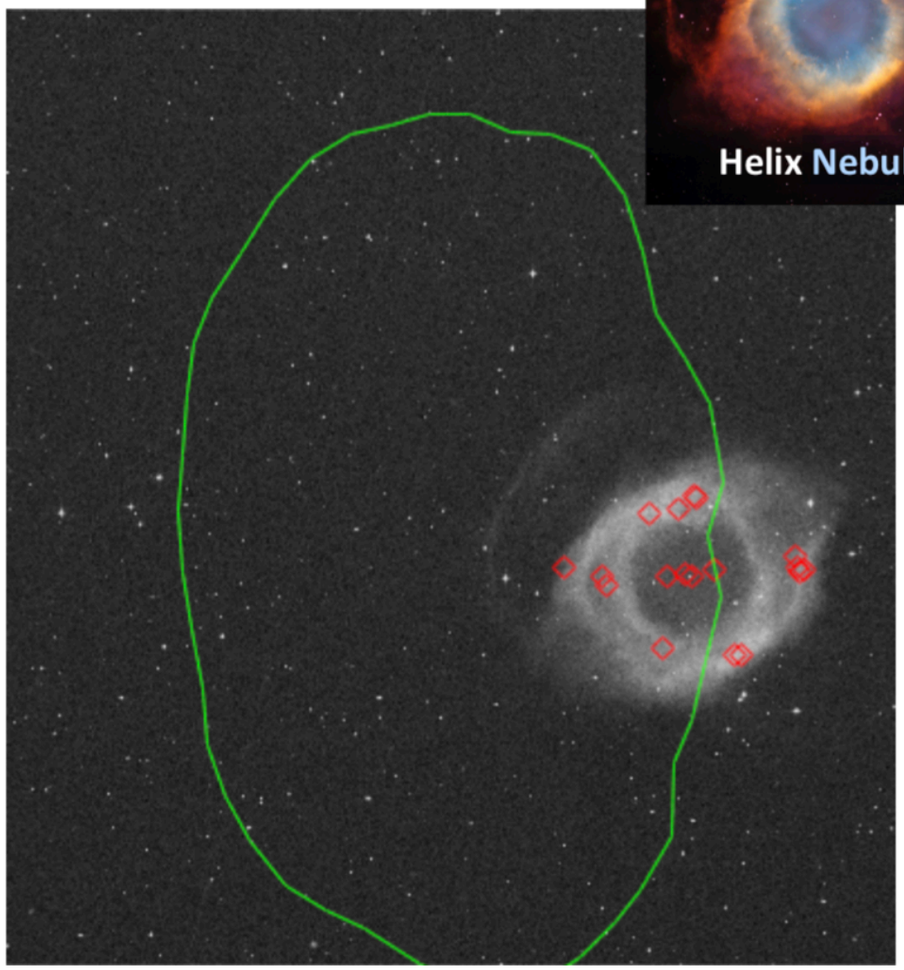




A larger detector with better angular resolution -> discovery level

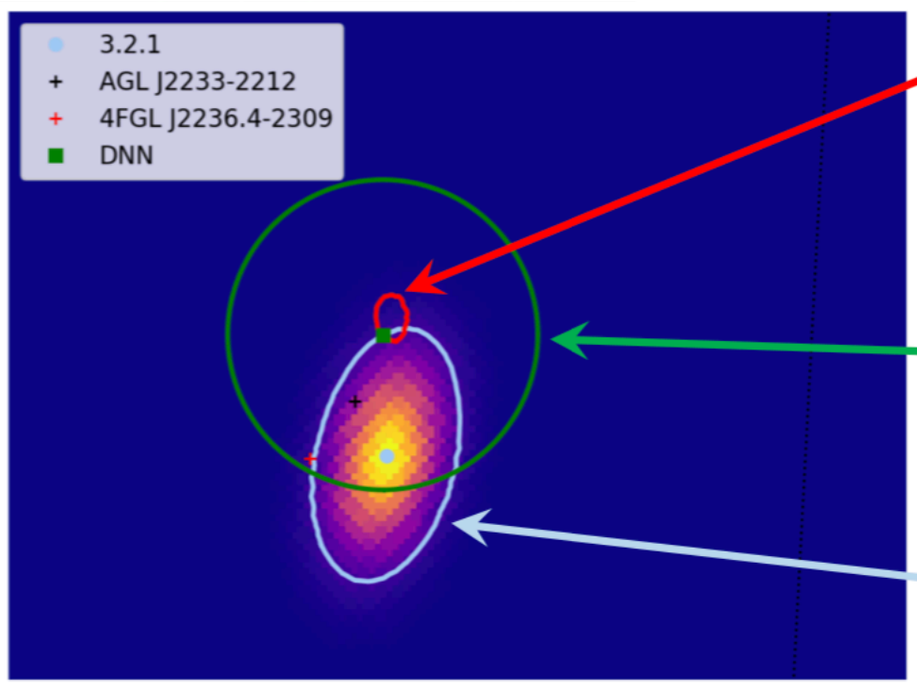
IC-190331A





Highest energy neutrino candidate to date; most probably energy exceeds 13 PeV

Efforts underway to better localize the event parameters



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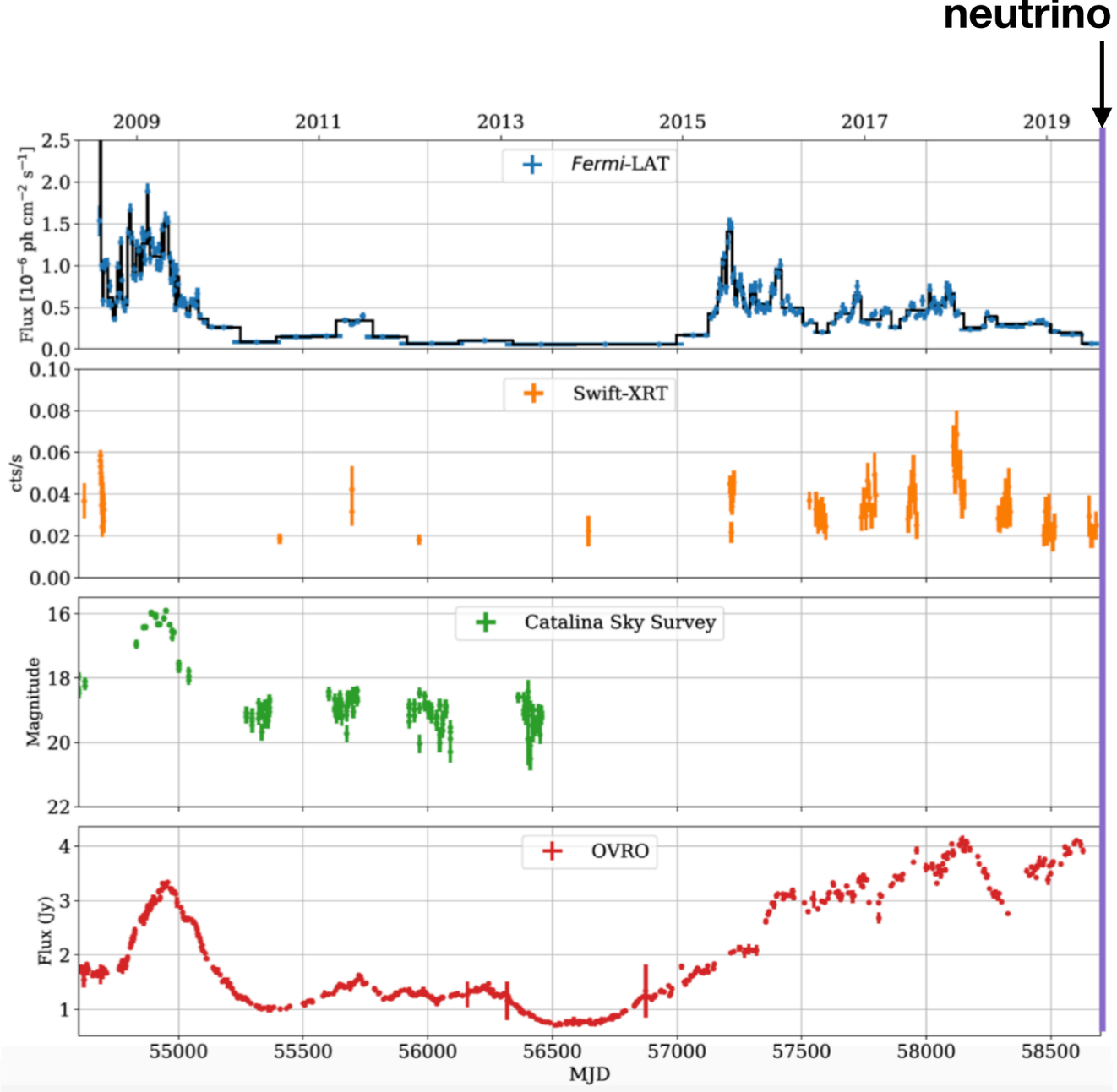
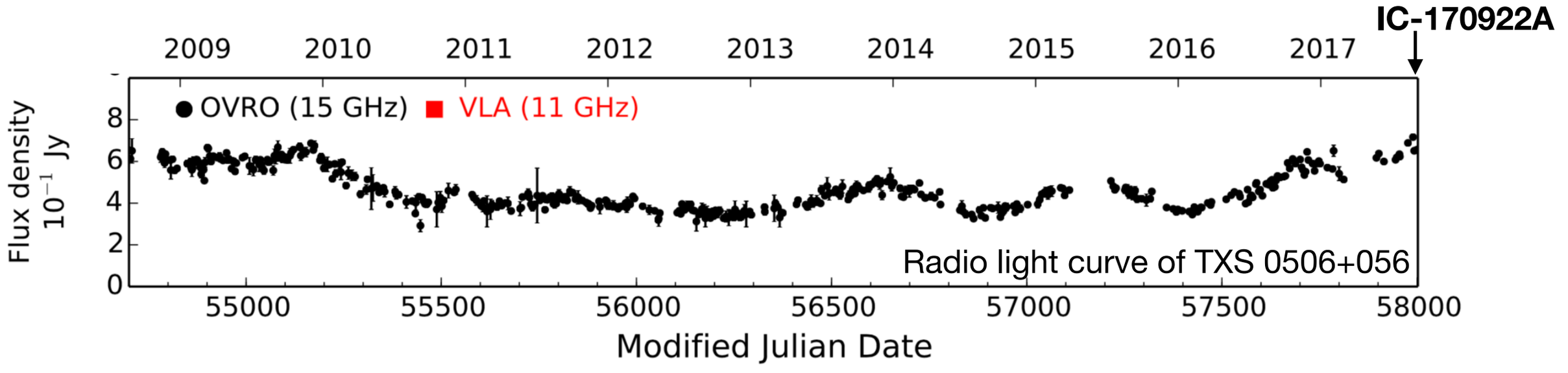
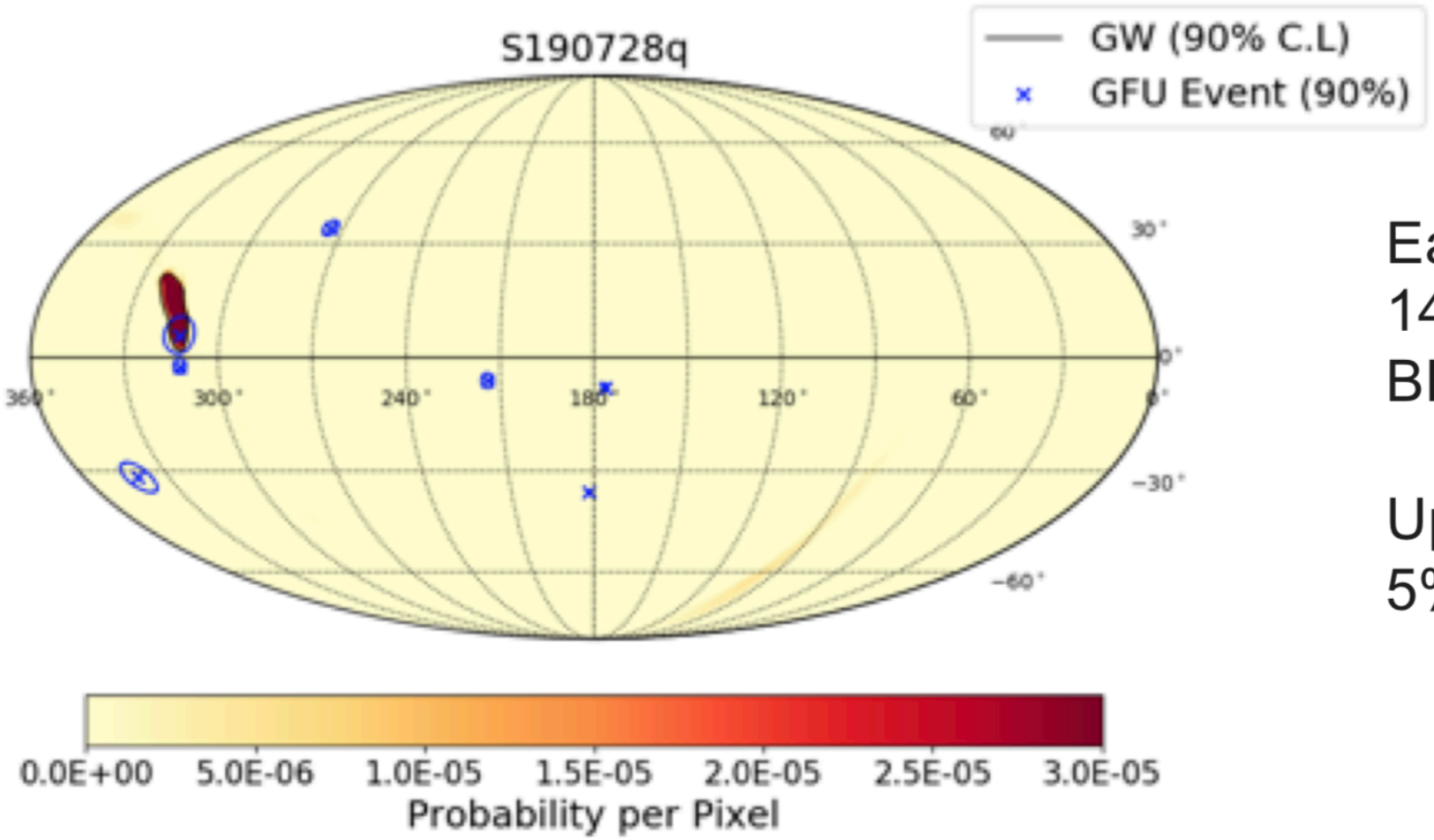
Coincident with PKS 1502+106

11th brightest blazar in the GeV sky





Gravitational wave follow-up



Early classification:
14.4% NS/BH, 34.0% BH/BH, 51.6% Mass gap

Updated to: 95% BH/BH. 5% Mass gap

dt (ns)	RA (deg)	Dec (deg)	Ang. Uncert. (deg)	P-value (Bayesian)	P-value (generic transient)
-360	312.87	5.85	4.81	0.010 (2.33 σ)	0.016 (2.21 σ)

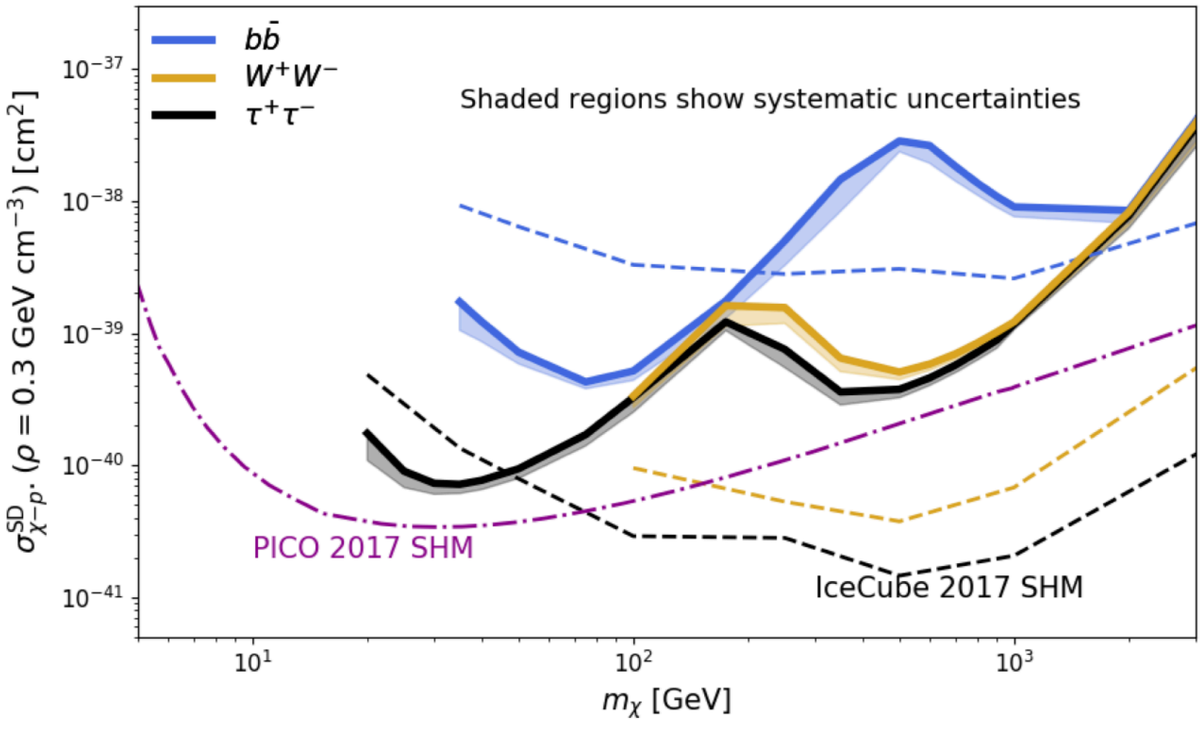
The Standard Model and beyond

Efforts on multiple fronts towards enhancing our precision knowledge of neutrino properties. Expect new results of the global fit for high-energy neutrinos, and for neutrino oscillations in the next year

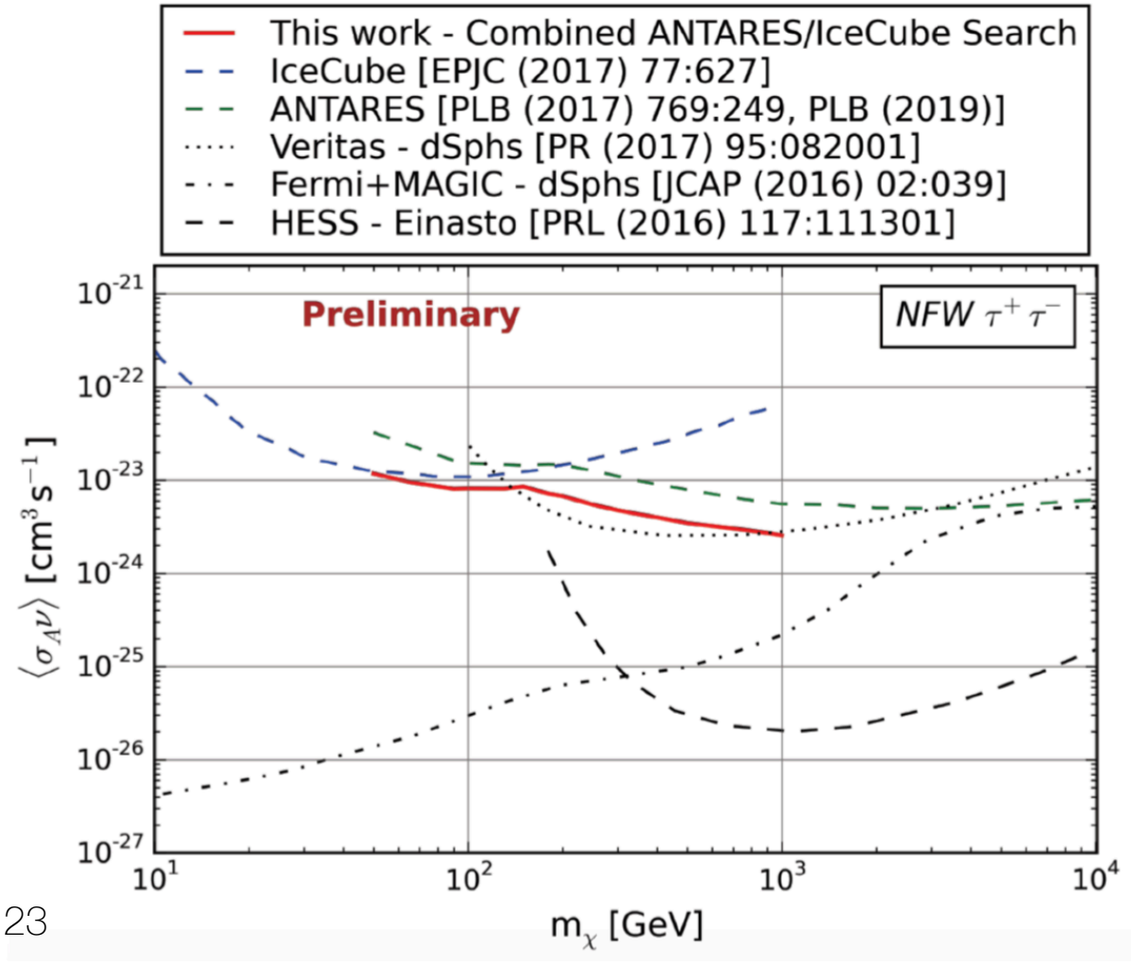
Continue to produce world-leading limits in dark matter searches, including advances through a number of new joint analysis with partner project

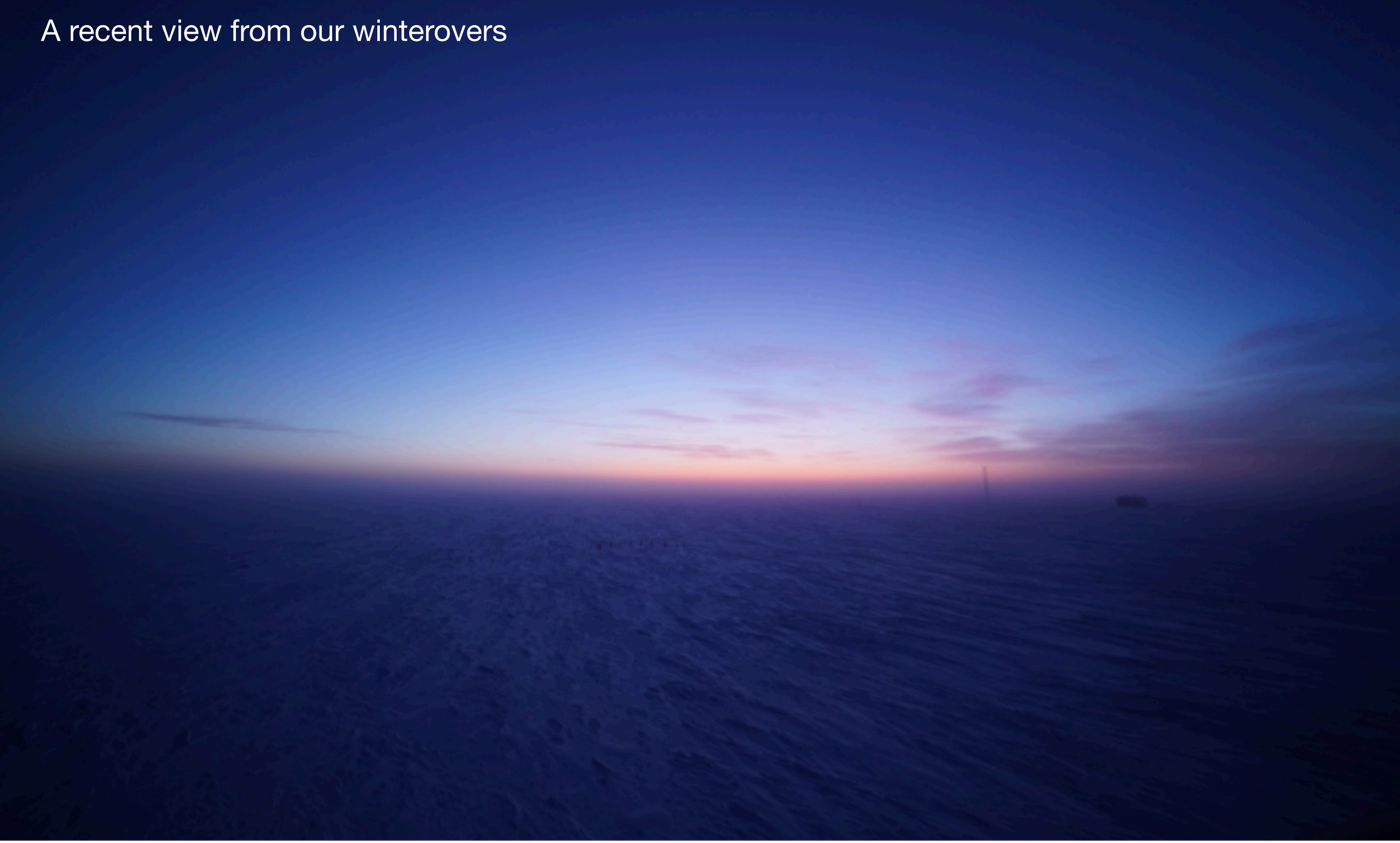
Beyond the Standard Model searches continue to explore crucial new parameter spaces. Coming soon are new leading results in searches for sterile neutrinos, tests of quantum gravity

IceCube & PICO



IceCube & ANTARES





Thank you! Questions?