THE EVENT HORIZON TELESCOPE

COMMUNICATIONS WITH LARGE, MULTI-INSTITUTIONAL COLLABORATIONS LESSONS LEARNED

JESSICA DEMPSEY

EAST ASIAN OBSERVATORY

EVENT HORIZON TELESCOPE COLLABORATION

Event Horizon Telescope

James Clerk Maxwell Telescope
East Asian Observatory

MMA/TDA Media Workshop AAS January 2021

OVERVIEW

The M87* black hole shadow world-wide simultaneous press announcement from the Event Horizon Telescope in April 2019

The challenge of embargoes

The Hawaii media release and Pōwehi

Applying lessons learned to the Venus phosphine announcement

Future results and plans


EHT BLACK HOLE IMAGE
SOURCE: NSF
PLUTO
VOYAGER 1
SUN
42μas

SHORT WAVELENGTH VLBI

VLBI had never been achieved at this wavelength, at this scale

To do so meant pushing technological envelopes in:

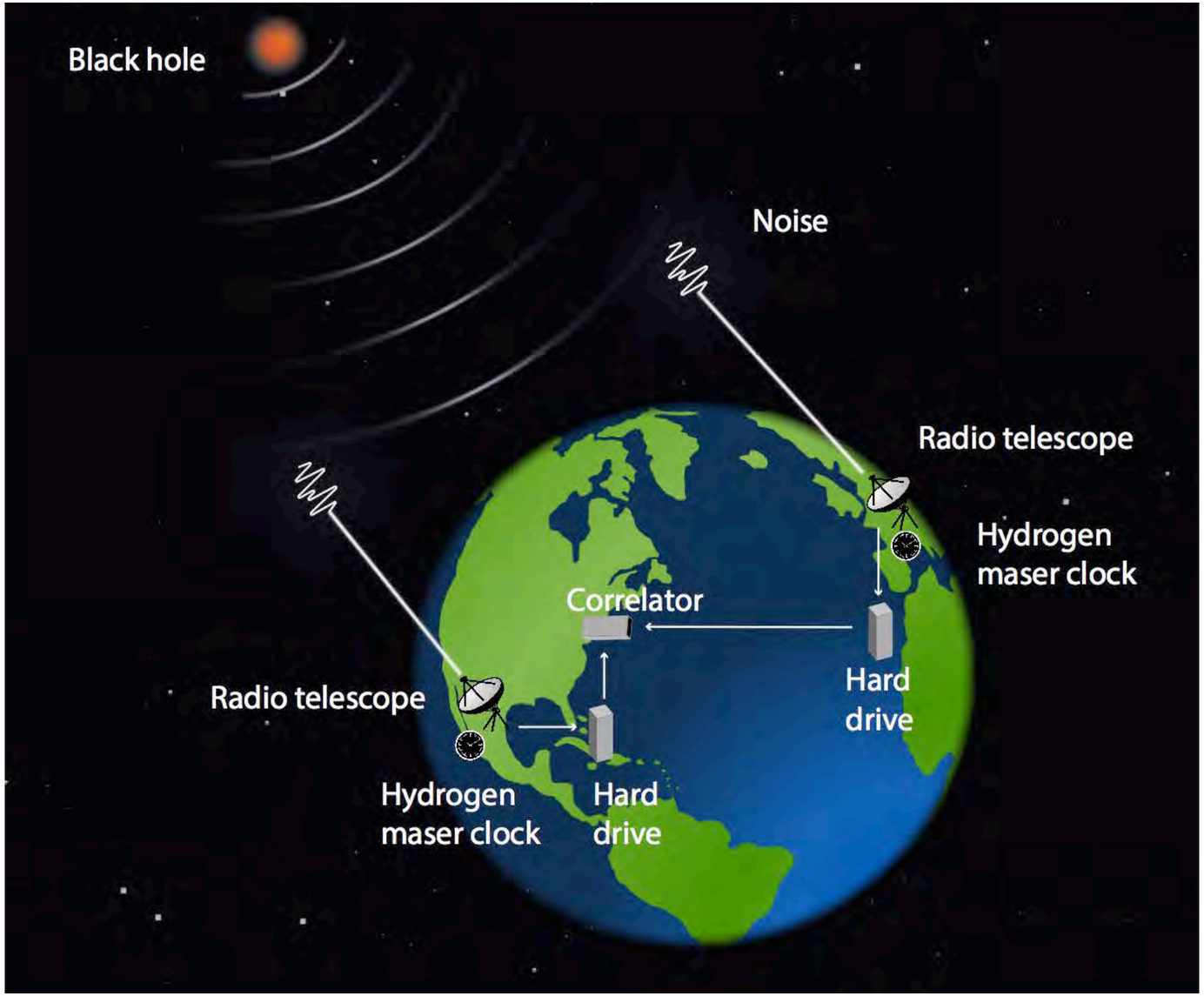
Timing and spacial accuracy

Data rates

Data volume

Global logistical coordination

…and every available millimeter and submillimeter mirror on the planet



Slide courtesy: S Doeleman

A TRUE GLOBAL COLLABORATION

3.5PB of data needed to be flown to a central location

Just confirming the telescopes were synced took months (and more - the South Pole disks were delayed until the October station open)

Then…lots of math.

One of the key goals for the team was to be absolutely sure we knew what we had - this means redundancy…

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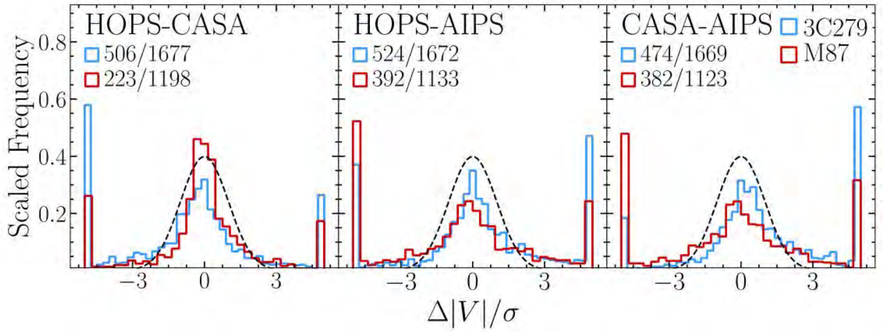

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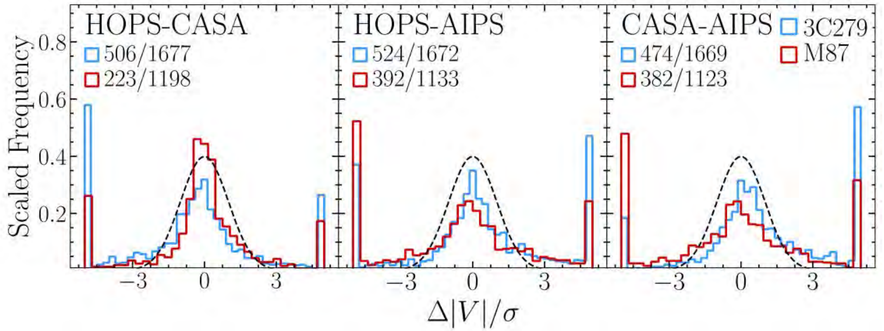
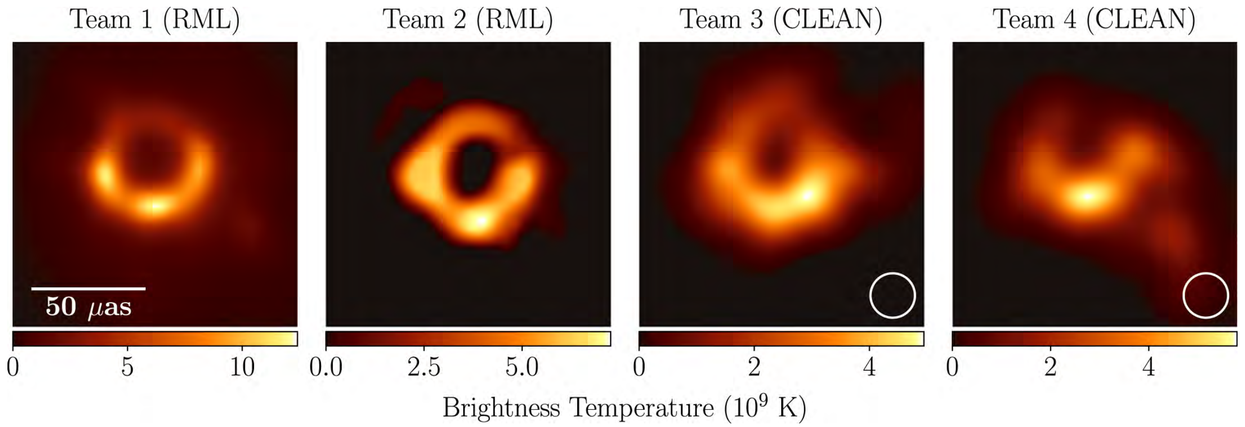
Calibration

Imaging





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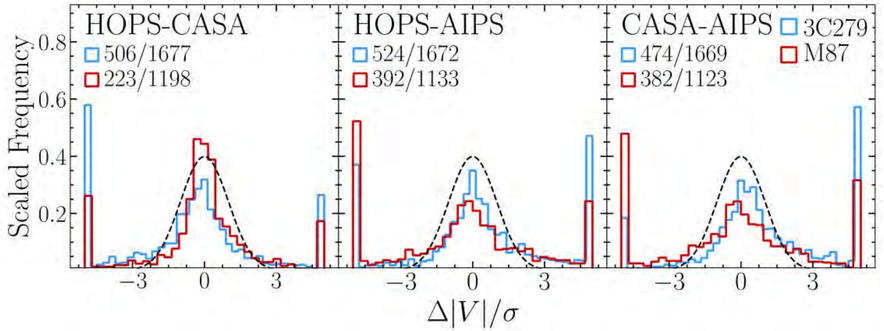
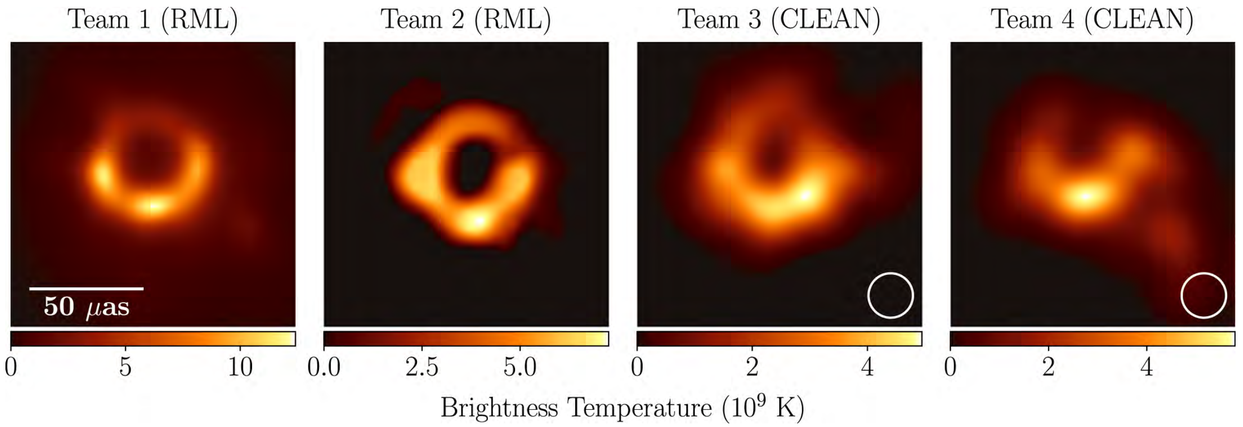
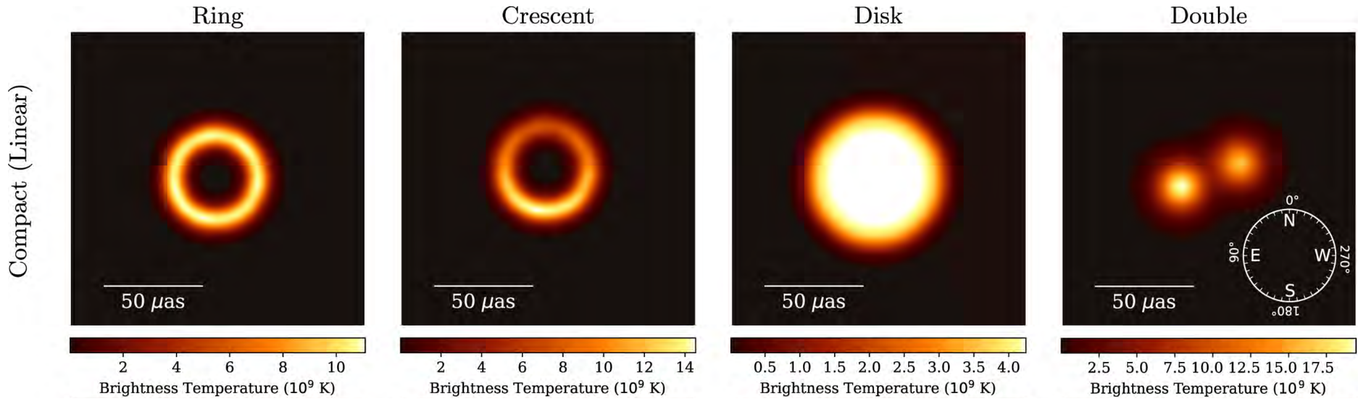
Calibration

Imaging

Models







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3.5PB of data

Just confirm
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One of the key g
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12.5 15.0 17.5
rature (10^9 K)

>200 members - 60 institutes - 20 countries/regions

6 PAPERS, OVER 300 AUTHORS

The Event Horizon Telescope Collaboration,
Kazunori Akiyama[1,2,3,4], Antxon Alberdi[5], Walter Alef[6], Keiichi Asada[7], Rebecca Azulay[8,9,6], Anne-Kathrin Baczko[6], David Ball[10], Mislav Baloković[4,11], John Barrett[2], Dan Bintley[12], Lindy Blackburn[4,11], Wilfred Boland[13], Katherine L. Bouman[4,11,14], Geoffrey C. Bower[15], Michael Bremer[16], Christiaan D. Brinkerink[17], Roger Brissenden[4,11], Silke Britzen[6], Avery E. Broderick[18,19,20], Dominique Broguiere[16], Thomas Bronzwaer[17], Do-Young Byun[21,22], John E. Carlstrom[23,24,25,26], Andrew Chael[4,11], Chi-kwan Chan[10,27], Shami Chatterjee[28], Koushik Chatterjee[29], Ming-Tang Chen[15], Yongjun Chen (陈永军)[30,31], Ilje Cho[21,22], Pierre Christian[10,11], John E. Conway[32], James M. Cordes[28], Geoffrey B. Crew[2], Yuzhu Cui[33,34], Jordy Davelaar[17], Mariafelicia De Laurentis[35,36,37], Roger Deane[38,39], Jessica Dempsey[12], Gregory Desvignes[6], Jason Dexter[40], Sheperd S. Doeleman[4,11], Ralph P. Eatough[6], Heino Falcke[17], Vincent L. 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Ortiz-León[6], Tomoaki Oyama[33], Feryal Özel[10], Daniel C. M. Palumbo[4,11], Nimesh Patel[11], Ue-Li Pen[18,78,79,80], Dominic W. Pesce[4,11], Vincent Piétu[16], Richard Plambeck[81], Aleksandar PopStefanija[76], Oliver Porth[29,36], Ben Prather[45], Jorge A. Preciado-López[18], Dimitrios Psaltis[10], Hung-Yi Pu[18], Venkatessh Ramakrishnan[75], Ramprasad Rao[15], Mark G. Rawlings[12], Alexander W. Raymond[4,11], Luciano Rezzolla[36], Bart Ripperda[36], Freek Roelofs[17], Alan Rogers[2], Eduardo Ros[6], Mel Rose[10], Arash Roshaneshat[10], Helge Rottmann[6], Alan L. Roy[6], Chet Ruszczyk[2], Benjamin R. Ryan[82,83], Kazi L. J. Rygl[65], Salvador Sánchez[84], David Sánchez-Arguelles[52,85], Mahito Sasada[33,86], Tuomas Savolainen[6,87,88], F. Peter Schloerb[76], Karl-Friedrich Schuster[16], Lijing Shao[6,51], Zhiqiang Shen (沈志强)[30,31], Des Small[58], Bong Won Sohn[21,22,89], Jason SooHoo[2], Fumie Tazaki[33], Paul Tiede[19,20], Remo P. J. Tilanus[17,47,90], Michael Titus[2], Kenji Toma[91,92], Pablo Torne[6,84], Tyler Trent[10], Sascha Trippe[93], Shuichiro Tsuda[33], Ilse van Bemmel[58], Huib Jan van Langevelde[58,94], Daniel R. van Rossum[17], Jan Wagner[6], John Wardle[95], Jonathan Weintroub[4,11], Norbert Wex[6], Robert Wharton[6], Maciek Wielgus[4,11], George N. Wong[45], Qingwen Wu (吴庆文)[96], Ken Young[11], André Young[17], Ziri Younsi[97,36], Feng Yuan (袁峰)[30,48,98], Ye-Fei Yuan (袁业飞)[99], J. Anton Zensus[6], Guangyao Zhao[21], Shan-Shan Zhao[17,63], Ziyan Zhu[44], Juan-Carlos Algaba[7,100], Alexander Allardi[101], Rodrigo Amestica[102], Jadyn Anczarski[103], Uwe Bach[6], Frederick K. Baganoff[104], Christopher Beaudoin[2], Bradford A. Benson[26,24], Ryan Berthold[12], Jay M. Blanchard[75,58], Ray Blundell[11], Sandra Bustamente[105], Roger Cappallo[2], Edgar Castillo-Domínguez[105,106], Chih-Cheng Chang[7,107], Shu-Hao Chang[7], Song-Chu Chang[107], Chung-Chen Chen[7], Ryan Chilson[15], Tim C. Chuter[12], Rodrigo Córdova Rosado[4,11], Iain M. Coulson[12], Thomas M. Crawford[24,25], Joseph Crowley[108], John David[84], Mark Derome[2], Matthew Dexter[109], Sven Dornbusch[6], Kevin A. Dudevoir[2,144], Sergio A. Dzib[6], Andreas Eckart[6,110], Chris Eckert[2], Neal R. Erickson[76], Wendeline B. Everett[111], Aaron Faber[112], Joseph R. Farah[4,11,113], Vernon Fath[76], Thomas W. Folkers[10], David C. Forbes[10], Robert Freund[10], Arturo I. Gómez-Ruiz[105,106], David M. Gale[105], Feng Gao[30,40], Gertie Geertsema[114], David A. Graham[6], Christopher H. Greer[10], Ronald Grosslein[76], Frédéric Gueth[16], Daryl Haggard[115,116,117], Nils W. Halverson[118], Chih-Chiang Han[7], Kuo-Chang Han[107], Jinchi Hao[107], Yutaka Hasegawa[7], Jason W. Henning[23,119], Antonio Hernández-Gómez[67,120], Rubén Herrero-Illana[121], Stefan Heyminck[6], Akihiko Hirota[3,7], James Hoge[12], Yau-De Huang[7], C. M. Violette Impellizzeri[7,1], Homin Jiang[7], Atish Kamble[4,11], Ryan Keisler[25], Kimihiro Kimura[7], Yusuke Kono[3], Derek Kubo[122], John Kuroda[12], Richard Lacasse[102], Robert A. Laing[123], Erik M. Leitch[23], Chao-Te Li[7], Lupin C.-C. Lin[7,124], Ching-Tang Liu[107], Kuan-Yu Liu[7], Li-Ming Lu[107], Ralph G. Marson[125], Pierre L. Martin-Cocher[7], Kyle D. Massingill[10], Callie Matulonis[12], Martin P. McColl[10], Stephen R. McWhirter[2], Hugo Messias[121,126], Zheng Meyer-Zhao[7,127], Daniel Michalik[128,129], Alfredo Montaña[105,106], William Montgomerie[12], Matias Mora-Klein[102], Dirk Muders[6], Andrew Nadolski[46], Santiago Navarro[84], Joseph Neilsen[103], Chi H. Nguyen[10,130], Hiroaki Nishioka[7], Timothy Norton[11], Michael A. Nowak[131], George Nystrom[15], Hideo Ogawa[132], Peter Oshiro[15], Tomoaki Oyama[133], Harriet Parsons[12], Scott N. Paine[11], Juan Peñalver[84], Neil M. Phillips[121,126], Michael Poirier[2], Nicolas Pradel[7], Rurik A. Primiani[134], Philippe A. Raffin[15], Alexandra S. Rahlin[23,135], George Reiland[10], Christopher Risacher[16], Ignacio Ruiz[84], Alejandro F. Sáez-Madaín[102,126], Remi Sassella[16], Pim Schellart[17,136], Paul Shaw[7], Kevin M. Silva[12], Hotaka Shiokawa[11], David R. Smith[137,138], William Snow[15], Kamal Souccar[76], Don Sousa[2], T. K. Sridharan[11], Ranjani Srinivasan[15], William Stahm[12], Anthony A. Stark[11], Kyle Story[139], Sjoerd T. Timmer[17], Laura Vertatschitsch[11,134], Craig Walther[12], Ta-Shun Wei[7], Nathan Whitehorn[140], Alan R. Whitney[2], David P. Woody[141], Jan G. A. Wouterloot[12], Melvin Wright[142], Paul Yamaguchi[11], Chen-Yu Yu[7], Milagros Zeballos[105,143], Shuo Zhang[104], and Lucy Ziurys[10]

MANAGEMENT

Director	Shep Doeleman
Project Scientist	Dimitrios Psaltis
Project Manager	Remo Tilanus

SCIENCE COUNCIL

Keiichi Asada (ASIAA)

Geoffrey Bower (ASIAA) - Vice Chair

Heino Falcke (Radboud) - Chair

Vincent Fish (MIT)

Charles Gammie (U. Illinois)

Ciriaco Goddi (Radboud) - Secretary

Thomas Krichbaum (MPIfR)

Sera Markoff (U. Amsterdam)

Dan Marrone (U. Arizona)

Jim Moran (SAO/CfA)

Feryal Ozel (U. Arizona)

WORKING GROUP COORDINATORS

Instrumentation

Development: Gopal Narayanan, Jonathan Weintroub
Integration and Testing: Alan Roy, Andre Young, Satoki Matsushita
Array Coordination & Readiness: Remo Tilanus, David James
Monitoring and Control: Daan van Rossum, Nimesh Patel

Data Collection and Processing

Proposal Coordination: Michael Johnson, Eduardo Ros, Keiichi Asada, Sera Markoff
Science Operations: Vincent Fish, Thomas Krichbaum
Correlations: Walter Alef, Geoff Crew
Synthetic Data Generation: Vincent Fish, Roger Deane
Calibration and Error Analysis: Lindy Blackburn, Ilse van Bemmel

Data Analysis

Imaging: Michael Johnson, Kazunori Akiyama
Scattering: Geoff Bower, Ramesh Narayan
Time Variability: Dan Marrone
Polarimetry: Monika Mościbrodzka, Ivan Martí-Vidal

Near Horizon Science Utilization

Parameter Definition: Heino Falcke, Keiichi Asada
Theoretical Models and Simulations: Charles Gammie, Hung-Yi Pu, Yosuke Mizuno
Model Comparison and Feature Extraction: Jason Dexter, Feryal Özel

Beyond Horizon Science Utilization

Multiwavelength Science: Sera Markoff, Kazuhiro Hada
Active Galactic Nuclei: Svetlana Jorstad, Thomas Krichbaum, Neil Nagar
Pulsars: Jim Cordes, Michael Kramer, Scott Ransom

Products and Publicatons

Software and Data Compatibility: Chi-kwan Chan, Ciriaco Goddi
Publications: Laurent Loinard, Huib van Langevelde
Outreach: Mislav Baloković, Eduardo Ros, Fumie Tazaki

THE DOUBLE-EDGED SWORD OF EMBARGOES

Needed for greatest impact

Harder the bigger the news, the bigger the team

Meant internal coms were restricted when greatest value would have been in sharing amongst the wider collaboration

Concerns were raised about the inexperience of collaboration members in communicating with the media - highlighting media training needs for scientists

Worldwide Synchronized Press Conferences: April 10th, 2019

Brussels

Washington DC

Santiago, Chile

Taipei

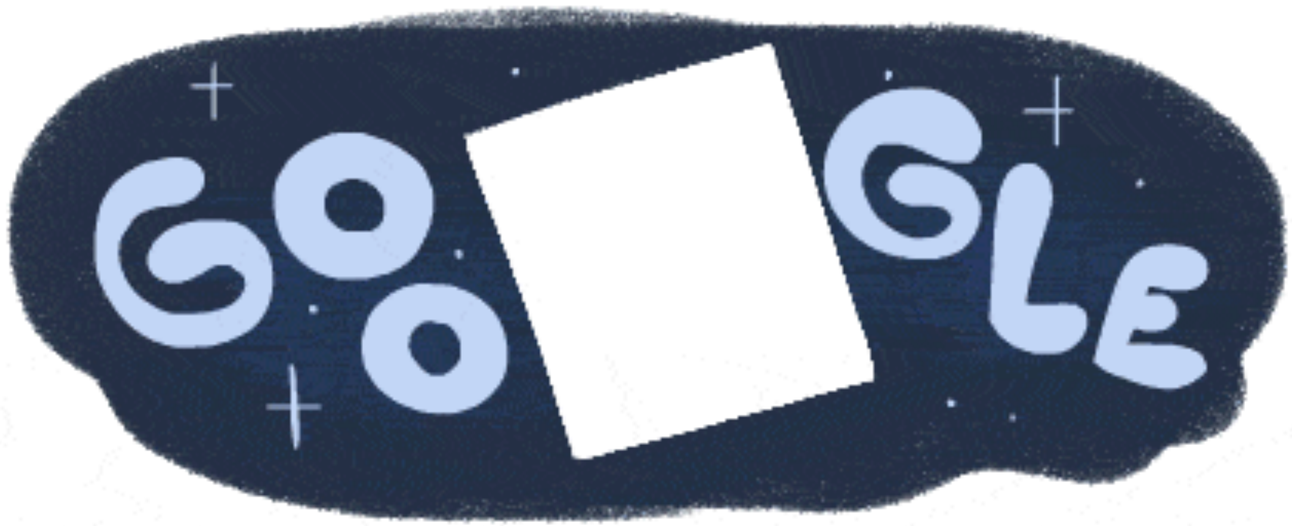
Tokyo

Shanghai

Event Horizon Telescope

The Black Hole Shadow in M 87

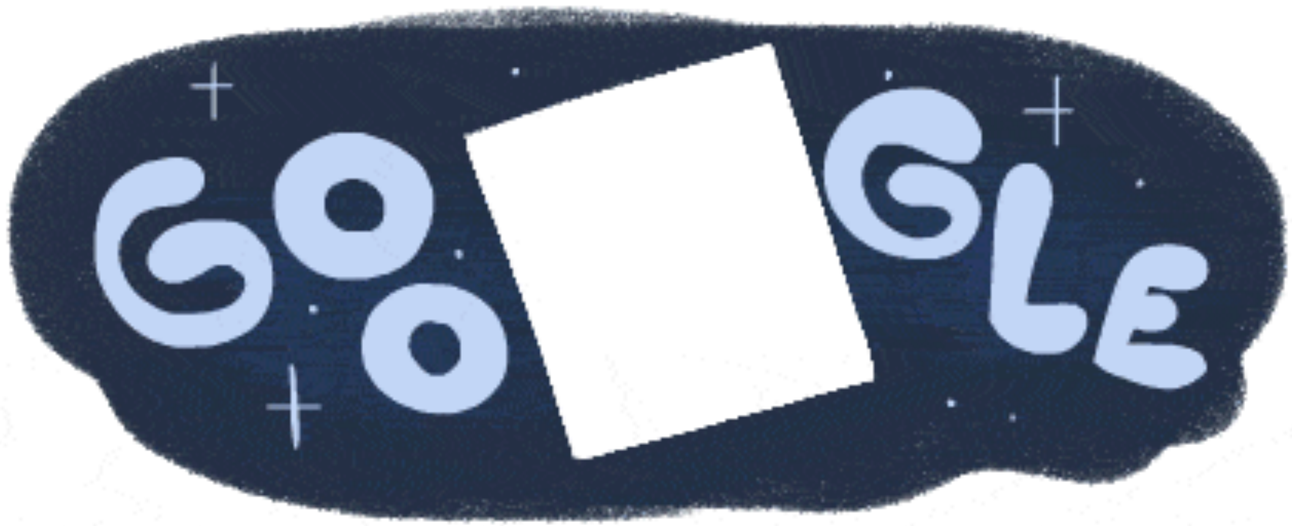
Cover Pages, 2019 April 1`



Event Horizon Telescope

The Black Hole Shadow in M 87

Cover Pages, 2019 April 1`



THE CONNECTION FROM LOCAL STORIES

Pōwehi impacted in Hawaii and around the world

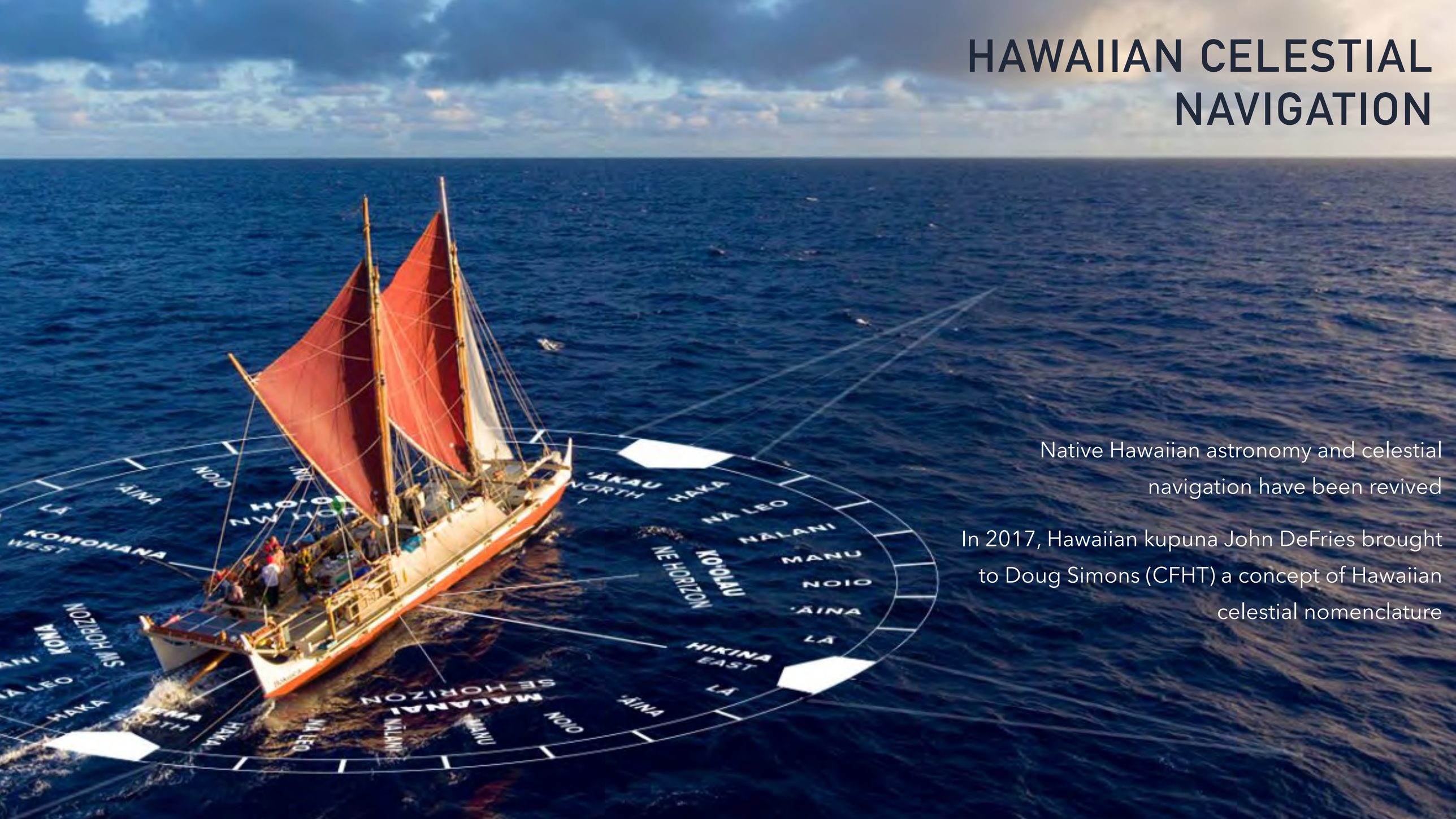
Cultural and community connection creates new stories

Scientists are unused to not being the experts in all things (and they should be banned from naming things)

Curating local releases to include local stories, culture and community is a way to enrich a world-wide collaboration and create more diverse and fair attribution and acknowledgement to team members

It also connects with the public, locally and more broadly, in different ways

HAWAIIAN CELESTIAL NAVIGATION



Native Hawaiian astronomy and celestial navigation have been revived

In 2017, Hawaiian kupuna John DeFries brought to Doug Simons (CFHT) a concept of Hawaiian celestial nomenclature

PROFESSOR LARRY KIMURA

THE GRANDFATHER OF THE HAWAIIAN LANGUAGE REVITALIZATION

Professor Kimura has initiated systematic efforts to retain knowledge of the Hawaiian language and return it to common use for new generations in Hawai'i.

"The success of the A Hua He Inoa pilot nomenclature project is a huge step forward for the fusion of indigenous culture and modern day science. By designating Hawaiian names for Hawai'i-born discoveries we enrich our connection to Hawai'i's cosmic genealogy and help people gain a spiritual sense of understanding, a greater grasp of Hawaiian culture as it relates to the universe."

Ka'iu Kimura, executive director of the 'Imiloa Astronomy Center

Pōwehi

Pō, profound dark source of unending creation, is a concept emphasized and repeated over and over in the Kumulipo, the primordial creation chant of the Hawaiian universe. It links the Hawaiian genealogy back into a pō of ceaseless creation. The words kumu and lipo, literally mean, source of deep darkness, accentuating the fathomless power of pō.

Wehi, or wehiwehi, honored with embellishments, is one of the many descriptions of pō found in the Kumulipo and so the name Pōwehi.

- Dr. Larry Kimura

The New York Times

That First Black Hole Seen in an Image Is Now Called Pōwehi, at Least in Hawaii

CNN World » US | Africa | Americas | Asia | Australia | China | Europe | Middle East | India | UK

The first black hole to be photographed now has a name

By Rob Picheta, CNN

Updated 1057 GMT (1857 HKT) April 12, 2019

U.S. POLITICS WORLD TECH ENTER

Black Hole Given the Hawaiian Name 'Powehi.' Here's What That Means

Read More

SCIENCE

SpaceX Laur
Rocket and
Lands All Th

New York Times, CNN, Time Magazine

The New York Times

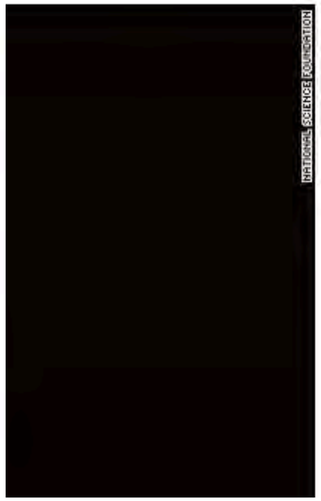
That First Black Hole Seen in an Image Is Now Called

CNN World » US | Africa | Americas | Asia | Australia | China | Europe | Middle East | India | UK

The first black hole to be photographed now has a name

Pōwehi - The Black Hole @powehi_official · Apr 12, 2019

#Powehi #BlackHole



New York Times, CNN, Time Magazine

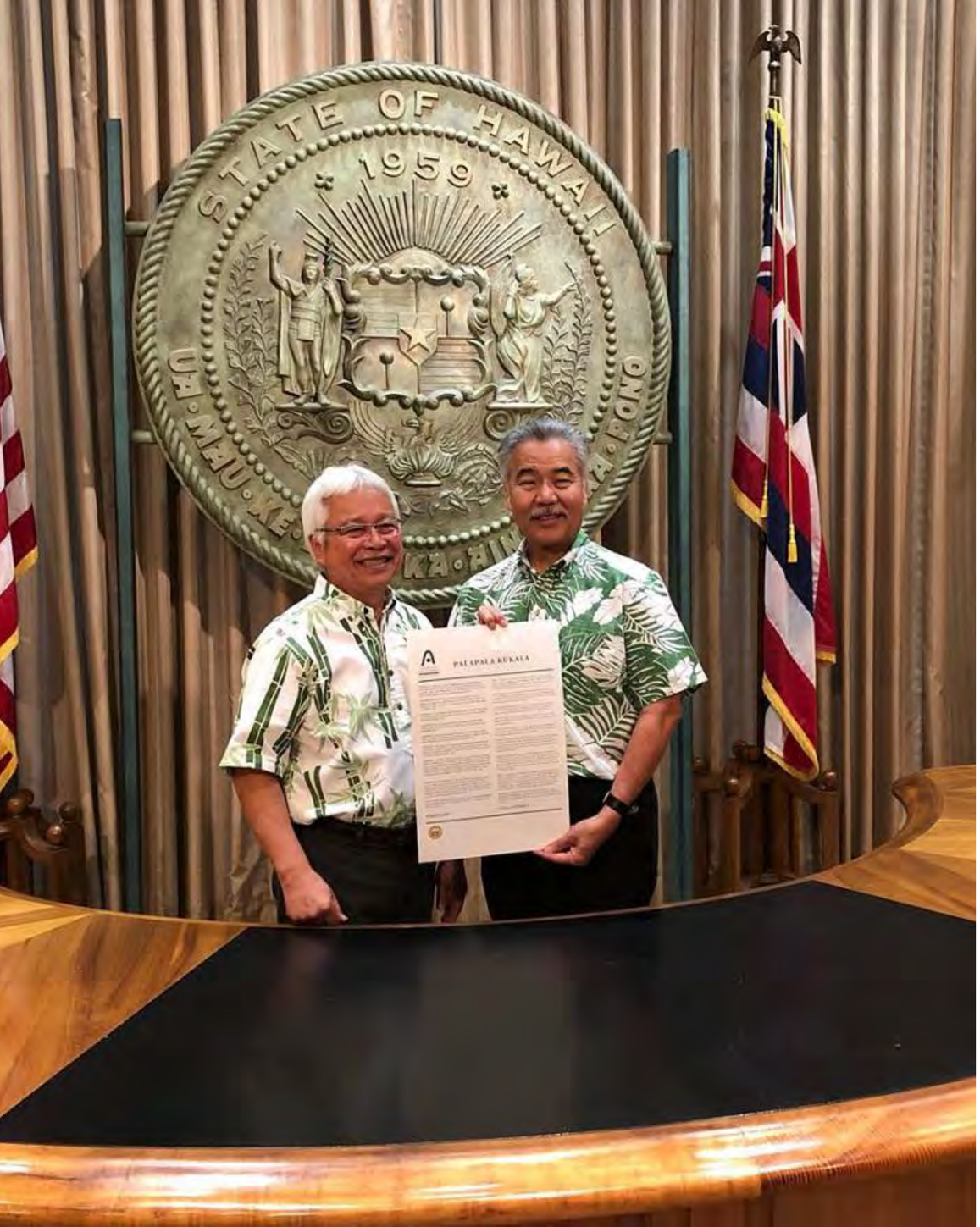
HAWAII PRESS IMPACT

GOING TO THE EXPERTS

We used a Hawaii-based PR firm for the Hawaii media coordination, strategy and implementation

Highly valuable for big news, sensitive news, and where internal teams lack these expertise (and most of the time, don’t need and can’t afford them)

These expertise can also be tapped for media training, strategy development, branding, public and internal surveying



PŌWEHI DAY

April 10 in the State of Hawaii is named Pōwehi Day by Governer Ige proclamation

First time a Maunakea Observatory press release is also released in ʻŌlelo Hawaii

Professor Kimura presents the first Hawaiian translation of a Governor proclamation back to Governor Ige

Congressman Case Praises Astronomers Who Captured Image of Black Hole

By Big Island Now

April 10, 2019, 12:18 PM HST (Updated April 10, 2019, 12:19 PM)

Recommend 20 people recommend this. Sign Up to see what your friends recommend.

Text Size: A A A

Representative Case gives speech on House floor

"I rise today to recognize the groundbreaking contributions of the James Clerk Maxwell Telescope and Submillimeter Array, located on the 13,803 feet summit of Mauna Kea in Hawai'i, and celebrate their contributions to a truly international effort producing the first-ever image of a black hole.

These Hawai'i observatories pioneered the study of black holes and, thanks to powerful new capabilities, perfect conditions atop Mauna Kea, and dedicated personnel, we can all look forward to more of JCMT and SMA's cutting edge discoveries in the future, in addition to the continued growth and reputation of Hawai'i as a world leader in exploring our heavens."

APPLYING OUR LESSONS

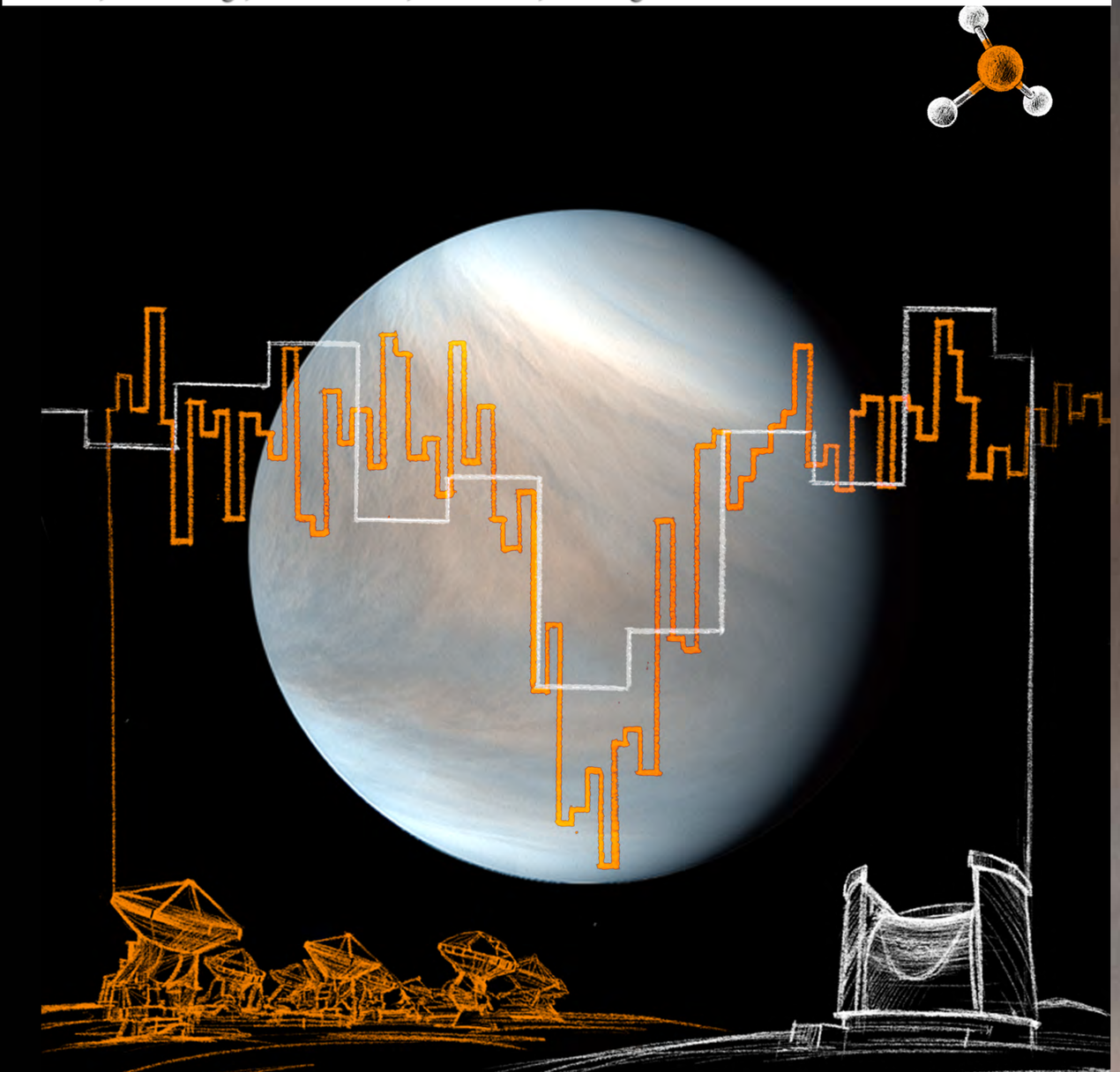
The JCMT/ALMA joint discovery of phosphine on Venus last year allowed us to put some of these lessons into action

We had a smaller author team, but we also knew this result was going to be impactful - and controversial

VENUS RESULT

Phosphine Gas in the Cloud Decks of Venus

Jane S. Greaves[1*†], Anita M. S. Richards[2], William Bains[3], Paul Rimmer[4], Hideo Sagawa[5], David L. Clements[6], Sara Seager[3‡§], Janusz J. Petkowski[3], Clara Sousa-Silva[3], Sukrit Ranjan[3¶], Emily Drabek-Maunder[1,7], Helen J. Fraser[8], Annabel Cartwright[1], Ingo Mueller-Wodarg[6], Zhuchang Zhan[3], Per Friberg[9], Iain Coulson[9], E'lisa Lee[9], Jim Hoge[9].



VENUS RESULT

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Phosphine Gas in the Cloud Decks of Venus

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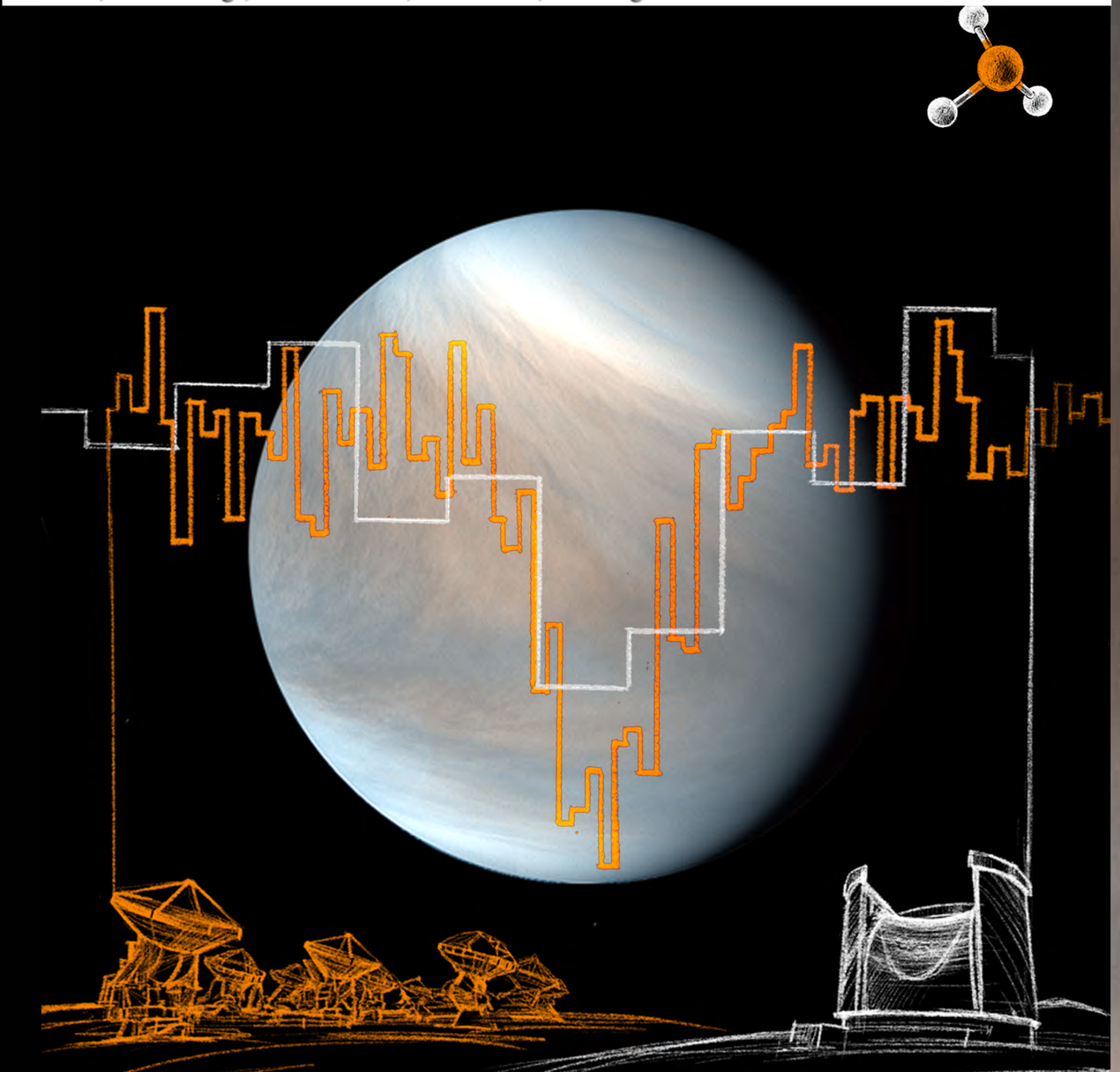

JCMT finds hints of life on Venus

Embargoed until: 14 September 2020 5am HST (3pm GMT)

DRAFT: NEED SIGN OFF FROM THE VENUS TEAM PRIOR TO PUBLICATION

MAUNAKEA HAWAI`I - An international team of astronomers, led by Professor Jane Greaves of Cardiff University, UK, today announced the discovery of a rare molecule – phosphine – in the clouds of Venus. On Earth, this gas is only made industrially, or by microbes that thrive in oxygen-free environments. The detection of phosphine could point to such extra-terrestrial "aerial" life. *"When we got the first hints of phosphine in Venus's spectrum, it was a shock!"*, said Jane, who first spotted signs of phosphine in observations from the James Clerk Maxwell Telescope (JCMT) in Hawai`i.

JCMT has detected phosphine in the mid-latitude clouds of Venus

Using RxA in 2018, the result will be published on September 14 in Nature

The only understood process to produce phosphine in such conditions is biological

VENUS RESULT

Led by JCMT ‘ohana Professor Jane Greaves

World-spanning, but small, author group

(UK, MIT, Japan, Hawaii)

IMPACT OF SOCIAL MEDIA

The Venus results were leaked in the days prior to the release date via slack, twitter and not by mainstream media but bloggers and amateur science reporters

The subsequent controversy was also primarily fueled via social media, as was the rallying support from the astronomical community, supporting the Venus authors and their work, that led to apologies from the detractors as well as a public IAU retraction

In this case, we could have been better served by a far stronger embargo on pre-release of information

The New York Times

OUT THERE

On Venus, Cloudy With a Chance of Microbial Life

Astrobiologists shift their gaze, and speculations, to Earth's broiling sister planet.

#VENUSNEWS

Publicity led in Hawaii by EAO team (Harriet Parsons) and the Bennet Group

maunakeaobservatories.org hosted the release (thanks to Gemini Observatory)

#1 Twitter handle for September 14

Worldwide coverage

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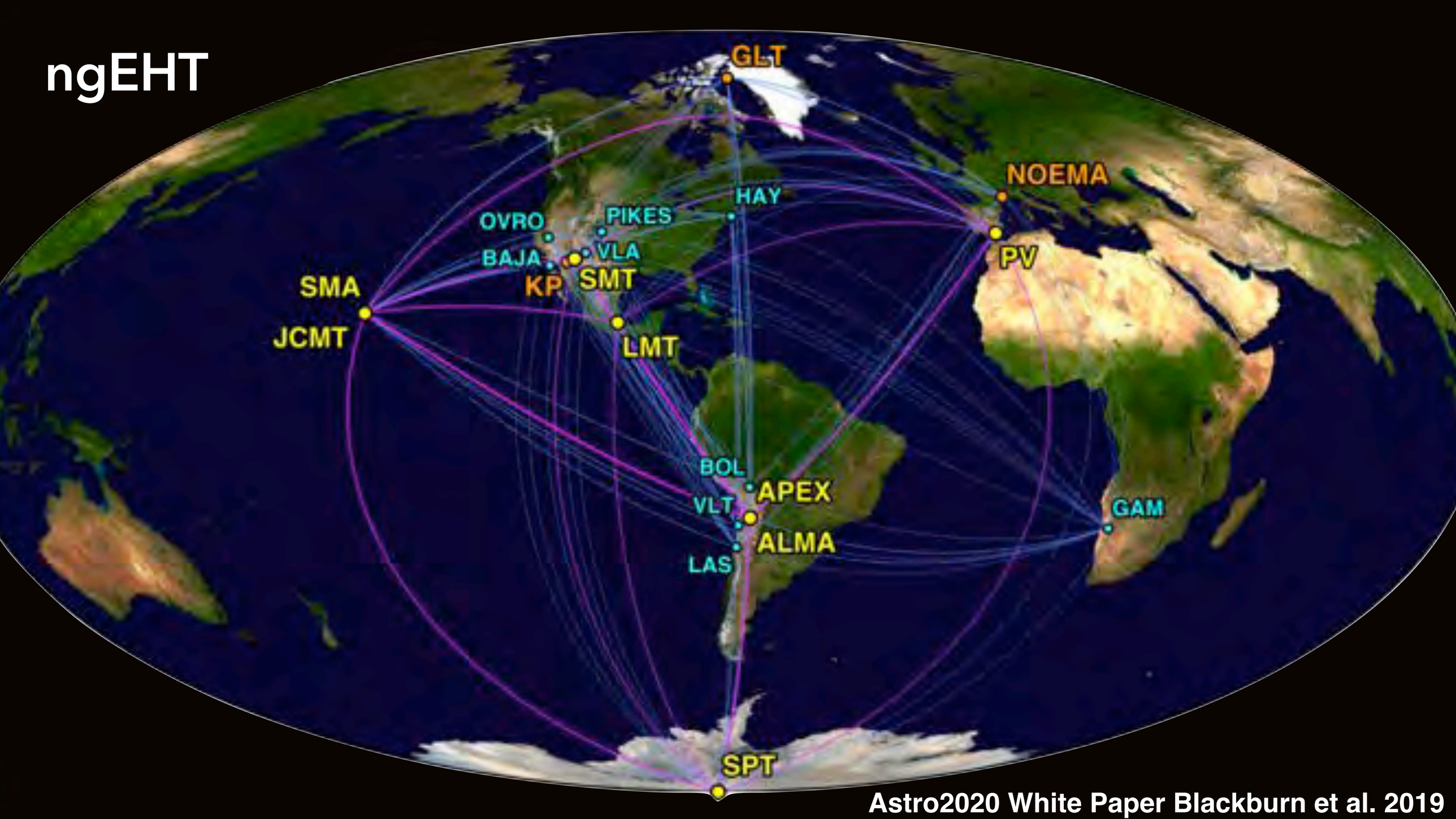
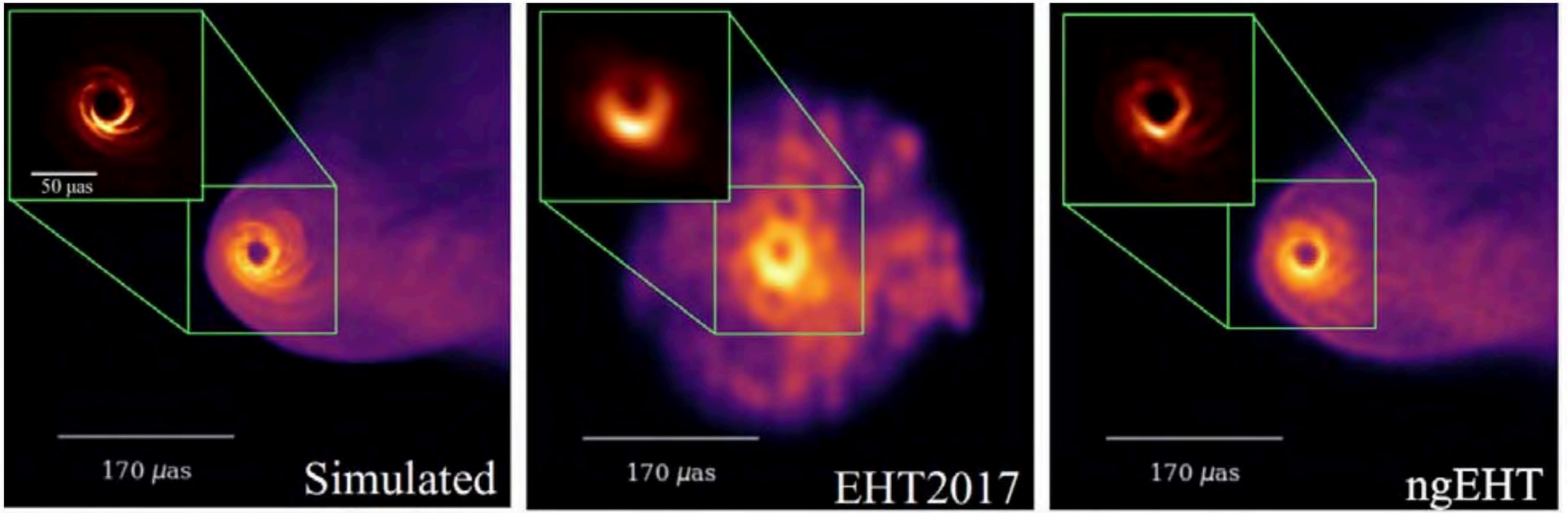
ngEHT



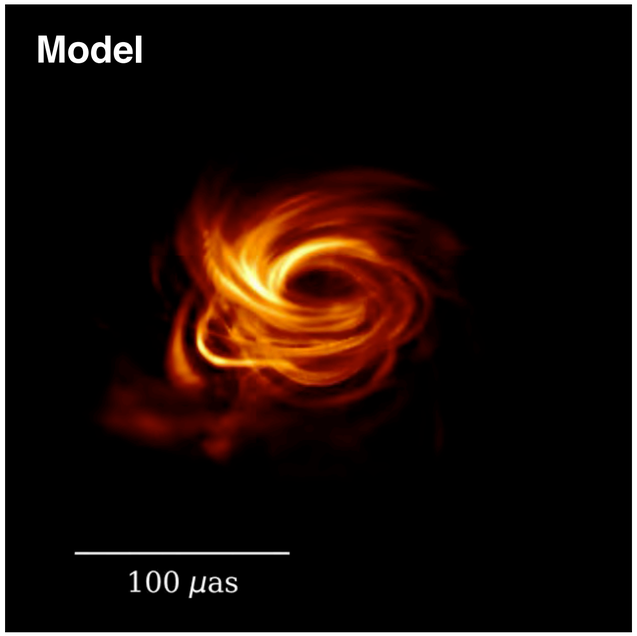
Astro2020 White Paper Blackburn et al. 2019

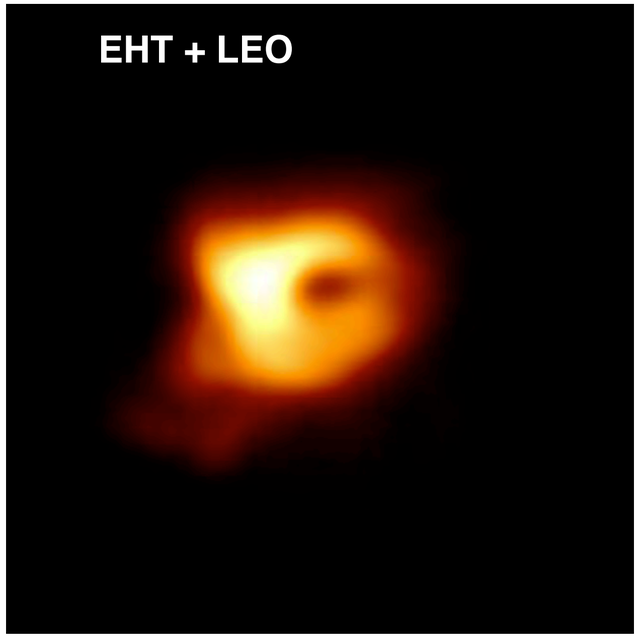
NGEHT: NEXT-GENERATION SCIENCE

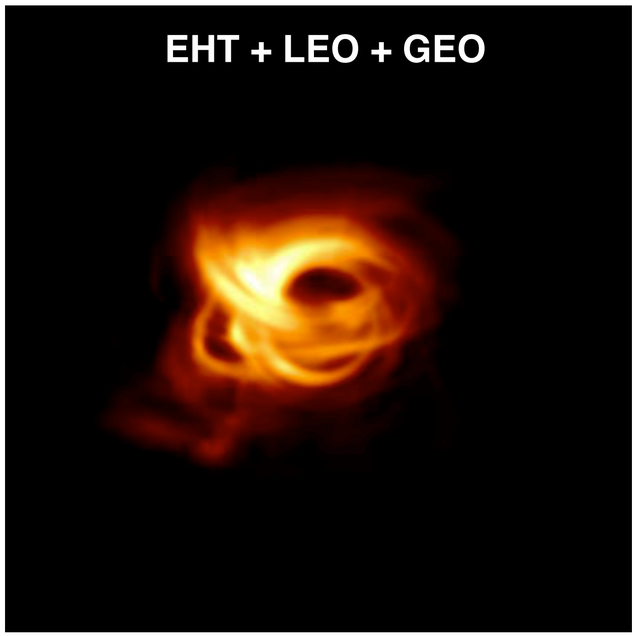


A. Chael.

NEXT GENERATION: MOVIES







Chael, Wielgus, Palumbo, Johnson, Bouman

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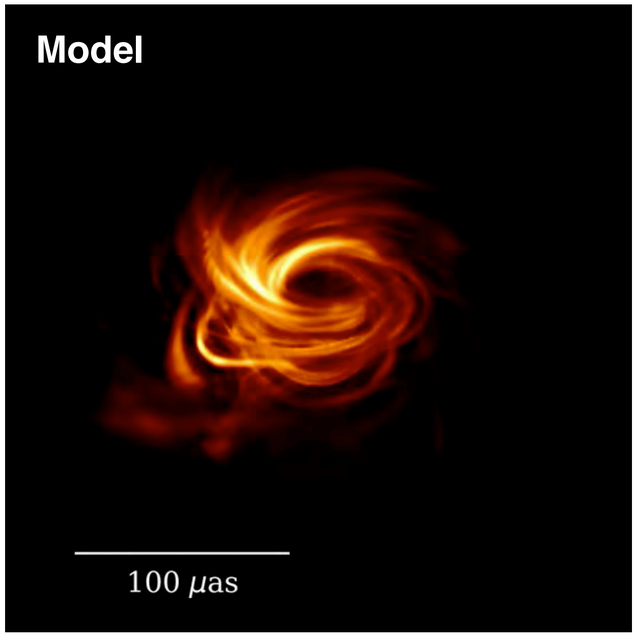

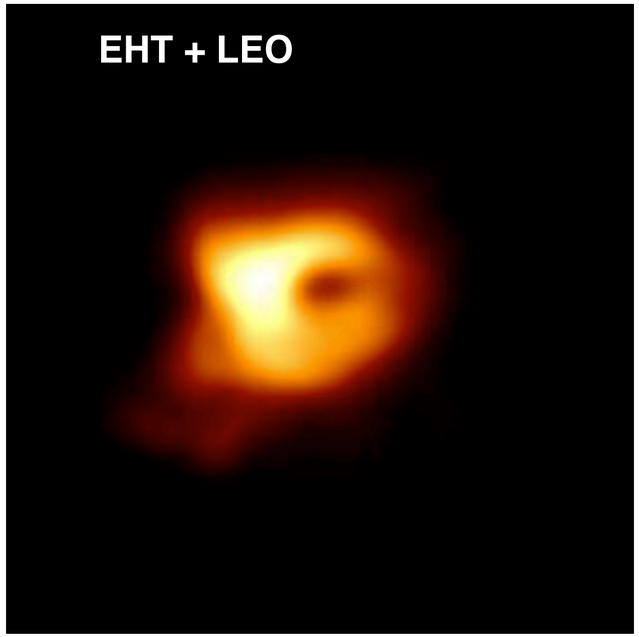

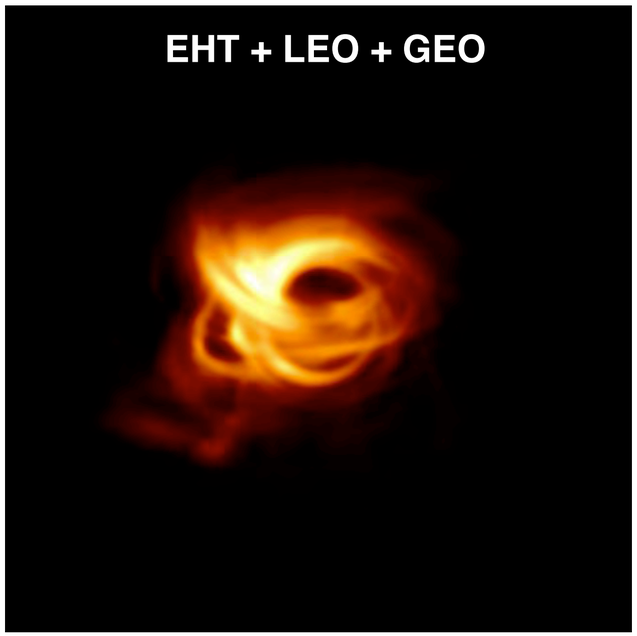

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FUTURE EHT RESULTS

We have another big target result in our near future - imaging the black hole at the heart of our own galaxy

A chance to apply our lessons learned

Prepare our scientists better (media training)

Be more inclusive in spotlighting our collaboration team members contributions

Create more local cultural and community connections

Harness the power of social media

THANK YOU

With thanks and acknowledgement to the EHT collaboration membership, participating and supporting institutes, Observatories and funding bodies.