

**Astrophysics
Subcommittee Meeting
October 22+23, 2015
Summary Report**

**Scott Gaudi
(Astrophysics Subcommittee Chair)**

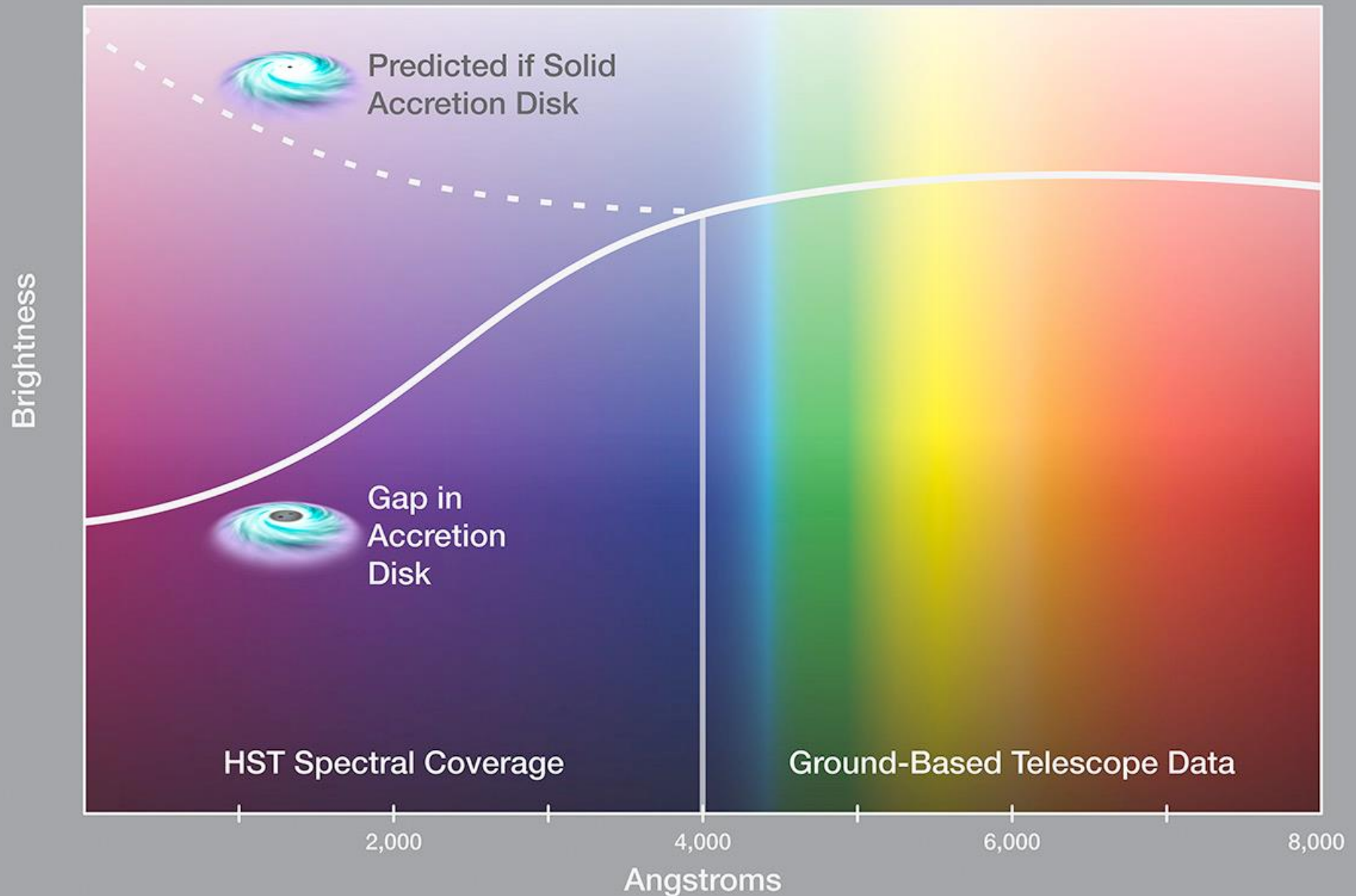
NAC Astrophysics Subcommittee Membership

- **Scott Gaudi (Chair)**
- **Hashima Hasan (Exec. Secretary)**
- **Joel Bregman (Vice Chair)**
- **Natalie Batalha**
- **Marshall Bautz**
- **Jamie Bock (PhysPAG EC Chair)**
- **Alan Boss (ExoPAG EC Chair)**
- **Patricia Boyd**
- **Neil J. Cornish**
- **Giovanni Fazio**
- **Jason Kalirai**
- **Paul A. Scowen**
- **Kenneth Sembach (COPAG EC Chair)**
- **Rachel Sommerville**
- **Yun Wang**
- **Beth Willman**

The Ohio State University
NASA Headquarters
University of Michigan
NASA Ames Research Center
Massachusetts Institute of Technology
California Institute of Technology
Carnegie Institution
NASA Goddard Space Flight Center
Montana State University
Harvard-Smithsonian CfA
Space Telescope Science Institute
Arizona State University
Space Telescope Science Institute
Rutgers University
California Institute of Technology
LSST/University of Arizona

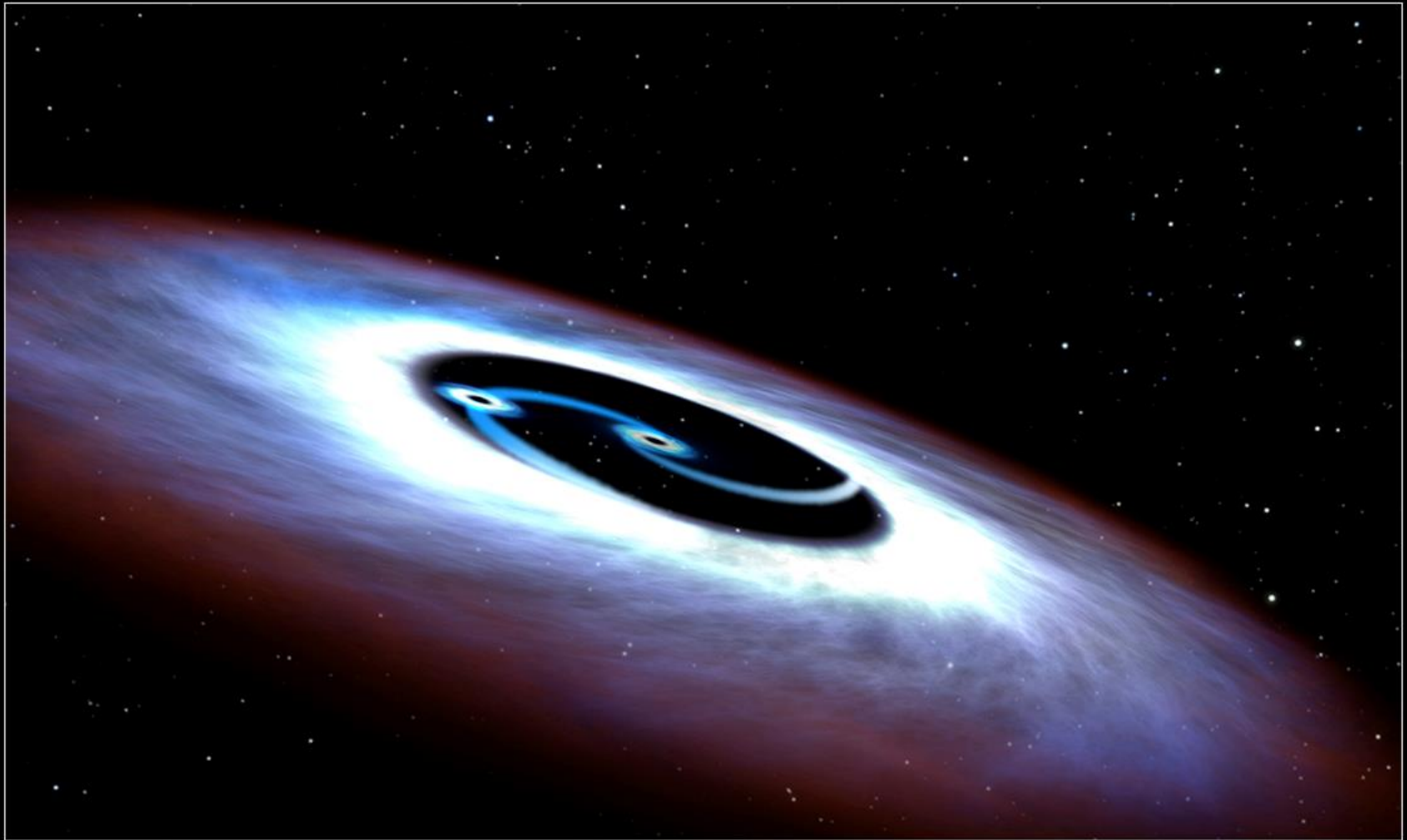
Hubble Finds That the Nearest Quasar is Powered by a Double Black Hole

Optical-to-UV Spectrum of Markarian 231





Hubble Finds That the Nearest Quasar is Powered by a Double Black Hole



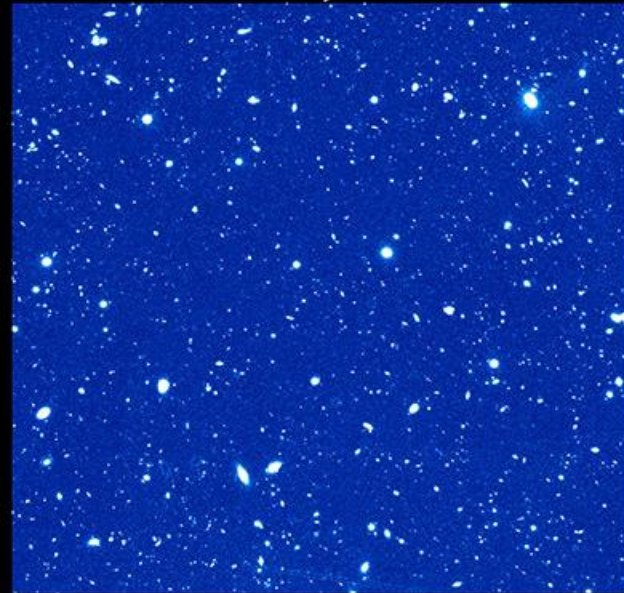
Artist's View of a Binary Black Hole

NASA and ESA ■ STScI-PRC15-31a

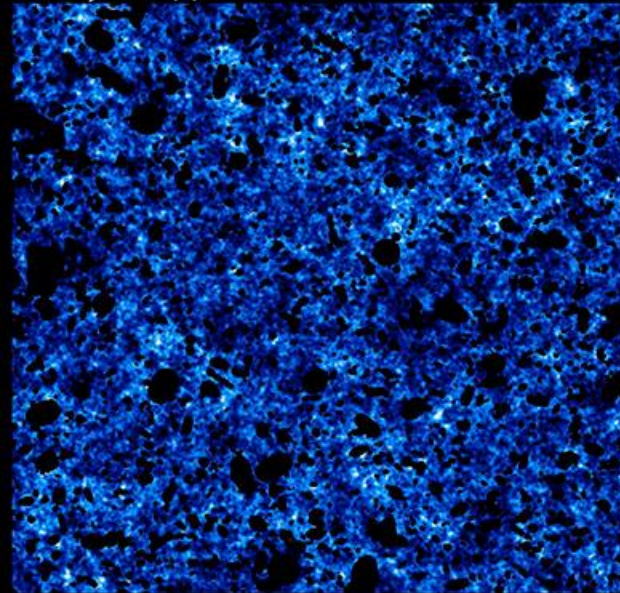


Hubble Uncovers Clues of Earliest Galaxies

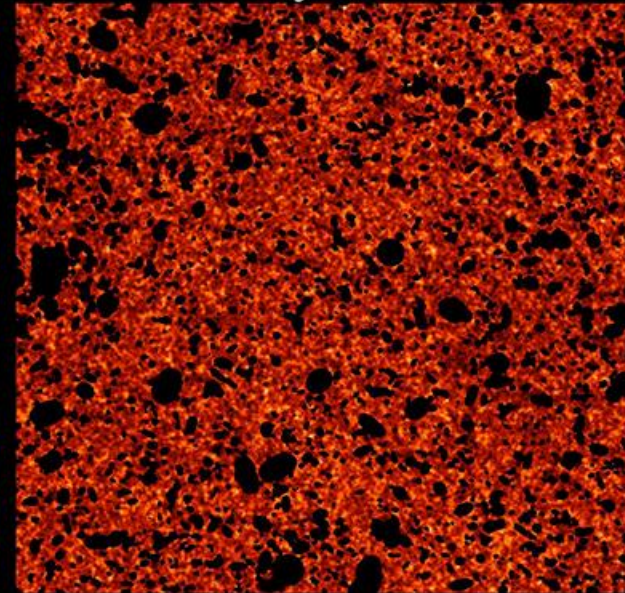
Sky



Tidally Stripped Stars between Galaxies



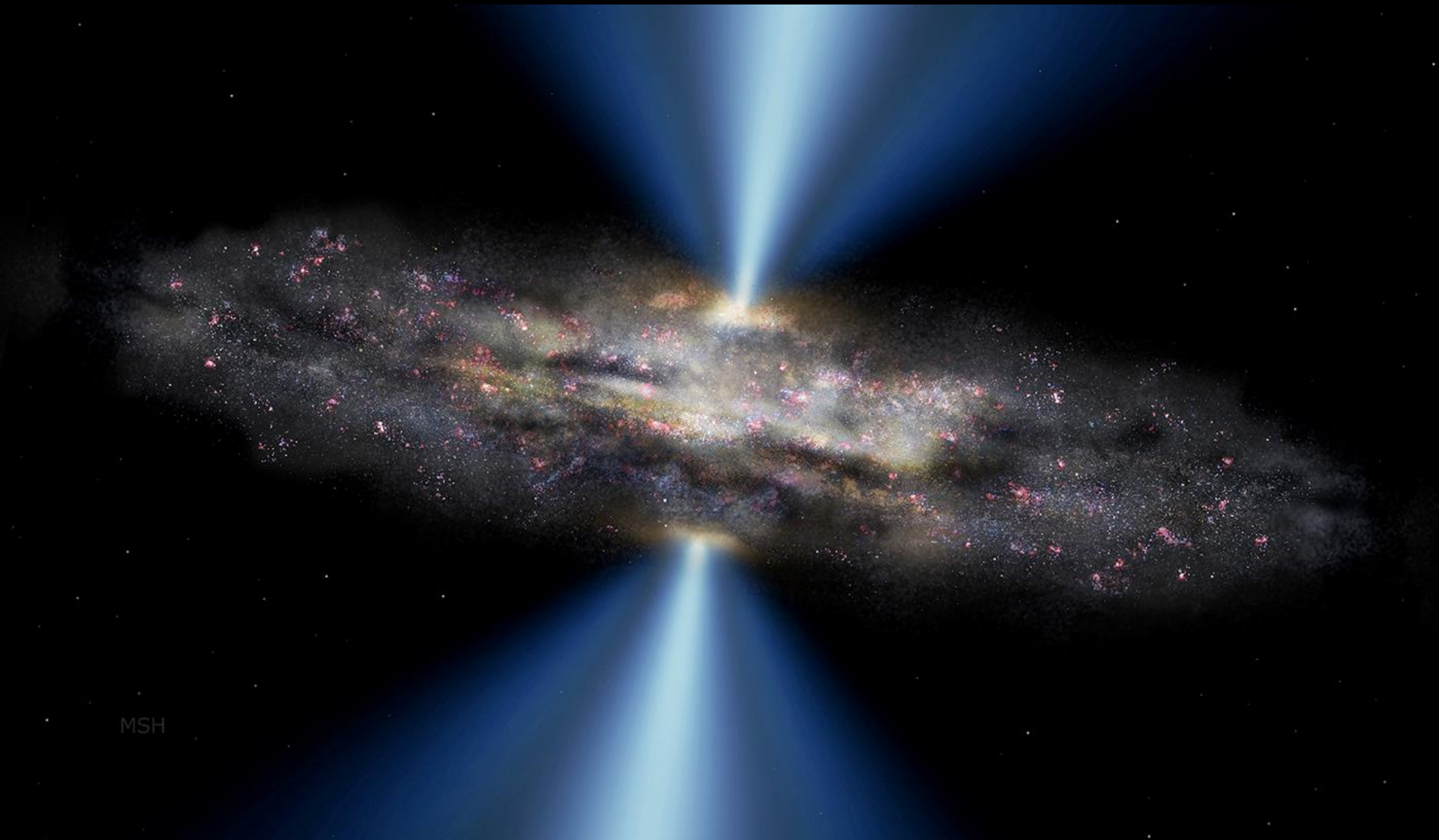
First Light Galaxies



Credit: NASA, ESA, and K. Mitchell-Wynne (University of California, Irvine)



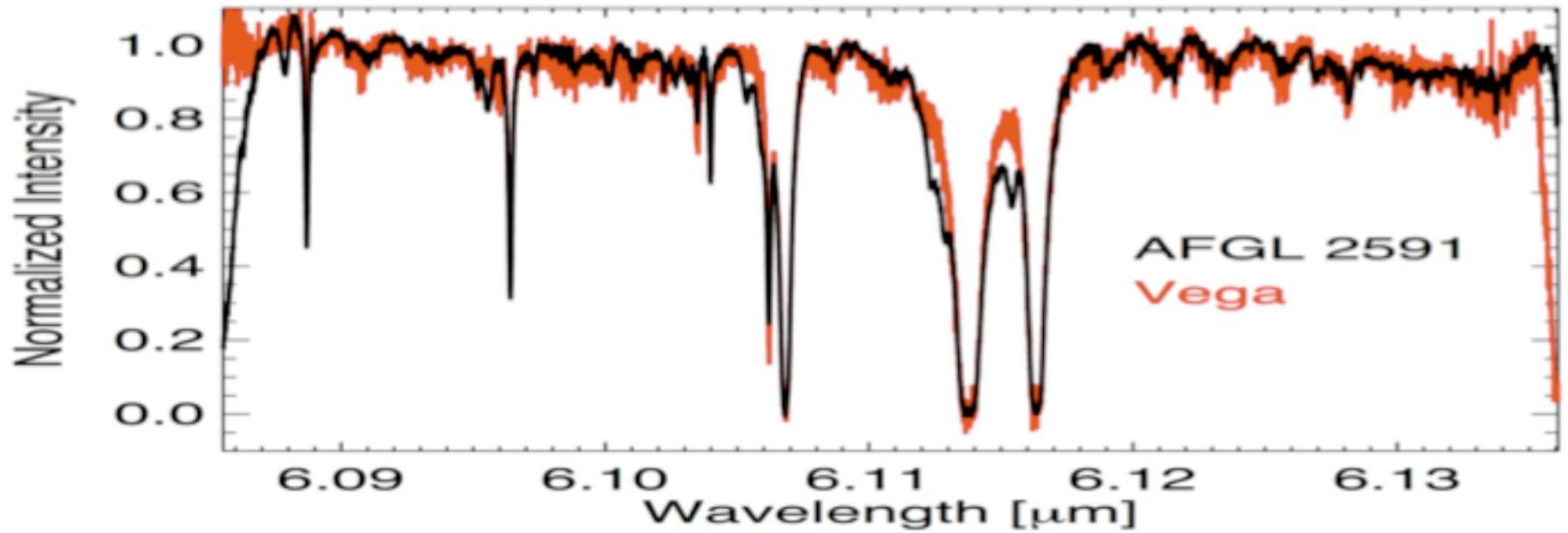
A Precocious Black Hole (in CID-947)



MSH

Illustration: M. Helfenbein, Yale University / OPAC

 **SOFIA observes Water Around the Protostar AFGL 2591**

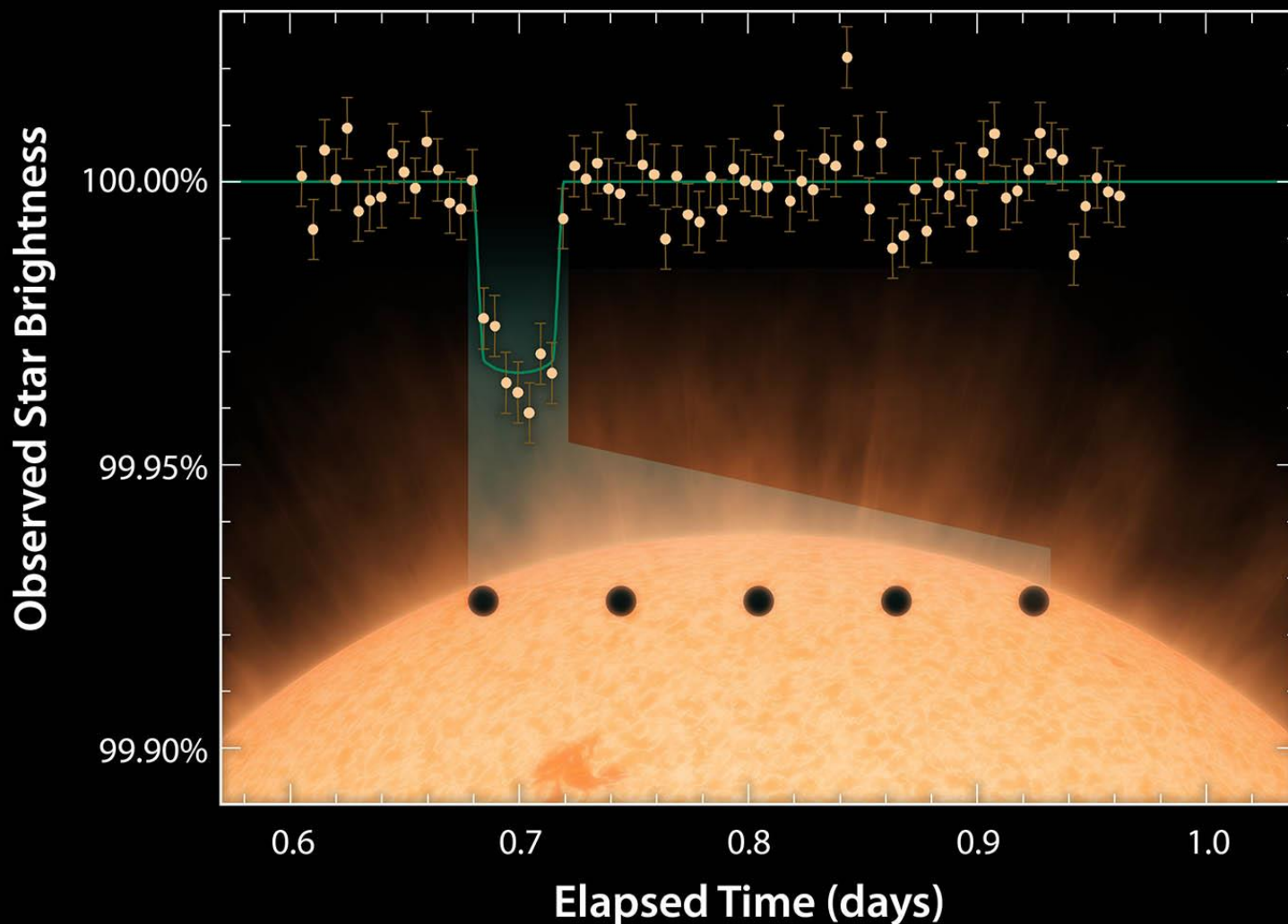


Credit: indriolo et al.



Spitzer Confirms Closest Rocky Exoplanet

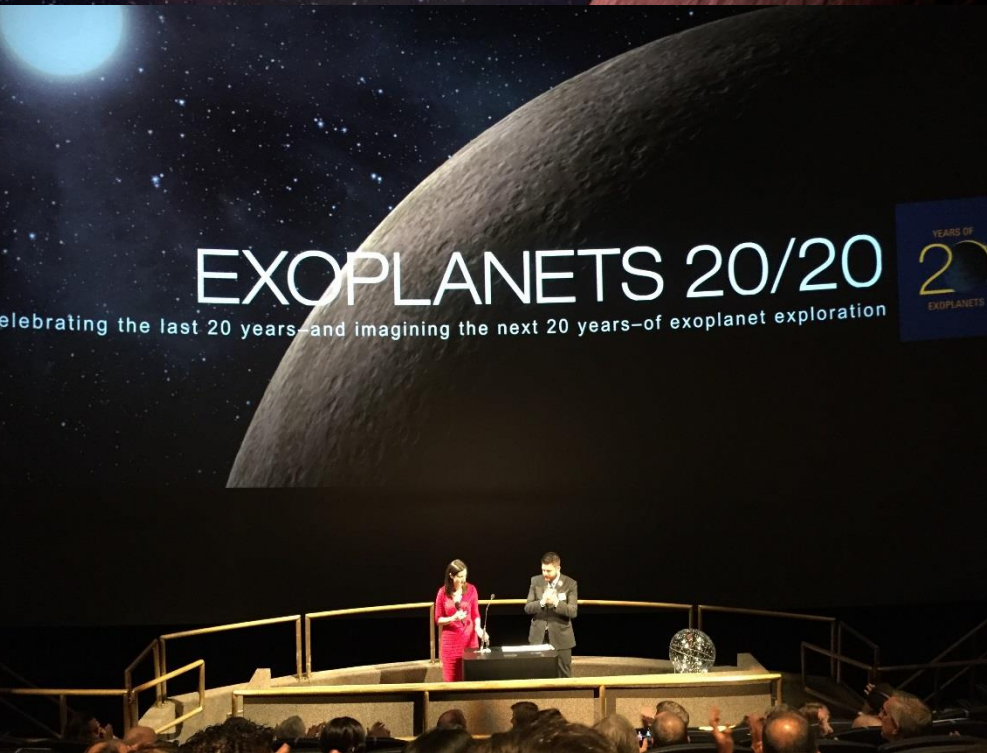
Infrared Light Curve for the Transiting Exoplanet HD 219134b



EXOPLANETS 20/20

Celebrating the last 20 years—and imagining the next 20 years—of exoplanet exploration

YEARS OF
20
EXOPLANETS



- October 10-11, JPL Open House with Exoplanet Theme
- October 19, NASM What's New in Aerospace Forum: "Exploring Alien Atmospheres."
- October 20, Congressional Staffers Lunch and Learn: "The Search for Planets, Habitability, Life in Our Galaxy."
- October 20, NASM Exoplanets 20/20—Celebrating 20 Years of Exoplanet Exploration, Imagining the Next 20 Years
- October 21, Carnegie Capital Science, "Hunting Planets: Celebrating 20 Years of Exoplanets."
- October 22, Reditt "Ask Me Anything" on Exoplanets
- October 22-23, Thursday-Friday, Astrophysics Subcommittee Meeting at GSFC

Presentations.

- **SMEX Missions Under Study.**
 - IXPE (PI Martin Weisskopf, NASA MSFC)
 - PRAXyS (PI Keith Jahoda, NASA GSFC)
 - SPHEREx (PI Jamie Bock, Caltech)
- **JWST Progress Update.**
 - Eric Smith (NASA HQ)
- **Other PAG Activities.**
 - COPAG (Ken Sembach, STScI)
 - ExoPAG (Alan Boss, Carnegie DTM)
 - PhysPAG (Jamie Bock, Caltech)

Presentations, cont.

- **Preparing for JWST Cycle 1 Observations**
 - Jason Kalirai (STScI)
 - Described the timing for the Cycle 1 solicitations and observations, as well as the Early Release Science (ERS) program.
- **AAAC Proposal Pressure Study Report**
 - Priscilla Cushman (U. of Minnesota)
- **Big Data Task Force**
 - Erin Smith (NASA Ames)
- **SMD Education Update**
 - Kristin Erickson (NASA HQ)

Paul's Charge to the PAGs.

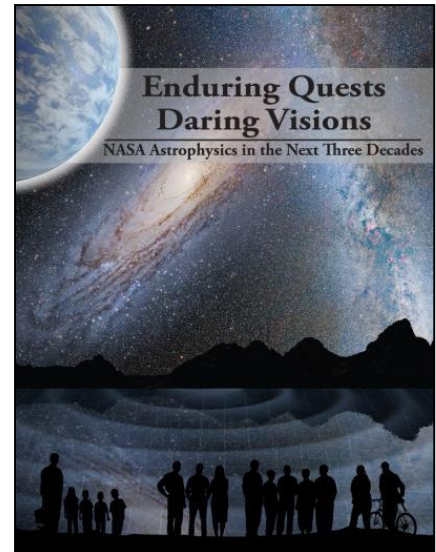
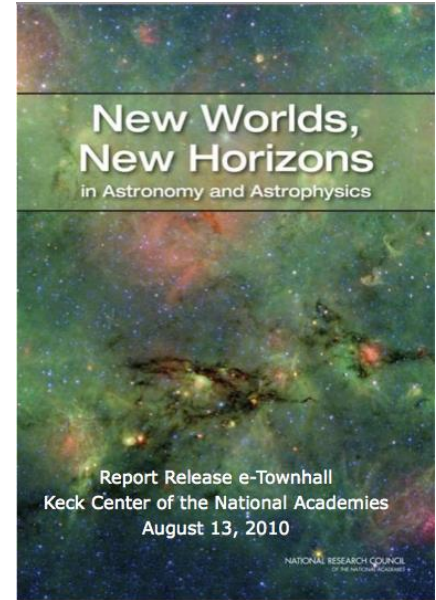
“I am charging the Astrophysics PAGs to solicit community input for the purpose of commenting on the small set [of large mission concepts to study], including adding or subtracting large mission concepts.”

– Paul Hertz, January 4, 2015

Initial list of four missions.

Taken from NASA Roadmap (Surveyors) and Decadal Survey (HabEx)

- **FAR IR Surveyor** – The Astrophysics Visionary Roadmap identifies a Far IR Surveyor as contributing through improvements in sensitivity, spectroscopy, and angular resolution.
- **Habitable-Exoplanet Imaging Mission (HabEx)**– The 2010 Decadal Survey recommends that a habitable-exoplanet imaging mission be studied in time for consideration by the 2020 Decadal Survey.
- **UV/Optical/IR Surveyor** –The Astrophysics Visionary Roadmap identifies a UV/Optical/IR Surveyor as contributing through improvements in sensitivity, spectroscopy, high contrast imaging, astrometry, angular resolution and/or wavelength coverage. The 2010 Decadal Survey recommends that NASA prepare for a UV mission to be considered by the 2020 Decadal Survey.
- **X-ray Surveyor** – The Astrophysics Visionary Roadmap identifies an X-ray Surveyor as contributing through improvements in sensitivity, spectroscopy, and angular resolution.



Many meetings and telecons.

- January 2014: Initial discussion of SIG#1 at ExoPAG 9
- March 2014: APS approves SIG #1
- June 2014: Brainstorming session at ExoPAG 10
- January 2015: Brainstorming session at ExoPAG 11, Paul's charge
- February 2015: First dedicated SIG #1 Meeting, brainstorming & consensus building.
- March 10 2015: COPAG Virtual Town Hall
- March 19 2015: Joint PAG EC meeting.
- April 11-14 2015, Am. Phys. Soc. (Baltimore) - PhysPAG
- June 2, 2015: ExoPAG Virtual Meeting #1
- June 3-5 2015: Far-IR Workshop – COPAG
- June 13-14 2015: ExoPAG #12 – ExoPAG
- June 25-26 2015: UV/Vis SIG Meeting, Greenbelt, MD – COPAG
- July 1 2015: panel discussion during the HEAD meeting - PhysPAG
- July 3 2015: joint PAG EC Chair telecon
- July 13 2015: joint PAG EC Chair telecon with Paul Hertz
- July 14 2015 – ExoPAG Virtual Meeting #2
- August 7 2015 - Joint PAG Splinter Session at IAU
- August 18 2015 – ExoPAG Virtual Meeting #3
- August 20 2015 – COPAG Virtual Town Hall
- August 31 2015, - Joint PAG Session at AIAA Meeting
- Now – September 18: Finalizing the report
- October 1 2015: Deliver report to APS
- October 22+23 2015: APS Meeting, Washington, DC

Joint PAG Points of Consensus.

- **The PAGs concur that all four large mission concepts should be studied.**
- This finding is predicated upon the assumptions outlined in the white paper and subsequent charge:
 - Development of future large flagship missions under consideration are to follow the implementation phases of the JWST and WFIRST.
 - NASA will partner with the European Space Agency on its L3 Gravitational Wave Surveyor. (e.g., the 2010 Decadal Survey priorities are realized).
- The PAGs find that there is strong community support for the maturation of the four mission concepts via science and technology definition teams (STDTs). There is strong consensus that all of the STDTs contain broad and interdisciplinary representation of the science community.
- The PAGs find that there is broad community support for a line of probe-class missions within the Astrophysics mission portfolio.

Final Reports.

- [COPAG Final Report](#)
- [ExoPAG Final Report](#)
- [PhysPAG Final Report](#)

APS Findings, Recommendations, and Comments.

- Large Mission Reports:
 - The APS concurs with the recommendation of the three PAGs that all four large mission concepts be studied, with no additional missions included.
 - The APS recognizes that this recommendation is predicated on the assumptions outlined in the white paper and subsequent charge.
 - The APS concurs with the strong support for developing these four missions via Science and Technology Definition Teams (STDTs), and that there be strong coordination between the STDTs.
- AAAC Proposal Pressure Study Report
 - There was a suggestion that the declining success rate was due to accumulation of ~10% effects.
 - There was also a suggestion that a decline in GO funding is causing people to turn to grants for support.
 - Selection rates for this past year in APD were 23% (R&A) and 26% (GO).

APS Findings, Recommendations, and Comments.

- Preparing for JWST Cycle 1
 - The APS commends STScI for protecting the community's interest via the Early Release Science program.
- SMD Education Update
 - The APS would like to thank Kristen Erickson, Paul Hertz, and John Grunsfeld for being strong advocates of education and outreach.
- Big Data Task Force
 - The APS suggests that the task force first assess what are the current and future big data needs in each science division, and determine what is being done to meet those needs. This will provide the context with which it can determine what synergies or useful exchange of information may be possible between the science divisions.