astronomy X

Baltimore | 2018.09.24-27

AAS AMERICAN ASTRONOMICAL SOCIETY

STScI

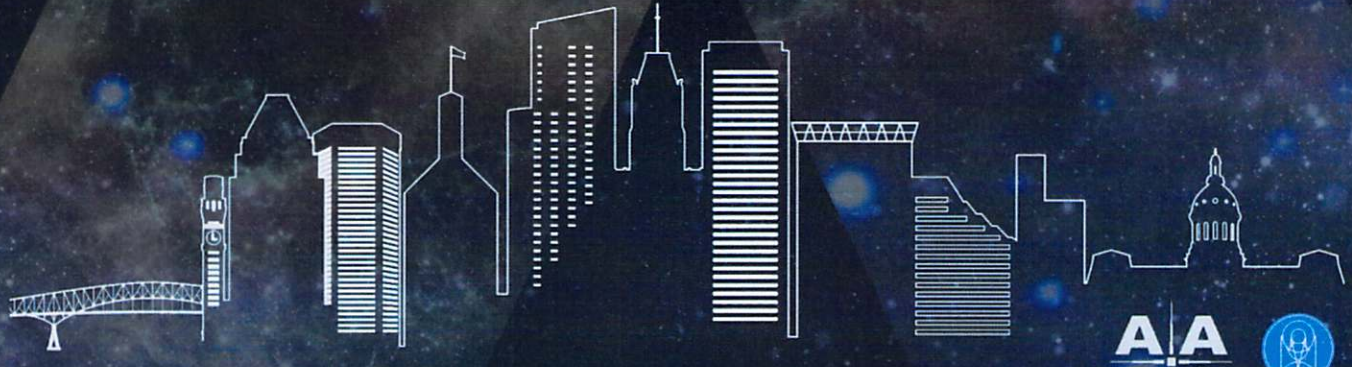
Astronomy is the science of the past and the future of the Universe. For the 10th edition of .Astronomy ("dot Astronomy") we will explore this duality of our science in all its guises: we push to build, innovate and explore to study at the same time our history and our future. We apply new technologies to data from past observations to generate new knowledge. The conference venue, the Space Telescope Science Institute in Baltimore, is a global center for space astronomy: the hub of Hubble, and the home of its golden heir, the James Webb Space Telescope. STScI hosts MAST, the Mikulski Archive for Space Telescopes which makes data available to the global community from numerous missions and surveys, such as Kepler, TESS and PanSTARRS. We'll be incorporating the theme of space telescopes into our sessions.

For the conference, we invite you to leave your presentation slides behind, and bring your ideas and enthusiasm to work together to learn from our past and build for the future. The conference starts with "Day Zero": a day of introductions and tutorials. On days 1 and 3, we'll mix talks with unconference sessions, which are led by the participants themselves on topics of their choosing. The Hack Day on day 2 gives room for learning, collaborating and being creative around the themes of the conference – be it technical, cultural or artistic.

astronomy X

Baltimore | 2018.09.24-27

Agenda



AAS AMERICAN ASTRONOMICAL SOCIETY

STScI

AGENDA

Monday, September 24, 2018

9:00-10:00	**Coffee & Light Breakfast in Café Azafran**		
9:00-10:00	**Registration**		
10:00-11:00	**Welcome: The Director, Ken Sembach, STScI & Introductions**		
11:00-11:30	**Sarah Kendrew** Ten Years of .Astronomy		
11:30-12:00	**Jane Rigby** The Future of NASA Astrophysics Missions		
12:00-1:00	**Lunch & Tutorial Session Planning**		
1:00-1:30	**Erik Tollerud** Intro To Open Source/Astropy/Open Development		
1:30-2:00	**Clara Brasseur & Tom Donaldson** Introductions To MAST, Astroquery.Mast Demo		
Parallel Session			
2:00-3:00	**Auditorium** TBD	**Café Con** TBD	**Café Azafran** TBD
3:00-3:30	**Coffee Break in Café Azafran**		
Parallel Session			
3:30-4:30	**Auditorium** Introduction to Google Cloud Speaker: Jamie Kinney	**Café Con** TBD	**Café Azafran** TBD
Joint Session (Bahcall Auditorium)			
4:30-5:30	**Frank Summers & Office of Public Outreach Team** Cinematic Astronomy		

Tuesday, September 25, 2018

8:00-9:15	**Coffee & Light Breakfast in Café Azafran**		
Joint Session (Bahcall Auditorium)			
9:15-9:30	**Welcome: .Astronomy Organizers**		
9:30-10:00	**James Howison** *Software Makes Science Better-but is it Research?*		
10:00-10:15	***Stephanie Juneau*** *Galaxy Evolution at the Crossroads of Astronomy and Data Science*		
10:15-10:30	**Ayat Mohammed** *Visualize This: Lessons from the Front-lines of High Performance Visualization*		
10:30-11:00	**Coffee Break in Café Azafran & Unconference Planning**		
11:00-11:30	**Alcione Mora** *GAIA: Science, Data and Challenges*		
11:30-11:45	**Lauren Chambers** *A Different Kind of Dark Energy: Placing Race and Gender in Physics*		
11:45-12:00	**Brian Nord** *Ethics in AI: What Does the Future Hold for Science, Work, Privacy, Justice?*		
12:00-1:30	**Lunch & Unconference Session Voting**		
Unconference Session 1			
1:30-2:30	**Auditorium** TBD	**Café Con** TBD	**Café Azafran** TBD
Unconference Session 2			
2:30-3:30	**Auditorium** TBD	**Café Con** TBD	**Café Azafran** TBD
3:30-4:00	**Coffee Break in Café Azafran**		
Unconference Session 3			
4:00-5:00	**Auditorium** TBD	**Café Con** TBD	**Café Azafran** TBD
Joint Session (Bahcall Auditorium)			
5:00-5:15	**Wrap Up – Report Back & Close**		
5:30-onwards	**Happy Hour & Dinner at R. House**		

Wednesday, September 26, 2018

8:00-9:00	**Coffee & Light Breakfast in Café Azafran**
Joint Session (Bahcall Auditorium)	
9:00-10:00	**Hack Day Pitches**
10:00-10:30	**Hacking**
10:30-11:00	**Coffee Break in Café Azafran & Hacking**
11:00-12:00	**Hacking**
12:00-1:30	**Lunch & Hacking**
1:30-2:00	**Optional: Report back on hack progress (Bahcall Auditorium)**
2:00-3:30	**Hacking**
3:30-4:00	**Coffee Break in Café Azafran**
4:00-5:00	**Hacking**
5:00-6:30	**SDAS**
6:30-close	**Optional: Evening Hacking**

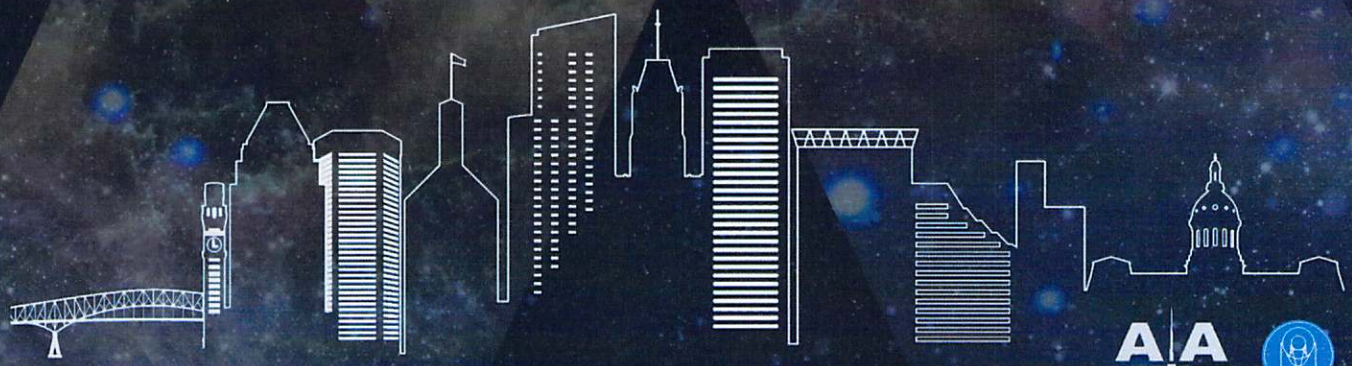
Thursday, September 27, 2018

8:00-9:30	**Coffee & Light Breakfast in Café Azafran**		
Joint Session (Bahcall Auditorium)			
9:30-10:00	**Andrew Connolly** *Back to the Future: A Decade of LSST Development and the Growth in Machine Learning*		
10:00-10:15	**Dara Norman** *Can Big Data Lead an Inclusion Revolution*		
10:15-10:30	**Craig Jones** *Hubble Image Discovery Using Transfer Learning*		
10:30-11:00	**Coffee Break in Café Azafran & Unconference Planning**		
11:00-11:30	**Jarita Holbrook** *Educating Astrophysicists in South Africa*		
11:30-12:00	**Sarah Hörst** *The Role of Laboratory Work in Space Science*		
12:00-1:30	**Lunch & Unconference Session Voting**		
Unconference Session 1			
1:30-2:30	**Auditorium** TBD	**Café Con** TBD	**Café Azafran** TBD
Unconference Session 2			
2:30-3:30	**Auditorium** TBD	**Café Con** TBD	**Café Azafran** TBD
3:30-4:00	**Coffee Break in Café Azafran**		
Unconference Session 3			
4:00-5:00	**Auditorium** TBD	**Café Con** TBD	**Café Azafran** TBD
Joint Session (Bahcall Auditorium)			
5:00-5:15	**Wrap Up: Report Back & Close**		

astronomy X

Baltimore | 2018.09.24-27

Talks



AAS AMERICAN ASTRONOMICAL SOCIETY

STScI

Title	**Ten Years of .Astronomy**
Author	*Sarah Kendrew*
Affiliation	*European Space Agency, and the .Astronomy Brain Trust*
Abstract	A decade ago, PhD student Robert Simpson hosted a small conference at the University of Cardiff to discuss how the "new media" were changing the face of science, and of science communication. Blogs, social networks, citizen science were offering exciting new opportunities for astronomy. Increasingly connected resources were allowing new ways of accessing, exploring and visualizing data, and providing new platforms for communication and collaboration, across traditional academic boundaries. The Baltimore conference marks our 10th edition. To mark this milestone, I will provide a look back to our past events, and discuss the impact the conference has made on the the field, based on a large participant survey carried out in 2017. I will look toward the future and the role .Astronomy can play in the future of global astronomy. **NOTES:**

Title	**The Future of NASA Astrophysics Missions**
Author	*Jane Rigby*
Affiliation	*NASA Goddard Space Flight Center*
Abstract	I'll give a broad overview of the astrophysics missions that NASA is currently operating, building, and dreaming, and give you a taste for how missions get designed, built, tested, and operated. As astronomers, we are fortunate to enjoy data from currently operating missions like Hubble, Chandra, Spitzer, Fermi, and TESS. Our community eagerly awaits missions being integrated and tested in preparation for launch (The James Webb Space Telescope). Astronomers also have the power to influence the formulation of missions like WFIRST, and to shape and influence the selection of missions in the conceptual stage (Lynx, Habex, LUVOIR, OST). **NOTES:**

astronomy
Baltimore | 2018.09.24-27
AAS AMERICAN ASTRONOMICAL SOCIETY
STScI

Title	**Making Use of the Mikulski Archive for Space Telescope (MAST)**
Author	*Clara Brasseur and Tom Donaldson*
Affiliation	*STScI*
Abstract	Best known as the archive for the Hubble Space Telescope (HST), MAST provides archival services for a wide variety of astronomical projects including Kepler, GALEX, PanSTARRS, FUSE, and over 100 community-contributed collections. In this talk, we will provide an overview of MAST data discovery and access tools, with an emphasis on Pythonic programmatic interfaces. **NOTES:**

Title	**Cinematic Astronomy**
Author	*Frank Summers*
Affiliation	*Space Telescope Science Institute*
Abstract	The rapid growth of computer graphics over the past few decades has fueled an explosion of CG-heavy movies and created a setting where the public has come to expect impossible superhero physics presented in sophisticated visual style. Astronomers can attempt to keep pace by utilizing some of the same Hollywood software tools and the visual language of film to present the scientific view of the universe in a cinematic fashion. From web graphics to press release videos to IMAX films, visualization can more effectively present the messages of basic and research astronomy to a wide variety of audiences. **NOTES:**

Title	**Software Makes Science Better, but is it Research? Arguments for a Research Agenda in Scientific Software Work**
Author	*James Howison*
Affiliation	*University of Texas-Austin*
Abstract	Better software makes for better science, yet software work is questioned as scientific contribution. This is a clear tension in the lives of scientists writing and using software. In this presentation I describe different arguments made for why software work is research. I draw on interviews from empirical studies of scientific software work, discussions at workshops, as well as participation in peer review, promotion and tenure, and grant review panels. I present arguments that seem to work well, arguments that seem to work poorly, and sketch potential arguments rarely made. I hope to provoke discussion, reflection, and to encourage better writing about the contribution of scientific software work. **NOTES:**

Title	**Galaxy Evolution at the Crossroad of Astronomy and Data Science**
Author	*Stephanie Juneau*
Affiliation	*National Optical Astronomy Observatory (NOAO)*
Abstract	After a brief overview of the NOAO Data Lab (datalab.noao.edu), a science platform hosting a suite of services developed around large astronomy datasets, I will highlight example applications in the field of galaxy evolution. Science examples will include the classification of objects from wide surveys, evolutionary trends within the topic of galaxy and black hole co-evolution, and inspecting large-scale structures. On the data side, we are serving images and catalogs containing hundreds of millions to a few billions of objects as we prepare for large-scale spectroscopy surveys. For instance, DESI - the Dark Energy Spectroscopic Instrument - will yield spectra for over 30 million galaxies and quasars with a coverage close to one third of the full sky. I will briefly discuss important points to consider as we strive to maximize the scientific return from such datasets involving unprecedented numbers of objects, while also dealing with the low signal-to-noise ratio regime. **NOTES:**

Title	**Visualize This: Lessons From the Front-Lines of High-Performance Visualization**
Author	*Ayat Mohammed*
Affiliation	*University of Texas - Austin*
Abstract	This talk presents a comprehensive workflow to address two major factors in multivariate multidimensional (MVMD) scientific visualization: the scalability of rendering and the scalability of representation (for perception). Our workflow integrates the metrics of scientific computing and visualization across different STEM domains to deliver perceivable visualizations that meet scientists' expectations. Our approach attempts to balance the performance of MVMD visualizations using techniques such as sub-sampling, domain decomposition, and parallel rendering. When mapping data to visual form we considered: the nature of the data (dimensionality, type, and distribution), the computing power (serial or parallel), and the rendering power (rendering mechanism, format, and display spectrum). We used HPC clusters to perform remote parallel processing and visualization of large-scale data sets such as 3D point clouds, galaxy catalogs, and airflow simulations. Our workflow brings these considerations into a structured form to guide the decisions of visualization designers who deal with large heterogeneous data sets. **NOTES:**

Title	**Gaia: Science, Data and Challenges**
Author	*Alcione Mora*
Affiliation	*European Space Agency*
Abstract	The ESA Gaia mission is surveying the sky since 2014. It acquires multi-epoch ultra precise astrometry, visible spectrophotometry and intermediate spectroscopy. The first two data releases already constitute the highest accuracy astrometric atlas ever produced, including positions, parallaxes and proper motions for more than a billion stars in the Milky way and close neighbours in the Local Group. When combined with the several million radial velocities, a full 6D (positions + velocities) window to the Galaxy is revealed. In this talk, several topics will be covered: an overview of the mission, Data Release 2, a selection of scientific results and the associated computational challenges. **NOTES:**

astronomy Baltimore | 2018.09.24-27
AAS AMERICAN ASTRONOMICAL SOCIETY
STScI

Title	**A Different Kind of Dark Energy: Placing Race and Gender in Physics**
Author	*Lauren Chambers*
Affiliation	*Space Telescope Science Institute*
Abstract	In December 2015, the Chief Justice of the United States Supreme Court John Roberts asked, "What unique perspective does a minority student bring to a physics classroom? I'm just wondering what the benefits of diversity are in that situation?" The subtle malice of this question, which implies (among many things) that students of color must justify their place in white-male-dominated physics classrooms, is a result of the historical and modern glorification of the field of physical sciences as a meritocratic bastion of objectivity: physics supposedly occurs independently of physicist. Why should the identity of the physicist matter? Yet when one views the ideals of the physical sciences through the critical lens of ethnic studies, the entire notion of objectivity breaks down. Scientific knowledge is but a particular form of cultural knowledge, and thus any purported distinction between 'science' and 'culture,' or between 'science' and 'individual', deserves rigorous examination. In this work, I critically analyze the culture and theory of physics and astronomy, focusing specifically on the stakes and implications of patriarchal white supremacy on the content of physics knowledge. My analysis is shaped by the fields of science studies, feminist theory, and critical race theory, and it centers on interviews I conducted with Black women astronomers and physicists. I also draw upon my knowledge of astrophysical concepts, namely dark energy and dark matter, as framing analogies that enable a deeper understanding of the effects of a racist-sexist society upon scientific ways of knowing. Ultimately, I present evidence for a deeply racist-sexist physics epistemology as I examine the entanglement between race, gender, and physics. **NOTES:**

Title	**Ethics in AI: What Does the Future Hold for Science, Work, Privacy and Justice?**
Author	*Brian Nord*
Affiliation	*University of Chicago*
Abstract	Advances in technology have been compounding for millennia, with punctuations that have clear consequences. Recently, we entered an era in which data, combined with automation and advanced computing, are increasingly used to influence human behavior. These advances will likely drastically change our lives in many ways -- from entertainment and employment to justice and warfare. But, how will these advances affect us? Will robots replace workers? Or, might learning algorithms lead to a benevolent data-driven world government? Reflecting on and preparing for how we will approach these questions needs nuanced thinking and conversation. Also, scientists are developing AI algorithms for science, but these improvements will likely contribute to their use in non-science sectors. During this discussion, we will reflect on the roles of individuals and societies in the development of advanced algorithmic technology. **NOTES:**

Title	**Back to the Future: A Decade of LSST Development and the Growth in Machine Learning**
Author	*Andrew Connolly*
Affiliation	*University of Washington*
Abstract	The development of a new generation of telescopes, large-scale detectors, and computational facilities has led to an era where it is now possible for deep optical surveys to image a large fraction of the visible sky. This growth in data has been coupled with the emergence of machine learning as a general tool for the analysis of astronomical data. In this talk I will look at the rise of survey astronomy over the last two decades and how analysis techniques have been adopted by the astronomical community to address the challenges of large and complex data sets. I'll discuss why some techniques that, at first, appeared superior to existing applications did not gain traction in the astronomical community, and look at emerging methodologies that may impact astronomical surveys of the next decade such as the Large Synoptic Survey Telescope. **NOTES:**

Title	**Can Big Data Lead an Inclusion Revolutin**
Author	*Dara Norman*
Affiliation	*National Optical Astronomy Observatory (NOAO)*
Abstract	There are 2 trends taking place in astronomy right now: 1) ground-based astronomy research is evolving into an era of large surveys and big datasets and 2) the recognition that our field must evolve to be more diverse and inclusive in order to realize the best science. In this talk, I will show that the move toward large surveys and big datasets is an opportunity for a research 'Inclusion Revolution' by providing data and data products for use by ALL members of the science community. I will describe programs at NOAO to support broad use of current data holdings and near-term public surveys providing data and data products for use by ALL members of the science community. I will describe programs at NOAO to support broad use of current data holdings and near-term public surveys **NOTES:**

Title	**Hubble Image Discovery Using Transfer Learning**
Author	*Craig Jones*
Affiliation	*Space Telescope Science Institute*
Abstract	Convolution neural networks (CNN) are a relatively new neural network application in astronomy. There are several implementations of CNNs that enable simple testing of the methodology on astronomy images. We are using a subset of NNs, transfer learning, in which we calculate "fingerprints" of Hubble images and then compare the fingerprints in order to determine similarities and differences in the original Hubble images. To do this we created a software framework in Python that calculates predictions based on an ImageNet pre-trained network (in Keras / Tensorflow) and then use a data reduction method (e.g., t-SNE) for visualization and interaction. A UI was created to enable simple interaction with the calculated fingerprints to gain insight into the Hubble images. We have applied this framework to several datasets including cut-outs of Hubble Heritage images and thumbnails of ACS/WFC3 Hubble images. **NOTES:**

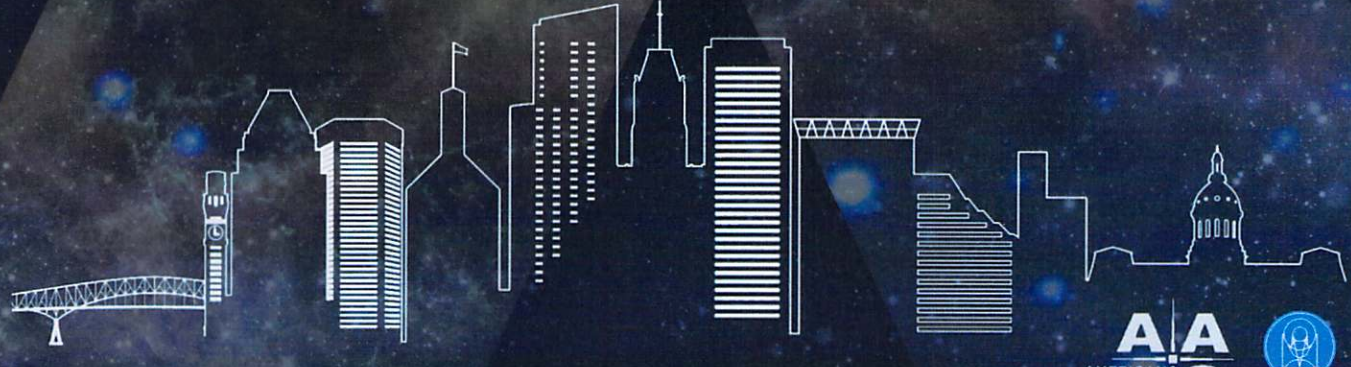
Title	**Educating Astrophysicists in South Africa**
Author	*Jarita Holbrook*
Affiliation	*University of the Western Cape*
Abstract	From 2011 to 2013, I interviewed students, instructors, and graduates of the national astrophysics honors and master's program in South Africa: NASSP. The early days of the program were not successful in producing the diversity expected, however changes were made that in the long run have had positive results. I will discuss these as well as the concept of a global culture of astrophysics that is exclusionary (discriminatory) unless serious work is put into making it otherwise. I will give examples of parallels from interviews done with American astrophysicists. This research is part of the "Astronomy & Society" group at the University of the Western Cape. **NOTES:**

Title	**The Role of Laboratory Work in Space Science**
Author	*Sarah Hörst*
Affiliation	*Johns Hopkins University*
Abstract	From remote sensing to modeling to mission development, much of our work in space science relies on a robust foundation of work done in laboratories. I'll discuss briefly how I ended up as a planetary scientist with a lab and the importance of lab work in everything from understanding the atmospheres of exoplanets to the development of flight instruments and planetary missions. **NOTES:**

astronomy X

Baltimore | 2018.09.24-27

Participants



AAS AMERICAN ASTRONOMICAL SOCIETY

STScI

List of Participants

FIRST NAME	LAST NAME	AFFILIATION
Alasdair	Allan	Babilim Light Industries,LTD.
Mehmet	Alpaslan	New York University
Geert	Barentsen	NASA Kepler/K2
Bernadette	Boscoe	University of California-Los Angeles
K. Azalee	Bostroem	University of California-Davis
Matthew	Bourque	Space Telescope Science Institute
Clara	Brasseur	Space Telescope Science Institute
Katelyn	Breivik	Canadian Institute for Theoretical Astrophysics
Victor	Calderon	Vanderbilt University
Lauren	Chambers	Space Telescope Science Institute
Yi-Kuan	Chiang	Johns Hopkins University
Andrew	Connolly	University of Washington
Kelle	Cruz	CUNY Hunter College
Tom	Donaldson	Space Telescope Science Institute
Bridget	Falck	Johns Hopkins University
Nuwanthika	Fernando	Australian Astronomical Optics
James	Fowler	Space Telescope Science Institute
Jonathan	Fraine	Space Telescope Science Institute
Alyssa	Goodman	Harvard University
Michael	Hlabathe	University of Cape Town
Renee	Hlozek	University of Toronto
Jarita	Holbrook	University of Western Cape
Benne	Howerda	University of Louisville
Sarah	Hörst	Johns Hopkins University
James	Howison	University of Texas-Austin
Craig	Jones	Space Telescope Science Institute
Stephanie	Juneau	National Optical Astronomy Observatory
Susan	Kassin	Space Telescope Science Institute
Sarah	Kendrew	European Space Agency/Space Telescope Science Institute
Gourav	Khullar	University of Chicago
Rocio	Kiman	CUNY, American Museum of Natural History
Jamie	Kinney	Google
Christina	Lindberg	University of Washington
Chris	Lintott	University of Oxford
Joseph	Long	University of Arizona
Nora	Luetzgendorf	European Space Agency/Space Telescope Science Institute
Orapeleng	Mogawana	University of Cape Town
Ayat	Mohammed	University of Texas-Austin
Iva	Momcheva	Space Telescope Science Institute
Alcione	Mora	European Space Agency-Astronomy Center

List of Participants

FIRST NAME	LAST NAME	AFFILIATION
Susan	Mullally	Space Telescope Science Institute
Clair	Murray	Space Telescope Science Institute
Brian	Nord	University of Chicago
Dara	Norman	National Optical Astronomy Observatory
Carolina	Odman	Inter-University Institute of Data Intensive Astronomy
Joshua	Peek	Space Telescope Science Institute
Molly	Peeples	Space Telescope Science Institute
Jane	Rigby	NASA/Goddard Space Flight Center
David	Rodriguez	Space Telescope Science Institute
Victoria	Scowcroft	University of Bath
Robert	Simpson	Google
Arfon	Smith	Space Telescope Science Institute
Greg	Snyder	Space Telescope Science Institute
Juan	Soler	Max Planck Institute of Astronomy
Frank	Summers	Space Telescope Science Institute
Aaron	Tohuvavohu	Pennsylvania State University
Erik	Tollerud	Space Telescope Science Institute
Jean-Paul	Ventura	CUNY Hunter College
Ethan	Vishniac	Johns Hopkins University
Benjamin	Weiner	University of Arizona-MMT Observatory
Rick	White	Space Telescope Science Institute
Eric	Winter	Space Telescope Science Institute
Abbey	Yacoe	Large Synoptic Survey Telescope
Catherine	Zucker	Harvard-Smithsonian Center for Astrophysics