

# Curriculum Vitae

## June 2020

### Garth D. Illingworth

Distinguished Professor of Astronomy/Astronomer Emeritus UCSC

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<http://www.ucolick.org/~gdi/>      <http://firstgalaxies.org>

1969–1973      Ph.D. (Astrophysics) Australian National University, Ken Freeman, Supervisor  
1974–1975      Postdoctoral Fellow, Kitt Peak National Observatory, Tucson, Arizona  
1976–1977      Miller Fellow, Department of Astronomy, University of California, Berkeley  
1978–1984      Astronomer, Kitt Peak National Observatory, Tucson, Arizona  
1984–1987      Deputy Director, Space Telescope Science Institute, Baltimore, Maryland  
1988–2017      Astronomer, University of California Observatories/Lick Observatory  
1988–2017      Distinguished Professor, Department of Astronomy and Astrophysics, UCSC  
2010            D.Sc. (h.c.), University of Western Australia, Perth, Western Australia  
2017–          Distinguished Professor of Astronomy/Astronomer Emeritus, Department of  
Astronomy and Astrophysics/University of California Observatories, UCSC

### SCIENCE SUMMARY

- 1) **Science: ADS Citations June 2020 41420 h-Index 113.** Science ranges from Globular Clusters to nearby Galaxies to 25 years of work on High Redshift Galaxies, primarily from Hubble, Spitzer and Keck. See: <http://firstgalaxies.org> <http://www.ucolick.org/~gdi/>
- 2) **One of the World's Most Highly Cited Researchers in 2017 and 2019** by Clarivate Analytics Web of Science Group – [link for 2019 here](#).
- 3) **firstgalaxies.org website** highlights two decades of Hubble, Spitzer and Keck research on high-redshift galaxies.
- 4) **First discovery of a z~10 galaxy (480 Myr) in 2010**, and then [found](#) and [confirmed](#) GN-z11 at z~11.1 (~400 Myr after the Big Bang): demonstrated power of Hubble by pushing into the edge of the realm of the “first galaxies”. GN-z11 lies in the pre-reionization era just 200-300 Myr later than when the very first stars and galaxies formed.
- 5) **MAST Archive release to community of XDF 2012:** the [eXtreme Deep Field \(XDF\)](#) is deepest image ever taken by Hubble from 10 years of ACS and WFC/IR data on the HUDF. The XDF consists of 2 MSec of Hubble imaging and reaches to 31 mag  $5\sigma$  (32.9 for  $1\sigma$ ).
- 6) **MAST Archive release to community of HLF 2018:** the [Hubble Legacy Field \(HLF-GOODS-S\)](#) is the largest single fully-rectified coherent dataset ever assembled from Hubble. The HLF-GOODS-S is 6.4 MSec in 7491 exposures from about 2655 orbits. This is ~75% of a full Hubble cycle!
- 7) **AAS 2016 Lancelot M. Berkeley New York Community Trust Prize** for work on *The Most-Distant Galaxies Viewed with Hubble*. Plenary Talk AAS 229 on *Exploring for Galaxies in the First Billion Years with Hubble and Spitzer — Pathfinding for JWST*.

- 8) **John N. Bahcall Lecturer 2018** at STScI, GSFC and National Air and Space Museum: *Galaxies at Cosmic Dawn: Exploring the First Billion Years with Hubble and Spitzer – Implications for JWST.*
- 9) **AIP Plenary Lecturer 2018:** Australian Institute of Physics Congress (AIP): *Galaxies at Cosmic Dawn: Exploring the First Billion Years with the Hubble Space Telescope.*
- 10) **TEDx 2018:** *Hubble, the First Galaxies and JWST.*
- 11) **Nick and Maggie DeWolf Foundation Public Lecture Aspen 2019** in the Wheeler Opera House on *The First Galaxies: Exploring Cosmic Sunrise with Hubble and JWST.*
- 12) **Memorial Symposium to honor Riccardo Giacconi 2019.** Talk on *The STScI Years: Riccardo, Hubble, and the Early Days of JWST* at the National Academy of Sciences.
- 13) **SSB/ASEB invited presentation 2020** on *Galaxies Over (Nearly) All Time* for a celebration of Hubble's 30<sup>th</sup> Birthday.
- 14) **Working with outstanding Colleagues** – Students, Postdocs and Collaborators. Over the years I have worked on numerous scientific projects and teams with a large number of extremely capable colleagues, particularly on two+ decades of work on high-redshift galaxies. The work with colleagues has also included working closely on instrumentation and telescope developments, and in science policy. Working with so many outstanding colleagues has been an immensely rewarding and productive experience and a personal highlight of my scientific career.

## POLICY SUMMARY

- 1) **Deputy-Director STScI 1984-1987 (under Director Riccardo Giacconi):** dealt with numerous policy, technical and scientific issues on pre-launch Hubble; NGST concept.
- 2) **NRC/NAS 1990 Decadal Panel Chair:** *UV/Optical in Space* Panel of the Astronomy and Astrophysics Survey Committee (Decade of Discovery). [UV-Optical in Space Panel](#) report.
- 3) **NRC/NAS Task Group Member for SSB 1995:** *Task Group on BMDO New Technology Orbital Telescope.*
- 4) **AURA: Space Telescope Institute Council (STIC) Chair 1998-2002.**
- 5) **AURA: Board of Directors, Member 1998-2004:** nominated for Chair of BOD in 2004, but appointed AAAC Chair same year. Recognized CoI was an issue. Decided not to complete AURA election process.
- 6) **NASA Space Science Advisory Committee (SScAC) 2002-2005:** NASA Astrophysics FACA advisory committee.
- 7) **Astronomy and Astrophysics Advisory Committee (AAAC) Chair 2004-2008:** Congressionally-chartered FACA committee reporting to agency leadership NSF, NASA, DOE, plus OSTP Director and Congress. AAAC submits [annual reports each March](#).
- 8) **AAAC Task Forces set up while AAAC Chair:** [Five major studies](#) were set up as AAAC Subcommittees while Chair: *Task Force on Cosmic Microwave Background Research (TFCR) 2005; Report on GSMT-JWST Synergy 2005; Dark Energy Task Force (DETF) 2006; Dark Matter Scientific Assessment Group (DMSAG) 2007; ExoPlanet Task Force (ExoPTF) 2008.*
- 9) **Spitzer TAC Chair 2004:** *Spitzer* Time Assignment Committee (Chair of overall TAC).
- 10) **Witness – Congressional House Science Committee Hearing 2007:** Invited Witness, House Committee on Science and Technology's Subcommittee on Space and Aeronautics Hearing on [NASA's Space Science Programs](#).

- 11) **JWST Science Advisory Committee (JSTAC) Chair 2009-2017:** JSTAC charged with advising STScI (and indirectly NASA) on maximizing the science return from JWST. Numerous letters from JSTAC regarding recommendations can be [found at this link](#).
- 12) **JWST Independent Comprehensive Review Panel (ICRP) 2010:** Chair John Casani and Garth Illingworth represented ICRP's findings to NASA Administrator and Deputy and Associate Administrator and Congress. [The ICRP report is here](#).
- 13) **Witness – Congressional House Science Committee Hearing 2011:** Invited Witness, Hearing [The Next Great Observatory: Assessing the James Webb Space Telescope](#).
- 14) **ESO VC Chair 2010:** ESO Visiting Committee for all ESO facilities.
- 15) **AURA: AURA President Search Committee, Member 2014.**
- 16) **AURA: STScI Director Search Committee, Chair 2015.**
- 17) **Co-Lead of JWST Center Directors External Team (CDET) 2015–:** with Rick Howard (*ret.* former JWST Program Director NASA HQ); in part dealing with policy issues related to JWST mission – reporting to GSFC Center Director.
- 18) **Member and Chair of GSFC Center Director's Visiting Committee 2017–:** member, and now Chair since 2019, of the Goddard Center Director's Visiting Committee.
- 19) **Co-Lead of WFIRST Center Directors External Group 2019–:** with Rick Howard; dealing with policy and mission issues for WFIRST.

### MISSIONS/INSTRUMENTS SUMMARY

- 1) **NGST concept development 1987-1992:** co-leader of Next Generation Space Telescope (NGST – now JWST) concept activities and developments with Peter Stockman and Pierre Bely. Large 8-m class passively-cooled optical-IR space telescope became the baseline concept, even though a range of sizes were explored.
- 2) **NGST (JWST) workshops and reviews 1989-1991:** Organized the first science conference in 1989 *The Next Generation: A 10 m Class UV-Visible-IR Successor to HST*.
- 3) **Chair of the UV-Optical in Space Panel of the 1990 Decadal Survey:** the [Panel](#) recommended a 6-m passively-cooled large space telescope (like the NGST concept).
- 4) **NGST Technical Concept Development under NASA *Astrotech 21* 1990-1991:** NGST technologies with NASA HQ and JPL support – see *Workshop Proceedings: Technologies for Large Filled-Aperture Telescopes in Space* 1991. NGST was chosen in the 2000 Decadal, and then was subsequently named JWST.
- 5) **Chair and Member Keck Science Steering Committee 1989-1999:** responsible for instrument deliveries from UC and Caltech PIs for Keck Telescopes.
- 6) **Keck DEIMOS spectrograph, early 1990s:** developed DEIMOS concept as part of DEEP project and led successful initial NSF proposal (with Co-P.I.s S. Faber, J. Miller, H. Epps).
- 7) **HST ACS Deputy PI 1995-2007:** Advanced Camera for Surveys for Hubble Space Telescope (PI Holland Ford).
- 8) **NHST/VLST Workshop 2002:** Co-organizer with Rob Kennicutt and Ken Sembach. Organized [major workshop](#) *Hubble's Science Legacy* sponsored by NASA, ESA, AURA and U. Chicago on science issues and technical challenges for a *Very Large Space Telescope (VLST)* successor to *Hubble*. Proceedings and NASA HQ White Paper.
- 9) **PI of Scalable Concepts for Large UV-Optical Telescopes in Space proposal 2003:** with scientists/engineers/managers/astronauts from universities, NASA centers and industry. Concept for VLST observatory assembly in space developed in proposal.
- 10) **Organizing Committee 2004:** *Very Large Space Telescope (VLST)* Workshop at STScI.

- 11) **TPF-C STDT Member NASA HQ/JPL Study 2004-2006:** *Terrestrial Planet Finder Coronagraph Science Technology Definition Team* (TPF-C STDT) – working to define a mission for detecting and characterizing exoplanets with a space coronagraph.
- 12) **TMT SAC Co-Chair/Chair 2009-2018:** UC Co-Chair of TMT Science Advisory Committee, (SAC) and also overall Chair of SAC for 2010-2013.
- 13) **Co-Lead of JWST Center Directors External Team (CDET) 2015–:** to independently evaluate progress of the JWST Project. Small focused group to assess overall JWST Project on an ongoing basis and to provide individual feedback to GSFC Center Director, the Project Manager and the Program Director. Co-Chair for organizing group with prior NASA HQ JWST Program Director Rick Howard and members Bob Bitten (Project Financial Analyst; Aerospace) and Tom Gavin (former Deputy-Director JPL Flight Programs).
- 14) **NGST/JWST Early History in STScI Newsletter 2016:** [Newsletter article](#) *NGST: The Early Days of JWST* overview of the early history of the development of NGST – the concept that ultimately became JWST.
- 15) **Co-Lead of WFIRST Center Directors External Group 2019–:** as for JWST, this has involved assessing activities for the WFIRST (now Roman Space Telescope) Project and Program as co-lead with Rick Howard.

## TEAMS AND COLLABORATIVE ACTIVITIES

A central aspect of my career has been to work with, and lead, teams and groups over a wide range of science programs, as well as enabling complex and challenging instruments and missions. As noted above, this has involved working with outstanding and very capable colleagues – students, postdocs and collaborators – on numerous scientific projects, some of which are noted below. It is through such team efforts that major space missions and observatories, and their instruments, are successfully completed. The challenges of constructing complex technical systems, and overcoming the inevitable political and policy issues requires teams of excellent people. Working with so many outstanding colleagues has been an immensely rewarding and productive experience and a personal highlight of my scientific career.

## STUDENTS, POSTDOCS AND COLLABORATORS

Over the years I have worked with a large number of scientists and have found those collaborations to be immensely rewarding experiences. I started to list those with whom I have worked, but when I got to over 100 people and I was nowhere near finished I decided that this was unwise since I surely would leave out many people who played an important role in so many aspects of my career. I just note here some of the science and instrument/telescope teams that played a particularly important role – the HUDF09/XDF and HLF teams, the 3D-HST team, the Hubble ACS GTO team, the NGST/JWST teams, and the DEEP/DEIMOS teams. I also note in particular the students and postdocs with whom I worked over many years and who made learning a two-way experience. These scientists include graduate students Marijn Franx, Valentino Gonzalez, Dan Kelson, Shannon Patel, Kim-Vy Tran, and also postdocs and researchers Rychard Bouwens, Brad Holden, Dan Magee, Pascal Oesch, Nicole Vogt. Collaborators, as noted above are too numerous to list.

## EXTERNAL RESEARCH SUPPORT

- Research support grants over the period 1988-2020 totalled a little over \$14.4 million.
- The scientific research grants were primarily from NASA.
- Of this total about \$5 million was from two major instrumentation grants where I was PI or Co-PI.
- I was also Deputy-PI on the Hubble Advanced Camera for Surveys (ACS) which was a NASA Project for the Hubble Space Telescope that cost in excess of \$100 million.

## TEACHING

Teaching during the 25+ years at UCSC was predominantly for graduate courses on:

- Distant Galaxies – Astronomy 240A – the structure and dynamics of nearby galaxies;
- High Redshift Galaxies – Astronomy 240B – a course that I developed on the nature of distant galaxies in the first half of time in the growth of the universe;
- Future Directions – Astronomy 207 – a new course that I developed that dealt with science policy, particularly regarding the technical, community efforts and political issues surrounding the development of major astronomy projects and missions;
- Our Galaxy and Beyond – Astronomy 5 – an introductory course for undergraduates was also taught a number of times.

## SCIENTIFIC ACTIVITIES

- 2020 SSB/ASEB invited presentation *Galaxies Over (Nearly) All Time* for Hubble's 30th Birthday celebration.
- AAS Media Event *Seminar for Science Writers: Hubble @ 30* presentation on *The Hubble Deep Sky Surveys & Planned Synergy with JWST & WFIRST*.
- 2019 Memorial Symposium to Honor Riccardo Giacconi invited talk on *The STScI Years: Riccardo, Hubble, and the Early Days of JWST* at the National Academy of Sciences.
- Nick and Maggie DeWolf Foundation Public Lecture, Aspen in the Wheeler Opera House on *The First Galaxies: Exploring Cosmic Sunrise with Hubble and JWST*.
- NASA News release for HLF [STScI-2019-17](#) *Hubble Astronomers Assemble Wide View of the Evolving Universe* NASA, ESA, G. Illingworth plus D. Magee, P. Oesch, R. Bouwens, K. Whitaker, P. van Dokkum and the HLF Team.
- Aspen Center for Physics Winter Conference *Into the Starlight – The End of the Cosmic Dark Ages* Aspen Talk on *James Webb Space Telescope – Constructing the Most Complex Space Telescope Ever*.

- 2019 Aspen Center for Physics Winter Conference *Into the Starlight – The End of the Cosmic Dark Ages* Aspen Talk on *Revealing Cosmic Sunrise: Galaxy Build-up in the First 600 Myr*.
- NASA’s Universe of Learning Science Web Briefing *Exploring the Realm of the First Galaxies with Hubble and JWST*.
- Talk at Workshop *Extremely Big Eyes in the Universe* UCLA Los Angeles on *JWST ELTs WFIRST: A Synergistic Set of Powerful All-Sky Observatories*.
- 2018 Release to Hubble MAST Archive of Hubble Legacy Fields (HLF) Data Release 2.0 for the GOODS-S region (HLF-GOODS-S). The HLF-GOODS-S is the largest single fully-rectified coherent dataset ever assembled from Hubble. The HLF-GOODS-S is 6.4 MSec in 7491 exposures from about 2655 orbits. This is ~75% of a HST full cycle!
- John N. Bahcall Lecturer for 2018 at the National Air and Space Museum: *The Earliest Galaxies: Exploring Cosmic Sunrise with Hubble, Spitzer, and JWST*.
- John N. Bahcall Lecturer for 2018 at Goddard Space Flight Center: *Galaxies at Cosmic Dawn: Exploring the First Billion Years with Hubble and Spitzer – Implications for JWST*.
- John N. Bahcall Lecturer for 2018 at Space Telescope Science Institute Baltimore: *Galaxies at Cosmic Dawn: Exploring the First Billion Years with Hubble and Spitzer – Implications for JWST*.
- Invited AIP Plenary Lecturer: Australian Institute of Physics Congress (AIP): *Galaxies at Cosmic Dawn: Exploring the First Billion Years with the Hubble Space Telescope*.
- Talk at Australian Institute of Physics Congress (AIP) Session 10A on Major Facilities: *James Webb Space Telescope -- JWST Status: Insights into the Challenges of Constructing the most Complex Space Telescope Ever*.
- TEDx: Perth Australia: *Hubble, the First Galaxies and JWST*.
- Invited Talk at Workshop *WFIRST/LSST Deep Fields* Princeton *Going Deep: Deep Fields Beyond the UDF/XDF – Exploring the Realm of Galaxies in the First Gyr*.
- 2017 Invited Talk at *Distant Galaxies from the Far South* Conference Bariloche *Open Questions and the Impact of Future facilities*.
- Harvard-Smithsonian Center for Astrophysics ITC Lunch Talk *Thoughts on Flagship Missions: JWST and the Implications for Getting What’s Next(?)*.
- Invited Harvard-Smithsonian Center for Astrophysics Colloquium *Galaxies at Cosmic Dawn: Exploring the First Billion Years with Hubble and Spitzer. Implications for JWST*.
- Invited Colloquium Sydney University Sydney *Galaxies at Cosmic Dawn: Exploring the First Billion Years with Hubble and Spitzer – Implications for JWST*.
- Talk at Australian National University Canberra Mt Stromlo Observatory RSAA *A Status Update on JWST: Bringing One of the Most Challenging Science Missions Ever to Fruition*.
- Invited Colloquium Australian National University Canberra Mt Stromlo Observatory RSAA *Galaxies at Cosmic Dawn: Exploring the First Billion Years with Hubble and Spitzer – Implications for JWST*.

- 2017 Invited Colloquium Melbourne University Melbourne *Galaxies at Cosmic Dawn: Exploring the First Billion Years with Hubble and Spitzer – Implications for JWST.*
- Invited Colloquium Swinburne University Melbourne *Galaxies at Cosmic Dawn: Exploring the First Billion Years with Hubble and Spitzer – Implications for JWST.*
- Talk at Jerry Nelson Memorial "NelsonFest" on Jerry and Keck in context of *Galaxies at Cosmic Dawn: Exploring the First Billion Years with Keck and Hubble.*
- AAS Lancelot M. Berkeley New York Community Trust Prize for work on The Most-Distant Galaxies Viewed with Hubble. Plenary Talk AAS 229 on *Exploring for Galaxies in the First Billion Years with Hubble and Spitzer — Pathfinding for JWST.*
- Invited Talk at *Challenges in Galaxy Evolution Conference Florence Future Perspectives – Within the Context of Some Current Results – Mostly in the First Gyr.*
- Invited Talk *Galaxy Evolution Across Time Workshop Paris Galaxies at Cosmic Dawn: Implications for JWST from Exploring the First Billion Years with Hubble and Spitzer.*
- Invited Talk ESO Garching *Reaching New Heights in Astronomy "Tim Fest" Retirement for Director-General Tim de Zeeuw The Earliest Galaxies: Exploring Cosmic Sunrise with JWST, ALMA and the ELT.*
- Public UCSC Arts Event *Look Back in Time: Russell Crotty and Lick Observatory* with public talk on *The First Billion Years: The Dawn of Galaxies.*
- Talk at AAS January Meeting session *W. M. Keck Observatory: A Resource for NASA and the Entire US Community on The Confirmation and Characterization of the Highest Redshift Galaxies: The Power of Complementary Observations by Keck, Spitzer and Hubble.*
- 2016 Invited Talk Cepi Symposium Honoring Frank Cepollina *Science Highlight — The Earliest Galaxies: How Hubble Servicing and New Instruments Enabled Dramatic Advances.*
- Invited Talk at Workshop *Exploring the Universe with JWST - II Montreal Maximizing the Science Return from JWST Seven Years of JSTAC Deliberations and Recommendations.*
- NASA News release of GN-z11 confirmation [STScI-2016-07](#) *Hubble Team Breaks Cosmic Distance Record* NASA, ESA, P. Oesch, G. Brammer, P. van Dokkum, and G. Illingworth.
- Prior 2014 discovery of bright galaxies at  $z \sim 10$  (see STScI-2014-05) led to confirmation of most distant galaxy ever found, GN-z11 at  $\sim 400$  Myr after the Big Bang. GN-z11 shows power of Hubble by pushing into the edge of the realm of the "first galaxies" at  $z \sim 11.1$ . Planck indicates that GN-z11 lies in the pre-reionization era, and lies within probably just 200-300 Myr of the very first stars and galaxies.
- 2015 APS Meeting Invited talk: *Observing the Earliest Galaxies: Looking for the Sources of Reionization.*
- Invited Colloquium Northwestern University *Cosmic Dawn: The Growth of Galaxies in the Reionization Epoch.*
- Talk Northwestern University *The James Webb Space Telescope.*

- 2015 Organized Aspen Center for Physics 2016 Winter Conference on *The Reionization Epoch: New Insights and Future Prospects Program*, Chair of Organizing Committee.
- HIPPAC Workshop Talk *Cosmic Dawn: The Growth of Galaxies in the Reionization Epoch*.
- South by High Redshift Conference Talk *The First Billion Years: The Growth of Galaxies in the Reionization Epoch at  $z > 6$* .
- 2014 Invited Talk Science with the *Hubble Space Telescope IV Looking to the Future*, exploring the first billion years: *First Galaxies to the End of Reionization*.
- HIPACC/CGE The Near-Field Deep-Field Connection Talk *The First Billion Years: Galaxies in the Reionization Epoch*.
- Talk at Australian National University Canberra Mt Stromlo Observatory RSAA *JWST – an Informal Overview*.
- NASA News release of  $z \sim 10$  Galaxies discovery [STScI-2014-05](#) *Great Observatories Team Up to Discover Ultra-Bright Young Galaxies* NASA, ESA, G. Illingworth, P. Oesch, R. Bouwens and I. Labbé, and the Science Team.
- 2013 Invited Talk USP Conference Cosmology, Large Scale Structure and First Objects Brazil *Exploring the First Billion Years: Galaxy buildup just 200 Myr after the First Galaxies*.
- 2012 Santa Cruz Galaxy Workshop, *Exploring the First Billion Years: Galaxy Buildup at Early Times*.
- NASA News release of XDF [STScI-2012-37](#) *Hubble Goes To The Extreme To Assemble Farthest Ever View Of The Universe*, NASA, ESA, G. Illingworth, D. Magee, and P. Oesch, R. Bouwens, and the XDF Team. The XDF appeared in full color on Page 1 in the print issue of the New York Times' Science Times as [Hubble's 13.2 Billion Light-Year Squint](#).
- MAST Archive Release to Community of Hubble eXtreme Deep Field XDF. See [webpage on XDF](#).
- PI of eXtreme Deep Field (XDF) program. Decade of Hubble data combined to make the deepest image ever taken of the Universe. XDF combines 10 years of HST ACS and WFC3/IR images in the deepest field ever. The XDF consists of 2 MSec of Hubble imaging and reaches to 31 mag  $5\sigma$  (32.9 for  $1\sigma$ ). [More on XDF here](#).
- 2011 Wrote article for TMT Segments magazine (March 2011 issue) on high redshift galaxies (with Rychard Bouwens).
- Numerous interviews for media and blogs for discovery of highest redshift object at  $z \sim 10$  – earliest galaxy yet seen at just 480 Myr from Big Bang.
- Live interview on local FM radio in San Francisco about the most distant galaxy.
- Live interview on BBC World Service about the most distant galaxy and its implications.
- Interview for local TV on early galaxies and the future role of *JWST* that was shown a number of times on local media.
- Invited colloquium on *Galaxies in the Epoch of Reionization: Galaxy Buildup in the First Gyr* at Caltech.

- 2011 Invited colloquium on *Galaxy Buildup in the First Billion Years: Galaxies in the Epoch of Reionization* for the SETI Seminar series (over 200 attendees).
- Invited talk on *Galaxies in the Epoch of Reionization: Galaxy Buildup in the First Gyr* to the JWST SWG, and NASA and Northrup Grumman personnel.
- Talk on *Galaxy Buildup in the First Billion Years: Galaxies in the Epoch of Reionization* for the 2011 Santa Cruz Galaxy Workshop.
- Extensive media interviews for press, TV and radio, following press conference, at AAS in Washington for most distant galaxy found at  $z \sim 10$ , just 480 Myr from Big Bang, from the HUDF09 program.
- Member of media discussion panel for press briefing at January AAS on *Galaxies at Early Times* for STScI/NASA press release—included short presentation on *The Highest Redshift Galaxies from the HST HUDF09 Project* and Q&A sessions and interviews.
- NASA HUDF09 Press release [STScI-2011-05](#) *NASA's Hubble Finds Most Distant Galaxy Candidate Ever Seen in Universe*, NASA, ESA, G. Illingworth, R. Bouwens, and the HUDF09 Team.
- 2010 Japanese TV NHK hour-long production on high redshift galaxies and early universe. NHK shot footage in Washington at the AAS meeting and in Santa Cruz at UCSC in my office, and also highlighted my interest in nature photography with footage shot at *Año Nuevo* State Park.
- Featured in article in UCSC Review magazine Spring 2010 on high redshift galaxies.
- Extensive media interviews for press, TV and radio, including press conference, at AAS in Washington for HUDF09 program and first releases following discovery of  $z \sim 8$  galaxies.
- NASA HUDF09 Press release [STScI-2010-02](#) *Hubble Reaches the "Undiscovered Country" of Primeval Galaxies* NASA, ESA, G. Illingworth and R. Bouwens and the HUDF09 Team.
- Invited talk on *Revealing Galaxies in the First Billion Years: HST's Central Role at the Science with the Hubble Space Telescope – III* conference held in Venice.
- Invited talk on *Galaxy Buildup in the First Gyr: the Nature of Galaxies in the Epoch of Reionization* at the Lorentz Center workshop on the *Emergence of the Hubble Sequence*.
- Talk on *Constraints on Galaxies in the First Billion Years: The HST HUDF09 Program* at the University of Texas Austin workshop on *First Stars and Galaxies*.
- Talk on *Galaxy Buildup in the First Gyr: the Nature of Galaxies in the Epoch of Reionization* at the Penn State, State College, workshop on *The First Galaxies, Quasars & Gamma-Ray Bursts*.
- Talk on *Exploring the Nature of Galaxies in the First Billion Years with WFC3 and ACS: The HUDF09 Program* at the Aspen Center for Physics winter workshop on *The High Redshift Universe*.
- Invited talk on *Galaxy Buildup in the First Gyr: the Nature of Galaxies in the Epoch of Reionization* at the STScI May Workshop *Stellar Populations in the Cosmological Context*.

- 2009 PI of HUDF09 HST WFC3/IR program—top-ranked and largest program awarded by Cycle 17 HST TAC.
- Invited talk on *Galaxy Build-up in the First Billion years (or so...)* at the *Napa Valley 2009 Galaxy Formation and Evolution Workshop*.
- Talk on *Cosmic Star Formation since  $z \sim 7-8$ : The SFR Density from the Reionization Epoch to  $z \sim 2.5$*  at the *XXVth IAP 2009 The Ly $\alpha$  Universe*.
- 2008 Invited talk in Perth, Australia on *Answering the great outstanding questions in Astronomy* for the SKA Forum 2008 for the Australian Minister of Science and Head of Federal Science Department.
- Invited talk in Perth Australia on *High Redshift Galaxies* for the SKA workshop *Deep Surveys of the Radio Universe with SKA Pathfinders*.
- Talk on *The Highest Redshift Galaxies* at Aspen Center of Physics winter workshop on *The First Two Billion Years of Galaxy Formation: The Reionization Epoch and Beyond*.
- 2007 Organized Aspen Center for Physics 2008 Winter Conference on *The First Two Billion Years of Galaxy Formation: The Reionization Epoch and Beyond*, Chair of Organizing Committee.
- Interviewed on local TV (KSBW 8) on the impact of Google Sky.
- Interviewed on development of *Next Generation Space Telescope/James Webb Space Telescope* for forthcoming book.
- Interviewed for *Auckland Herald-Tribune* article on distant galaxies from talk at the *A New Zeal for Old Galaxies* workshop in Rotorua.
- Interviewed on *German National Radio* on US Science Plans.
- Invited talk in *A New Zeal for Old Galaxies* workshop Rotorua New Zealand on *Galaxy Build-up in the First 2 Gyrs*.
- Invited colloquium at Leiden Observatory on *The Highest Redshift Galaxies: Galaxy Formation and Evolution in the First 2 Billion Years*.
- Invited Speaker at *Astrophysics 2020: Large Space Missions Beyond the Next Decade* workshop at STScI with talk on *Science, Technologies, Telescopes and Budgets: The Challenge of Planning Large Science Missions that are 15-20 Years in the Future*.
- Invited Review Talk on the *Highest Redshift Galaxies Heidelberg Workshop on Galaxy Growth in a Dark Universe*.
- Invited talk and Discussion Panel Member for UC Berkeley *Spirit of Lyot* Symposium talk on the *Challenges and Opportunities: the Decadal Survey and Science Funding*.
- Invited Speaker, National Radio Astronomy Observatory's 50th Anniversary Science Symposium talk on *First Light: Observing Galaxy Build-up in the First 1-2 Gyrs*.
- Detailed contribution paper to the National Academy on the 2010 Astronomy Decadal Survey based on AAAC discussions and reports.
- 2006 Extensively interviewed on high-redshift galaxies during *BBC Radio 4's* visit to Santa Cruz.
- NASA/Space Telescope Science Institute *Hubble Space Telescope* science press release 2006-44, *First Galaxies*.

- 2006 NASA/Space Telescope Science Institute *Hubble Space Telescope* science press release 2006–12, *Redshift 6 Galaxies*.
- NASA/Space Telescope Science Institute *Hubble Space Telescope* science press release 2006–25, *Beta Pic Dust Disks*.
- *Sky and Telescope* article discusses our work on *Galaxy Assembly at High Redshifts*.
- Interviewed for *Nature*, popular commentary on *First Galaxies*.
- Subject of front-page article in *Santa Cruz Sentinel* on astronomy and *Hubble Space Telescope*.
- *Nature* News article about our work included on *Galaxies at Redshift 7–8*.
- Invited talk on *High Redshift Universe* at the *Texas in Melbourne Symposium*.
- Invited Speaker, the International Society for Optics and Photonics (SPIE), *Large Telescopes Meeting The Astronomy Program and Decadal Survey*.
- Talk on *High Redshift Galaxies* at Venice Distant Galaxies workshop.
- 2004 NASA/Space Telescope Science Institute *Hubble Space Telescope* science press release 2004–33, *Protoplanetary Disk*.
- NASA/Space Telescope Science Institute *Hubble Space Telescope* science press release 2004–07, *Hubble UDF IR*.
- Crown College Evening Talk on *Young Galaxies and HST*.
- Invited Talk, Chesley Bonestell Memorial Lecture for MIRA Monterey/Carmel *Studying the Formation of Galaxies at the Beginning of Time with the World’s Most Powerful Telescopes – Watching Galaxies Form and Grow*.
- 2003 NASA/Space Telescope Science Institute *Hubble Space Telescope* science press release 2003–02, *Circumstellar Disk*.
- NASA/Space Telescope Science Institute *Hubble Space Telescope* science press release 2003–01, *Cluster Zoom Lens*.
- Talk on *Redshift 6 Galaxies* from the new ACS camera at the Venice *Galaxies* workshop.
- 2002 NASA/Space Telescope Science Institute *Hubble Space Telescope* science press release 2002–11, *ACS Views of the Universe*.
- Numerous media releases on first observations with ACS, including *New York Times* front page for the *Hubble Early Release Observations (EROs)*.
- Interviewed by a number of media outlets on the *Hubble Space Telescope Advanced Camera Early Release Observations (EROs)*.
- Interviewed by NASA TV on ACS during *Hubble Space Telescope Servicing Mission 3B* while at Johnson Space Flight Center, Houston for Space Shuttle Servicing Mission SM3B.
- Talk at the June American Astronomical Society meeting on *First Science Results from the HST Advanced Camera*.
- 2001 Invited talk on *Issues in Early-Type Galaxy Formation and Evolution* at the *Dynamics, Structure and History of Galaxies* workshop.
- Talk on *M/L in Early-Type Galaxies: Cluster vs Field* at the European Southern Observatory/Padua Venice workshop on the *Masses of Galaxies*.

- 2000 Invited Talk at American Astronomical Society meeting on *Elliptical Galaxies: Oldest, Cleanest, Biggest* in the session on Extragalactic Astronomy.
- Talk on *The HST Advanced Camera Cluster Program* at the European Southern Observatory Workshop on *Deep Fields*.
- Talk on *Distant Cluster Galaxies* at the Aspen Center for Physics Summer Astrophysics Workshop.
- 1999 Invited Talk on *Formation and Evolution of E and S0 Galaxies in Clusters at  $z \sim 0.3-1$*  at the Johannesburg/Witwatersrand conference on *A New Millennium in Galaxy Morphology: From  $z = 0$  to the Lyman Break*.
- Keynote Review talk on *Galaxies at redshifts of 4–5+: Insights into Galaxy Development in the first 2–3 Gyr* at the Johannesburg/Witwatersrand conference on *A New Millennium in Galaxy Morphology: From  $z = 0$  to the Lyman Break*.
- Invited talk on *The Nature of Galaxies in Rich Environments at  $z \sim 0.3-1$ : Surveying Distant Clusters* at the Coral Sea Cosmology Conference.
- Invited Talk on *Future Prospects of Observational Cosmology (and Cosmogony): Ground-Based Optical/Infrared* at the *Hy-Redshift Universe* conference.
- 1998 Presentation on *High Redshift Galaxies* at the August Physics Department *JoelFest*.
- Presentation on the *Structure and Star Formation in Galaxies at  $z \sim 4-5$*  at the Xth Rencontres de Blois *The Birth of Galaxies*.
- Talk on *High Redshift Galaxies* at the Aspen Winter Astrophysics conference on *Universal Star Formation* at the Aspen Center for Physics.
- 1997 NASA/Space Telescope Science Institute Press Release 1997–25 on *Highest Redshift Galaxy*.
- Talk on the *Keck DEEP Survey* at the joint European Southern Observatory/Australia Workshop *Looking Deep in the Southern Sky*.
- Presentation on *Using Keck to Explore the High Redshift Universe* at the Monte Porzio meeting on *The Young Universe: Galaxy Formation and Evolution at Intermediate and High Redshift*.
- 1996 Presentation on *Keck Spectroscopy of the Hubble Deep Field at HST and the Distant Universe* conference, Cambridge, UK.
- Invited Talk on *The HST Advanced Camera* at the *HST and the Distant Universe* conference, Cambridge, UK.
- 1995 Invited Review on *Elliptical Galaxies* at *Science with the Hubble Space Telescope—II* meeting, Paris.
- 1994 NASA/Space Telescope Science Institute *Hubble Space Telescope* science press release 1994–49, *Galaxy Distance*.
- 1994 Talk at 17th Texas Symposium, Munich, Germany, on *Keck Observations of Distant Galaxies*.
- Invited Presentation to *VLT Science* meeting at ESO, Munich.
- 1992 Inaugural Lecture, UCSC on *The Distant Universe from Space Telescope*.
- Interviewed on *Hubble Space Telescope Refurbishment and Hubble Space Telescope Science Research* for local newspapers and NBC TV.

- 1991 Interviewed on Keck Telescope for *San Jose Mercury News* and KSBW-TV Channel 8.
- Cal State Sacramento: Visit and talk on *The Keck Telescope*.
- 1990 *Sky and Telescope* report on *Next Generation Space Telescope*.
- Interviewed on *Hubble Space Telescope* for *Executive Intelligence Report*, *Economist*, *Sacramento Bee*, *San Jose Mercury News*, *Panorama* (an Italian news weekly) and KSBW-TV Channel 8.
- Interviewed on Keck Telescope for *Science Magazine*, *Santa Cruz Sentinel*, *San Jose Mercury News* and for a Honolulu radio station.
- Talk on *Astronomy in the 1990s* to the Santa Cruz Astronomy Club.
- UCSC Physics Colloquium: *HST: Capability, Status and Science Program*.
- Invited Presentation on *Kinematics and Color Gradients in Ellipticals* at the meeting *Internal Dynamics of Galaxies at the Accademia Nazionale dei lincei* Rome.
- Invited Presentation on *Large Telescopes in Space* at the IAU Colloquium 123, *Observations in Earth Orbit and Beyond* NASA/Goddard Space Flight Center, Maryland.
- Invited review on the *16-m UV-Visible-IR Lunar-Based Telescope* NASA sponsored meeting *Astrophysics from the Moon* Annapolis, Maryland.
- Speaker, public lecture, Lick Observatory Summer Visitors' Program.
- 1989 Speaker, public lecture, Lick Observatory Summer Visitors' Program.
- Invited Review on *Elliptical Galaxies* at the Astronomical Society of the Pacific Hubble Centennial Symposium, *The Evolution of the Universe of Galaxies*, Berkeley, California.
- 1988 Invited Presentation on *The Next Generation: An 8–16-m Space Telescope* at the International Astronomical Union XX<sup>th</sup> General Assembly Joint Discussion *The Space Telescope—Status and Perspectives*, Baltimore, Maryland.
- Presentation at Dean's Forum on *Future Directions in Technologies for Astrophysics* to Silicon Valley Business Leaders, Techmart, Santa Clara.

## PROFESSIONAL ACTIVITIES

- 2019– Chair, Goddard Space Flight Center Director's Visiting Committee.
- 2019– Co-Lead of WFIRST Center Directors External Group: involved assessing issues/concerns for the WFIRST (now Roman Space Telescope) Project and Program as co-lead with Rick Howard (as for JWST).
- 2019 Memorial Symposium to Honor Riccardo Giacconi invited talk on *The STScI Years: Riccardo, Hubble, and the Early Days of JWST* at the National Academy of Sciences.\*
- Aspen Center for Physics Winter Conference *Into the Starlight – The End of the Cosmic Dark Ages* Talk *James Webb Space Telescope – Constructing the Most Complex Space Telescope Ever*.\*

- 2018 Talk at Australian Institute of Physics Congress (AIP) Session 10A on Major Facilities: *James Webb Space Telescope – JWST Status: Insights into the Challenges of Constructing the most Complex Space Telescope Ever*.\*
- 2017 Talk at Australian National University Canberra Mt Stromlo Observatory RSAA A Status Update on JWST: *Bringing One of the Most Challenging Science Missions Ever to Fruition*.\*
- 2016 Invited Talk at Workshop *Exploring the Universe with JWST – II Montreal Maximizing the Science Return from JWST – Seven Years of JSTAC Deliberations and Recommendations*.\*
- JSTAC article in [STScI Newsletter 2016, 33, 04](#): *The JWST Advisory Committee (JSTAC): The Impact of a Long 12-Month Proprietary Period*.
- JSTAC article in [STScI Newsletter 2016, 33, 03](#): *The JWST Advisory Committee (JSTAC): Recommendations for JWST Cycle 1 Proposals*.
- JSTAC article in [STScI Newsletter 2016, 33, 01](#): *The JWST Advisory Committee (JSTAC): Maximizing the Scientific Productivity of JWST*.
- NGST/JWST Early History in [STScI Newsletter 2016, 33, 01](#): [Newsletter article NGST: The Early Days of JWST](#) is an overview of the early history of the development of NGST – the NGST concept ultimately became JWST.
- 2015– Co-Chair, GSFC Center Director External Team to independently evaluate progress and issues on the JWST Project. Small focused group to assess overall JWST Project on an ongoing basis and to provide individual feedback to GSFC Center Director if issues/concerns arise. Co-Chair for organizing group with prior NASA HQ JWST Program Director Rick Howard and members Bob Bitten (Project Financial Analyst; Aerospace) and Tom Gavin (JPL – former Deputy-Director JPL Flight Programs).
- 2015 Organized Aspen Center for Physics 2016 Winter Conference on *The Reionization Epoch: New Insights and Future Prospects Program*, Chair of Organizing Committee.
- Chair, AURA Director Search Committee.
- 2014–2018 Member, Goddard Space Flight Center Director’s Visiting Committee. Meets 2-3 times yearly with senior management to assess and offer individual opinions on performance, priorities and activities of Center.
- 2014 Member, AURA President Search Committee.
- 2013 Assembled 135-page Whistleblower report to the UC Office of the President regarding the UCOP Vice President who was working to shut down Lick Observatory and UCO and to lessen support for Keck and TMT.
- 2012–2014 Numerous media interviews and reports regarding the attempt by UCOP Vice President Steve Beckwith and UCB Prof Geoff Marcy to shut down Lick Observatory and UCO.
- 2011 Diversity Committee, Aspen Center for Physics.
- Invited Witness, House Committee on Science and Technology’s Subcommittee on Space and Aeronautics Hearing re NASA’s JWST – Hearing *The Next Great Observatory: Assessing the James Webb Space Telescope*.

- 2011 *Independent Comprehensive Review Panel (ICRP)* follow-up discussions and communications with Agency and Community members regarding *JWST*.
- Letter from *James Webb Space Telescope* Science Advisory Committee (JSTAC) to Dr. John Holdren, President’s Science Advisor, Director, OSTP regarding *JWST*.
- 2010–2013 Chair, Thirty Meter Telescope (TMT) Science Advisory Committee (SAC).
- Presentations on SAC business to TMT Board.
- 2010 Member, *Independent Comprehensive Review Panel (ICRP)* for study of *JWST* budget problems, per request by Senator Mikulski (MD) to NASA Administrator Bolden. Only scientist on ICRP; Chair John Casani and Garth Illingworth represented ICRP’s findings to NASA leadership and Congress.
- Presentation of ICRP report, with ICRP Chair, John Casani, to NASA Administrator, Deputy Administrator and Associate Administrator in two meetings at NASA HQ and KSFC.
- Presentation of ICRP report, with ICRP Chair, John Casani, to OMB and OSTP, and to Senate and House Appropriations Committee lead staffers.
- Chair, European Southern Observatory (ESO) Visiting Committee.
- Presentation of ESO Visiting Committee Report to ESO Council.
- 2009–2017 JSTAC Chair, James Webb Space Telescope Science Advisory Committee (JSTAC). JSTAC was charged with advising STScI on maximizing the science return from JWST. Numerous letters regarding recommendations at [STScI JSTAC website](#).
- 2008–2016 Co-Chair for UC, TMT Science Advisory Committee.
- 2008 Organized Aspen Center for Physics Winter Conference on *The First Two Billion Years of Galaxy Formation: The Reionization Epoch and Beyond*, Chair of Organizing Committee.
- Invited Speaker, second European Union ASTRONET Workshop (EU Decadal Planning Study groups)— US Astronomy Decadal Survey process.
- Member of the NRAO/AUI “Committee to Assess NRAO Operations” – involving several site visits and discussions and a 15-page report to the AUI President and Board.
- Fifth AAAC Task Force report: *ExoPlanet Task Force (ExoPTF)*.
- 2007 Organizer/Leader of Public Policy Session on Astronomy and Astrophysics Advisory Committee report, American Astronomical Society Annual Meeting.
- Panel Participant, Public Policy Session on NASA, American Astronomical Society Annual Meeting.
- Invited Talk and Discussion Panel Member for UC Berkeley Lyot Symposium.
- Invited Witness, House Committee on Science and Technology’s Subcommittee on Space and Aeronautics Hearing on *NASA’s Space Science Programs*.
- Invited Speaker, European Union ASTRONET Workshop (EU Decadal Planning Study groups) – talk on *Status of US Astronomy Program*.
- Co-organizer of ACS Science Team meeting, Jackson Wyoming.
- Reviewer of European Space Agency/NASA science mission proposal.

- 2007 Fourth AAAC Task Force report: *Dark Matter Scientific Assessment Group (DMSAG)*.
- 2006–2007 American Astronomical Society Committee on Astronomy and Public Policy.
- 2006 Third AAAC Task Force report: *Dark Energy Task Force (DETF)*.
- Organizer/Leader of Public Policy Session on Astronomy and Astrophysics Advisory Committee report, American Astronomical Society Annual Meeting.
- 2005–2008 Presented yearly, to the US House of Representatives’ Science Committee staff, *Astronomy and Astrophysics Advisory Committee Annual Report*.
- Presentations to the President’s Science Advisor, Director, Office of Science and Technology Policy, regarding the *Astronomy and Astrophysics Advisory Committee Annual Report*.
- Presentations yearly at the National Research Council’s Committee on Astronomy and Astrophysics, The National Academies’ Board on Physics and Astronomy, the Association of Universities for Research in Astronomy (and other meetings) on the *Astronomy and Astrophysics Advisory Committee Annual Report*.
- Presented the *Astronomy and Astrophysics Advisory Committee Annual Report* yearly to the NSF leadership and to NASA leadership.
- Editor, with the Committee, of the *Astronomy and Astrophysics Advisory Committee Annual Report* for Congress and for the Agencies.
- 2005 Second AAAC Task Force report: *Report on GSMT-JWST Synergy*.
- First AAAC Task Force report: *Task Force on Cosmic Microwave Background Research (TFCR)*.
- 2004–2008 AAAC Task Forces – [Five major studies](#) were set up as AAAC Subcommittees while I was AAAC Chair: *Task Force on Cosmic Microwave Background Research (TFCR)*; *Report on GSMT-JWST Synergy*; *Dark Energy Task Force (DETF)*; *Dark Matter Scientific Assessment Group (DMSAG)*; *ExoPlanet Task Force (ExoPTF)*.
- AAAC Chair, Congressionally chartered Astronomy and Astrophysics Advisory Committee (AAAC) from 2004 to 2008. AAAC is FACA committee whose annual report is to NSF, NASA and DOE, to Congress and to OMB/OSTP. Annual reporting to Agency senior management (NSF, NASA, DOE), OSTP Director and Congressional staff.
- 2004–2006 Member, *Terrestrial Planet Finder Coronagraph Science Technology Definition Team* (TPF-C STDT)—planning search for exoplanets using space coronagraph/nuller.
- 2004 American Physical Society/Panel on Public Affairs Task Force on NASA funding for Astrophysics.
- Chair, *Spitzer* General Observer Time Allocation Committee (GO TAC).
- Member, APS/POPA Task Force on NASA funding for Astrophysics.
- Member, Organizing Committee, *Very Large Space Telescope (VLST)* workshop STScI.
- 2003–2013 General Member, Aspen Center for Physics.
- 2003 Member, newly-formed Astronomy and Astrophysics Advisory Committee (AAAC).

- 2002–2005 Member, NASA Space Science Advisory Committee (SScAC), NASA Space Science Advisory Committee.
- 2002 NHST/VLST: Co-organizer, with Rob Kennicutt and Ken Sembach, of major workshop (*Hubble's Science Legacy*) sponsored by NASA, ESA, AURA and U. Chicago on science issues and technical challenges for Very Large Space Telescope (VLST) successor to HST. Proceedings and NASA HQ White Paper.
- 2002 PI of large study proposal on similar topic *Scalable Concepts for large UV-Optical Telescopes in Space* with scientists/engineers/managers/astronauts from universities, NASA centers and industry. Concept for Very Large Space Telescope (VLST) developed in proposal. STScI.
- 2000 Chair and member, Space Infrared Telescope Facility Legacy Proposal Panel on Distant Galaxies, Legacy Time Allocation Committee.
- 1999–2000 *Hubble Space Telescope* Second Decade Study Committee.
- 1999 Association of Universities for Research in Astronomy President Search Committee.
- Next Generation Space Telescope Instrument Study Team.
- 1998–2002 Chair, Space Telescope Institute Council.
- 1998–2002 Member, AURA Board of Directors.
- 1998–1999 Chair, Organizing Committee, Aspen Center for Physics Winter Astrophysics Conference, *Galaxy Formation and Evolution*.
- 1998 *Hubble Space Telescope* Second Decade Study — led the effort in the committee on *Making the case for an Infra-Red channel for the Wide-Field Camera 3*.
- 1997–2008 University of California Representative, Association of Universities for Research in Astronomy.
- 1997–1999 Association of Universities for Research in Astronomy Board Search Committee for Space Telescope Science Institute Director.
- 1996–2002 Member, Space Telescope Institute Council.
- 1995–2008 Deputy PI, *Hubble Space Telescope* Advanced Camera.
- 1995–2008 University of California Representative, Association of Universities for Research in Astronomy Board.
- 1995 *Hubble Space Telescope* Time Allocation Committee Panel on *Cosmology, Cluster and Distant Galaxies*.
- Member, National Research Council Space Studies Board *Task Group on BMDO New Technology Orbital Telescope*.
- Chair, Space Telescope Science Institute Deputy-Director Search Committee.
- 1994–1995 NASA Headquarters Ultraviolet/Visible Management Operations Working Group
- 1994 Presentation to *HST and Beyond* Committee on Optical/UV/IR Space Telescopes.
- 1993–1999 Presentations on Keck Telescope Science Steering Committee (SSC) business to Keck Board—California Association for Research in Astronomy.
- Co-Chair, Keck Telescope Science Steering Committee (SSC).
- 1993–1996 NASA Planetary Systems Science Working Group.
- 1993–1995 Special Invitee, NASA Keck Review Team.

- 1993 Co-I. on proposal to European Space Agency for Joint NASA– European Space Agency development of *Hubble Space Telescope* Advanced Camera.
- Co-I. on POST Program for a NASA Explorer-class mission.
- 1992–1994 Development of *Deep Extragalactic Evolutionary Probe* (DEEP) Program at Center for Particle Astrophysics, University of California, Berkeley, and support of Center Reviews.
- 1992 *Hubble Space Telescope* Second Generation Instrument Review Team.
- Presentation at National Science Foundation, Washington, DC on DEEP Project.
- 1991–1999 Keck Telescope Science Steering Committee.
- 1991–1993 Jet Propulsion Laboratory special review panel for *Hubble Space Telescope* replacement camera, WFPC–2, chaired by Charles Townes.
- 1991–1993 NASA Planetary Program *Towards Other Planetary Systems Science Working Group*.
- 1991 Organizer, Workshop on *Large Filled Apertures in Space* in Pasadena, California, March 4–5, sponsored by NASA and Jet Propulsion Laboratory.
- Presentation to NASA Headquarters meeting of the Planetary Division’s Planetary System Science Working Group meeting on the *Status of Keck Telescope* Washington, DC.
- Presentations on Distant Galaxy Cosmology Projects for DEEP for University of California at Berkeley’s Center for Particle Astrophysics retreats, with D. Koo and S. Faber
- 1990–1992 Chair, Next Generation Space Telescope Science-Engineering Working Group to oversee technology development program for future large space telescope.
- Executive Invitee for April Launch of *Hubble Space Telescope*, Kennedy Space Flight Center, Florida.
- Presentation to NASA UV-Visible-Relativity Management Operations Working Group (UVRMOWG) on results of *Next Generation Space Telescope* Workshop, Washington, DC.
- Presentation to NASA Astronomy Management Operations Working Group (AMOWG) of projected *UV-Visible Space Mission Program Plan for the 1990’s* Washington, DC.
- Presentation to Marshall Space Flight Center Advanced Projects Group and to Upper Management on *Next Generation Space Telescope* Huntsville, Alabama.
- Invited review on the *16-m UV-Visible-IR Lunar-Based Telescope* NASA sponsored meeting *Astrophysics from the Moon* Annapolis, Maryland.
- 1990–1991 Co-chair, Keck Telescope Science Steering Committee.
- 1989–1990 Chair, NRC/NAS 1990 Decadal Panel Chair: *UV/Optical in Space* Panel of the Astronomy and Astrophysics Survey Committee (Decade of Discovery). Sponsored by NASA, NSF and DOE, implemented under the auspices of the National Academy of Sciences, Washington, DC. Report here: “[UV-Optical in Space Panel](#)”.

- 1989 Presentation to NASA UV-Visible-Relativity Management Operations Working Group of plans for workshop and concepts for future space observations, Columbia, Maryland.
- Invited participant in Association of Universities for Research in Astronomy-sponsored retreat to develop a “White Paper” on Issues of Concern for the *Optical-IR on the Ground* panel of the National Research Council’s Astronomy and Astrophysics Survey Committee.
- 1988–1989 Chair, Scientific Organizing Committee for Workshop on *The Next Generation: A Successor to Hubble Space Telescope* sponsored by NASA Headquarters and Space Telescope Science Institute, Baltimore.
- 1988 Invited to Summarize Joint European Southern Observatory/National Optical Astronomy Observatory Workshop on *Very Large Telescopes and Their Instrumentation* at the European Southern Observatory, Garching bei München, Germany.
- 1987–1990 Keck Telescope Science Steering Committee.
- Chair, Keck Telescope Segment Acceptance Committee.
- 1987–1989 NASA Headquarters UV-Visible-Relativity Management Operations Working Group presentations and discussion.
- 1987 Executive Committee, *Hubble Space Telescope* Maintenance and Refurbishment Workshop, Goddard Space Flight Center, Greenbelt, Maryland.
- 1986–1991 NGST concept development: One of original initiators, with Peter Stockman and Pierre Bely of the JWST concept—Next Generation Space Telescope (NGST).
- 1986–1987 Co-Chair, *Hubble Space Telescope* Science Certification Review.
- Science Working Group: 8-m Telescope Project, Johns Hopkins University.
- 1985–1987 *Hubble Space Telescope* Working Group Meetings, Sunnyvale, Greenbelt and Baltimore.
- Chair, Space Telescope Science Institute Scientific Staff.
- 1985 *Hubble Space Telescope* Quarterly Review, Marshall Space Flight Center, Huntsville, Alabama.
- 1983–1984 Director’s Budget and Management Committee, Kitt Peak National Observatory
- Chair, Scientific Overview Committee, Kitt Peak National Observatory.
- 1982–1984 Cerro Tololo Inter-American Observatory Time Assignment Committee.
- Executive Member, Kitt Peak National Observatory Computer Advisory Committee.
- Kitt Peak National Observatory Research and Development Advisory Committee.
- 1981–1984 Kitt Peak National Observatory Scientific Overview Committee.
- Kitt Peak National Observatory Council.

\* These are also in the “Science Activities” list since communicating JWST development and status has not only scientific but also broad mission development and policy aspects and implications.