

# Curriculum Vitae: Volker Bromm

## Office

Department of Astronomy  
University of Texas at Austin  
Austin, TX 78712-1199  
Phone: (512) 471-3432  
Fax: (512) 471-6016

## Residence

6601 Sumac Dr  
Austin, TX 78731-4118  
(512) 215-2756  
<http://www.as.utexas.edu/~vbromm>  
E-mail: [vbromm@astro.as.utexas.edu](mailto:vbromm@astro.as.utexas.edu)

## Education

University of Heidelberg, Germany – Physics, M.Sc. (1993)  
Yale University, New Haven, CT – Astronomy, Ph.D. (2000)

## Professional Experience

Since-2009: Associate Professor with Tenure, University of Texas at Austin, TX  
2004-2008: Assistant Professor, University of Texas at Austin, TX  
04-10/2004: Institute Fellow, Space Telescope Science Institute, MD  
2001-2004: Postdoctoral Scholar, Harvard University, MA  
2000-2001: Postdoctoral Scholar, Institute of Astronomy, Cambridge University, UK

## Dissertation

Title: Star Formation in the Early Universe  
Dissertation Advisors: Prof. Paolo S. Coppi and Prof. Richard B. Larson – Yale University

## Current Research Interests

Star and galaxy formation in the early universe  
Reionization of the universe  
High redshift supernovae and Gamma-Ray Bursts  
Formation of supermassive black holes  
Computational astrophysics

## Professional Societies

The American Astronomical Society

The German Physical Society

## Grant Awards

Previous Funding: PI

National Science Foundation (NSF) grant, *‘Early Coevolution of Massive Black Holes and Stellar Systems in the First Galaxies’*

Total amount: \$398,000; 2007–2010

Previous Funding: Co-PI

NASA Astrophysics Theory and Fundamental Physics (ATFP) grant, *‘The Observational Signature of the First Black Holes’*

PI: Milos Milosavljevic (UT), equally shared effort (used to hire jointly-advised postdoc)

Total amount: \$300,000; 2009–2012

NASA *Swift* theory grant, *‘Probing the First Stars with Swift’*

PI: Avi Loeb (Harvard University), equally shared effort

Total amount: \$45,000; Bromm’s share: \$10,000; 2005–2006

NASA ATFP grant, *‘Modeling the Power Spectrum of Galaxies in High- $z$  Surveys’*

PI: Eiichiro Komatsu (UT), co-PI: Avi Loeb (Harvard University), Bromm was responsible for carrying out galaxy formation simulations

Total amount: \$344,000; Bromm’s share: \$48,000; 2008–2011

NASA/JPL *Spitzer* Observatory cycle-5 grant, *‘Planetary Nebulae as a Laboratory for Molecular Hydrogen in the Early Universe’*

PI: Chris Sellgren (OSU), co-PI: Harriet Dinerstein (UT), Bromm was responsible for high redshift astrophysics part

Total amount (UT): \$83,178; Bromm’s share: \$27,736; 2008–2010

Current Funding: PI

National Science Foundation (NSF) grant, *‘Transport and Mixing of Metals during the First Billion Years’*

Total amount: \$488,985; 2010–2014

## Publications

### Guide to Volker Bromm's Publication List:

Unrefereed publications are marked with an asterisk (\*). Invited articles/chapters are designated with a double dagger (‡).

For most of my publications since joining UT, I have adopted the philosophy of having my name appear towards the end of the author list, although I was responsible for conceiving the scientific idea and approach underlying the research project, writing proposals and obtaining outside funding for the work, hiring graduate students and postdoctoral co-workers, supervising the conduct of the research on a daily basis, and writing (or actively supervising the writing of) the paper.

### List of Published Peer-reviewed Papers:

#### **Publications while in rank of Associate Professor (UT)**

66. *On the Operation of the Chemo-thermal Instability in Primordial Star-forming Clouds*, Greif, T. H., Springel, V., & Bromm, V. 2013, MNRAS, **434**, 3408.
65. *Constraining the Statistics of Population III Binaries*, Stacy, A., & Bromm, V. 2013, MNRAS, **433**, 1094.
64. *Rotation and Internal Structure of Population III Protostars*, Stacy, A., Greif, T. H., Klessen, R. S., Bromm, V., & Loeb, A. 2013, MNRAS, **431**, 1470.
63. *Pregalactic Metal Enrichment: The Chemical Signatures of the First Stars*, Karlsson, T., Bromm, V., & Bland-Hawthorn, J. 2013, Rev. Mod. Phys., **85**, 809. [‡]
62. *The First Galaxies: Assembly under Radiative Feedback from the First Stars*, Pawlik, A. H., Milosavljević, M., & Bromm, V. 2013, ApJ, **767**, 59.
61. *Confined Population III Enrichment and the Prospects for Prompt Second-generation Star Formation*, Ritter, J. S., Safranek-Shrader, C., Gnat, O., Milosavljević, M., & Bromm, V. 2012, ApJ, **761**, 56.
60. *Probing Pre-galactic Metal Enrichment with High-redshift Gamma-ray Bursts*, Wang, F. Y., Bromm, V., Greif, T. H., Stacy, A., Dai, Z. G., Loeb, A., & Cheng, K. S. 2012, ApJ, **760**, 27.
59. *Chemical Signatures of the First Galaxies: Criteria for One-shot Enrichment*, Frebel, A., & Bromm, V. 2012, ApJ, **759**, 115.

58. *Star Formation in the First Galaxies – I. Collapse delayed by Lyman-Werner Radiation*, Safranek-Shrader, C., Agarwal, M., Federrath, C., Dubey, A., Milosavljević, M., & Bromm, V. 2012, MNRAS, **426**, 1159.
57. *The Source Density and Observability of Pair-instability Supernovae from the First Stars*, Hummel, J. A., Pawlik, A. H., Milosavljević, M., & Bromm, V. 2012, ApJ, **755**, 72.
56. *Formation and Evolution of Primordial Protostellar Systems*, Greif, T. H., Bromm, V., Clark, P. C., Glover, S. C. O., Smith, R. J., Klessen, R. S., Yoshida, N., & Springel, V. 2012, MNRAS, **424**, 399.
55. *The First Galaxies: Assembly with Black Hole Feedback*, Jeon, M., Pawlik, A. H., Greif, T. H., Glover, S. C. O., Bromm, V., Milosavljević, M., & Klessen, R. S. 2012, ApJ, **754**, 34.
54. *The First Stars: Mass Growth under Protostellar Feedback*, Stacy, A., Greif, T. H., & Bromm, V. 2012, MNRAS, **422**, 290.
53. *Effect of Population III Multiplicity on Dark Star Formation*, Stacy, A., Pawlik, A. H., Bromm, V., & Loeb A. 2012, MNRAS, **421**, 894.
52. *The First Galaxies*, Bromm, V., & Yoshida, N. 2011, ARA&A, **49**, 373. [‡]
51. *Simulations on a Moving Mesh: The Clustered Formation of Population III Protostars*, Greif, T. H., Springel, V., White, S. D. M., Glover, S. C. O., Clark, P. C., Smith, R. J., Klessen, R. S., & Bromm, V. 2011, ApJ, **737**, 75.
50. *Rotation Speed of the First Stars*, Stacy, A., Bromm, V., & Loeb A. 2011, MNRAS, **413**, 543.
49. *The First Galaxies: Assembly of Disks and Prospects for Direct Detection*, Pawlik, A. H., Milosavljević, M., & Bromm, V. 2011, ApJ, **731**, 54.
48. *Effect of Streaming Motion of Baryons Relative to Dark Matter on the Formation of the First Stars*, Stacy, A., Bromm, V., & Loeb A. 2011, ApJ, **730**, L1.
47. *The Formation and Fragmentation of Disks around Primordial Protostars*, Clark, P. C., Glover, S. C. O., Smith, R. J., Greif, T. H., Klessen, R. S., & Bromm, V. 2011, Science, **331**, 1040.
46. *Gravitational Fragmentation in Turbulent Primordial Gas and the Initial Mass Function of Population III Stars*, Clark, P. C., Glover, S. C. O., Klessen, R. S., & Bromm, V. 2011, ApJ, **727**, 110.
45. *Effects of Varying the Three-Body Molecular Hydrogen Formation Rate in Primordial Star Formation*, Turk, M. J., Clark, P. C., Glover, S. C. O., Greif, T. H., Abel, T., Klessen, R. S., & Bromm, V. 2011, ApJ, **726**, 55.
44. *Fragmentation in the First Galaxies*, Safranek-Shrader, C., Bromm, V., & Milosavljević, M. 2010, ApJ, **723**, 1568.

43. *The First Galaxies: Chemical Enrichment, Mixing, and Star Formation*, Greif, T. H., Glover, S. C. O., Bromm, V., & Klessen, R. S. 2010, ApJ, **716**, 510.
42. *The First Stars: Formation of Binaries and Small Multiple Systems*, Stacy, A., Greif, T. H., & Bromm, V. 2010, MNRAS, **403**, 45.
41. *The Observational Signature of the First H II Regions*, Greif, T. H., Johnson, J. L., Klessen, R. S., & Bromm, V. 2009, MNRAS, **399**, 639.
40. *The First Galaxies: Signatures of the Initial Starburst*, Johnson, J. L., Greif, T. H., Bromm, V., Klessen, R. S., & Ippolito, J. 2009, MNRAS, **399**, 37.

#### **Publications while in rank of Assistant Professor (UT)**

39. *Accretion onto Seed Black Holes in the First Galaxies*, Milosavljević, M., Bromm, V., Couch, S. M., & Oh, S. P. 2009, ApJ, **698**, 766.
38. *Formation of the First Stars and Galaxies*, Bromm, V., Yoshida, N., Hernquist, L., & McKee, C. F. 2009, Nature, **459**, 49.
37. *Accretion onto Intermediate-Mass Black Holes in Dense Protogalactic Clouds* Milosavljević, M., Couch, S. M., & Bromm, V. 2009, ApJ, **696**, L146.
36. *The Minimum Stellar Metallicity Observable in the Galaxy*, Frebel, A., Johnson, J. L., & Bromm, V. 2009, MNRAS, **392**, L50.
35. *Chemical Mixing in Smoothed-particle Hydrodynamics*, Greif, T. H., Glover, S. C. O., Bromm, V., & Klessen, R. S. 2009, MNRAS, **392**, 1381.
34. *Occurrence of Metal-free Galaxies in the Early Universe*, Johnson, J. L., Greif, T. H., & Bromm, V. 2008, MNRAS, **388**, 26.
33. *The First Galaxies: Assembly, Cooling and the Onset of Turbulence*, Greif, T. H., Johnson, J. L., Klessen, R. S., & Bromm, V. 2008, MNRAS, **387**, 1021.
32. *Uncovering the Chemical Signature of the First Stars in the Universe*, Karlsson, T., Johnson, J. L., & Bromm, V. 2008, ApJ, **679**, 6.
31. *Impact of Cosmic Rays on Population III Star Formation*, Stacy, A., & Bromm, V. 2007, MNRAS, **382**, 229.
30. *The First Supernova Explosions: Energetics, Feedback, and Chemical Enrichment*, Greif, T. H., Johnson, J. L., Bromm, V., & Klessen, R. S. 2007, ApJ, **670**, 1.
29. *Probing the Formation of the First Low-mass Stars with Stellar Archaeology*, Frebel, A., Johnson, J. L., & Bromm, V. 2007, MNRAS, **380**, L40.
28. *Local Radiative Feedback in the Formation of the First Protogalaxies*, Johnson, J. L., Greif, T.

H., & Bromm, V. 2007, ApJ, **665**, 85.

27. *The Aftermath of the First Stars: Massive Black Holes*, Johnson, J. L., & Bromm, V. 2007, MNRAS, **374**, 1557.

26. *High-Redshift Gamma-Ray Bursts from Population III Progenitors*, Bromm, V., & Loeb, A. 2006, ApJ, **642**, 382.

25. *Two Populations of Metal-free Stars in the Early Universe*, Greif, T. H., & Bromm, V. 2006, MNRAS, **373**, 128.

24. *The Cooling of Shock-compressed Primordial Gas*, Johnson, J. L., & Bromm, V. 2006, MNRAS, **366**, 247.

23. *The H II Region of the First Star*, Alvarez, M. A., Bromm, V., & Shapiro, P. R. 2006, ApJ, **639**, 621.

#### Publications as Postdoctoral Fellow (Harvard and Cambridge)

22. *The First Stars*, Bromm, V., & Larson, R. B. 2004, ARA&A, **42**, 79. [‡]

21. *Accretion onto a Primordial Protostar*, Bromm, V., & Loeb, A. 2004, New Astronomy, **9**, 353.

20. *The First Sources of Light*, Bromm, V. 2004, PASP, **116**, 103. [‡]

19. *The Era of Massive Population III Stars: Cosmological Implications and Self-termination*, Yoshida, N., Bromm, V., & Hernquist, L. 2004, ApJ, **605**, 579.

18. *The First Supernova Explosions in the Universe*, Bromm, V., Yoshida, N., & Hernquist, L. 2003, ApJ, **596**, L135.

17. *The Formation of the First Low-mass Stars from Gas with Low Carbon and Oxygen Abundances*, Bromm, V., & Loeb, A. 2003, Nature, **425**, 812.

16. *Formation of the First Supermassive Black Holes*, Bromm, V., & Loeb, A. 2003, ApJ, **596**, 34.

15. *The Characteristic Stellar Mass as a Function of Redshift*, Clarke, C. J., & Bromm, V. 2003, MNRAS, **343**, 1224.

14. *Low-mass Relics of Early Star Formation*, Schneider, R., Ferrara, A., Salvaterra, R., Omukai, K., & Bromm, V. 2003, Nature, **422**, 869.

13. *Three Epochs of Star Formation in the High-Redshift Universe*, Mackey, J., Bromm, V., & Hernquist, L. 2003, ApJ, **586**, 1.

12. *The Formation of a Star Cluster: Predicting the Properties of Stars and Brown Dwarfs*, Bate, M. R., Bonnell, I. A., & Bromm, V. 2003, MNRAS, **339**, 577.

11. *The Formation of the First Stars: The Primordial Star-forming Cloud*, Bromm, V., Coppi, P.

- S., & Larson, R. B. 2002, ApJ, **564**, 23.
10. *The Formation of the First Globular Clusters*, Bromm, V., & Clarke, C. J. 2002, ApJ, **566**, L1.
9. *The Expected Redshift Distribution of Gamma-Ray Bursts*, Bromm, V., & Loeb, A. 2002, ApJ, **575**, 111.
8. *The Contribution of the First Stars to the Cosmic Infrared Background*, Santos, M. R., Bromm, V., & Kamionkowski, M. 2002, MNRAS, **336**, 1082.
7. *The Formation of Close Binary Systems by Dynamical Interactions and Orbital Decay*, Bate, M. R., Bonnell, I. A., & Bromm, V. 2002, MNRAS, **336**, 705.
6. *The Formation Mechanism of Brown Dwarfs*, Bate, M. R., Bonnell, I. A., & Bromm, V. 2002, MNRAS, **332**, L65.
5. *The Fragmentation of Pre-enriched Primordial Objects*, Bromm, V., Ferrara, A., Coppi, P. S., & Larson, R. B. 2001, MNRAS, **328**, 969.

#### **Publications as Graduate Student (Yale)**

4. *Generic Spectrum and Ionization Efficiency of a Heavy Initial Mass Function for the First Stars*, Bromm, V., Kudritzki, R. P., & Loeb, A. 2001, ApJ, **552**, 464.
3. *Forming the First Stars in the Universe: The Fragmentation of Primordial Gas*, Bromm, V., Coppi, P. S., & Larson, R. B. 1999, ApJ, **527**, L5.
2. *The Spectrum of GRB 930131 ("Superbowl Burst") from 20 keV to 200 MeV*, Bromm, V., & Schaefer, B. E. 1999, ApJ, **520**, 661.
1. *Propagation of nonlinear longitudinal-transverse waves along magnetic flux tubes in the solar atmosphere. II. The treatment of shocks*, Zhugzhda, Y. D., Bromm, V., & Ulmschneider, P. 1995, A&A, **300**, 302.

#### List of Accepted Peer-reviewed Papers (in press):

1. *Formation of the First Stars*, Bromm, V. 2013, Rep. Prog. Phys., in press (arXiv:1305.5178). [‡] (accepted: 09/19/2013)

#### List of Submitted Peer-reviewed Papers:

5. *A Signature of Population III Stars in a GRB Host Galaxy at Redshift 5.9* Castro-Tirado, A. J., Sanchez-Ramirez, R., Ellison, S. L., Jelinek, M., Martin-Carillo, A., Bromm, V., *et al.* (34 additional authors) 2013, Nature, submitted (September 1, 2013).

4. *The Chemical Imprint of Dust on the Most Metal-Poor Stars* Ji, A. P., Frebel, A., & Bromm, V. 2013, ApJ, submitted (July 2013); arXiv:1307.2239.
3. *Star Formation in the First Galaxies – II. Clustered Star Formation and the Influence of Metal Line Cooling*, Safranek-Shrader, C., Milosavljević, M., & Bromm, V. 2013, MNRAS, submitted (July 2013); arXiv:1307.1982.
2. *The First Stars: A Low-mass Formation Mode* Stacy, A., & Bromm, V. 2013, ApJ, submitted (July 2013); arXiv:1307.1798.
1. *Dwarf Spheroidal Satellite Formation in a Reionized Local Group*, Milosavljević, M., & Bromm, V. 2013, MNRAS, submitted (arXiv:1306.4703).

#### Surveys, Editorials, and Reviews

4. *Perspectives: Embers of the Distant Past*, Bromm, V. 2012, Science, **338**, 1160-1161. [\* , ‡]
3. *Perspectives: To Cool or Not to Cool*, Bromm, V. 2010, Science, **329**, 45-46. [\* , ‡]
2. *Perspectives: The Cosmic Rosetta Stone*, Bromm, V. 2008, Science, **321**, 647-648. [\* , ‡]
1. *Perspectives: From Darkness to Light*, Bromm, V. 2007, Science, **317**, 1511-1512. [\* , ‡]

#### Edited Books

2. *The First Galaxies*, Wiklind, T., Mobasher, B., & Bromm, V. (eds.) 2013 (Springer).
1. *The First Stars and Galaxies: Challenges for the Next Decade*, Whalen, D., Bromm, V., & Yoshida, N. (eds.) 2010 (AIP Conf. Proc. 1294; Melville, NY).

#### Chapters in Books

3. *Gamma-ray Burst Cosmology*, invited book chapter in ‘Gamma-ray Bursts’ (eds. C. Kouveliotou, R. Wijers, & S. Woosley), Bromm, V., & Loeb, A. 2012 (Cambridge University Press). [‡]
2. *Reionizing the Universe with the First Sources of Light*, invited book chapter in ‘Adventures in Cosmology’ (ed. D. Goodstein), Bromm, V. 2011 (World Scientific Publishing). [\* , ‡]
1. *First Stars: Formation, Evolution, and Feedback Effects*, invited book chapter in ‘Structure formation in Astrophysics’ (ed. Gilles Chabrier), Bromm, V., Ferrara, A., & Heger, A. 2009 (Cambridge University Press). [\* , ‡]

#### Select Conference Proceedings

15. *Simulating the First Galaxies*, Bromm, V. 2013, Proceedings of The Intriguing Life of Massive



Galaxies, International Astronomical Union (IAU) Symposium 295, 3-12 (Cambridge Univ. Press). [\* , ‡]

14. *Formation of the First Galaxies*, Bromm, V. 2012, Proceedings of First Stars IV: From Hayashi to the Future, AIP Conf. Proc. 1480, 226-233 (AIP: Melville, NY). [\* , ‡]

13. *Gamma-ray Bursts as Probes of the First Stars*, Bromm, V. 2012, Proceedings of Gamma-ray Bursts 2012, Proceedings of Science, 84. [‡]

12. *The Very First Stars: Formation and Reionization of the Universe*, Bromm, V. 2010, Proceedings of Chemical Abundances in the Universe: Connecting First Stars to Planets, International Astronomical Union (IAU) Symposium 265, 27-33 (Cambridge Univ. Press). [\* , ‡]

11. *Formation of the First Stars*, Bromm, V. 2010, Proceedings of 11th Symposium on Nuclei in the Cosmos, Proceedings of Science, 4. [‡]

10. *The First Galaxies*, Bromm, V. 2009, Proceedings of The Galaxy Disk in Cosmological Context, International Astronomical Union (IAU) Symposium 254, 337-342 (Cambridge Univ. Press). [\* , ‡]

9. *Towards the First Galaxies*, Greif, T. H., Johnson, J. L., & Bromm, V. 2008, Proceedings of First Stars III, AIP Conf. Proc., 990, 405-417. [\*]

8. *GRB Cosmology: Probing the Early Universe*, Bromm, V., & Loeb, A. 2007, Proceedings of Supernova 1987A: 20 Years After: Supernovae and Gamma-Ray Bursters, AIP Conf. Proc., 937, 532-541. [\*]

7. *The Early Generations of Low-metallicity Stars*, Bromm, V. 2006, Proceedings of Stellar Evolution at Low Metallicity: Mass Loss, Explosions, Cosmology, ASP Conf. Series, 353, 285. [\* , ‡]

6. *The Primordial IMF*, Bromm, V. 2005, Proceedings of The Initial Mass Function 50 years later, Astrophysics and Space Science Library, 327, 469 (Springer). [\* , ‡]

5. *Formation of the First Stars*, Bromm, V. 2005, Proceedings of From Lithium to Uranium: Elemental Tracers of Early Cosmic Evolution, International Astronomical Union (IAU) Symposium 228, 121-128 (Cambridge Univ. Press). [\* , ‡]

4. *Formation of the First Supermassive Black Holes*, Bromm, V. 2005, Proceedings of Growing Black Holes: Accretion in a Cosmological Context, ESO Astrophysics Symposia, 42-49 (Springer). [\* , ‡]

3. *The First Stars and their Impact on Cosmology*, Bromm, V. 2004, Proceedings of the 22nd Texas Symposium on Relativistic Astrophysics, 12 (SLAC). [\* , ‡]

2. *Cosmological Context of Globular Cluster Formation*, Bromm, V. 2004, Proceedings of The Formation and Evolution of Massive Young Star Clusters, ASP Conf. Series, 322, 499. [\* , ‡]

1. *The First Stars and the Epoch of Reionization*, Bromm, V., & Loeb, A. 2004, Proceedings of The Interstellar Medium in Galaxies, 4th Cologne-Bonn-Zermatt Symposium, Springer Proc. in Physics, 91, 3 (Springer). [\*]

## **Awards and Honors**

2009 University of Texas Board of Regents' Outstanding Teaching Award.

2008 Board of Visitors Teaching Excellence Award.

2008 College of Natural Sciences Teaching Excellence Award.

2004 STScI Institute Fellowship (recently renamed: Giacconi Fellowship).

2003 Northeastern Association of Graduate Schools Dissertation Award.

2002 Robert J. Trumpler Award, Astronomical Society of the Pacific.

## **Service**

### **Departmental**

Graduate Advisor, Astronomy Department, UT Austin, 2005-2010, and 2012-2013

Member, Graduate Admissions Committee, 2005-2010

SOC member for first BASH Symposium: New Horizons in Astronomy, 2005

### **Community**

Authored articles in popular magazines on the First Stars: *Scientific American* (Dec. 2001), *Mercury* (Sept.-Oct. 2003), *Physics World* (Oct. 2004), *Sky & Telescope* (May 2006, Summer 2013), *Physics Today* (April 2012).

Radio interviews: BBC, Wisconsin Public Radio, Deutschlandfunk (Germany).

Frequent coverage of our work in internet columns of: Science News, New Scientist, Discover, National Geographic, Nature and Science.

2013 Lecturer at UT's Odyssey Outreach Program, From Eternity to Here.

2011 Lecturer at Summer School, Second Workshop on Numerical and Observational Astrophysics: From the First Structures to the Universe Today, IAFE, Buenos Aires, Argentina.

2008 Lecturer at Cosmology Summer School, The Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy.

## **Lectures: Partial List of Colloquia and Invited Talks**

2013 Invited review talk: "The First Stars and Galaxies", Mind the Gap, Cambridge, UK.

2013 Invited review talk: "Simulating the Formation of the First Stars and Galaxies",

Max-Planck-Society workshop, Ringberg, Germany.

2012 Invited review talk: “Simulating the First Galaxies”, IAU Symposium 295, Beijing, China.

2012 Invited review talk: “Formation of the First Galaxies”, First Stars IV, Kyoto, Japan.

2012 Invited review talk: “GRBs as Probes of the First Stars”, Gamma-ray Bursts 2012, Munich, Germany.

2011 Invited review talk: “Star Formation and Metal Enrichment in the High-redshift Universe”, GRBs as Probes, Brera, Italy.

2010 Invited review talk: “Formation of the First Stars”, 11th Symposium on Nuclei in the Cosmos, Heidelberg, Germany.

2009 Invited review talk: “The Very First Stars”, IAU Symposium 265, Rio de Janeiro, Brazil.

2008 Invited review talk: “Population III and Metal-free Star Formation”, IAU Symposium 255, Rapallo, Italy.

2008 Invited review talk: “Formation of the First Stars and Related Feedback Issues”, Institute for Theoretical Atomic, Molecular and Optical Physics, Harvard.

2008 Invited talk: “The First Galaxies”, IAU Symposium 254, Copenhagen.

2008 Invited talk: “First Black Holes”, 5<sup>th</sup> Harvard-Smithsonian Conference on Theoretical Astrophysics.

2007 Invited review talk: “The First Stars”, IAU Symposium 250, Kauai, Hawaii.

2007 Invited review talk: “First Stars: Review of Theory”, KITP conference on Star Formation, Then and Now, UC Santa Barbara.

2006 Invited review talk: “Formation of Pop III Stars”, May Symposium, STScI.

2006 Invited talk: “Observables from the First Stars”, Institute for Nuclear Theory, University of Washington.

2006 Invited talk: “Simulations of the First Black Holes”, 4<sup>th</sup> Harvard-Smithsonian Conference on Theoretical Astrophysics.

2005 Invited review talk: “Formation of the First Stars”, IAU Symposium 228, Paris.

2005 Invited talk: “Possible Formation Sites for CRUMP Stars in the High-Redshift Universe”, Max-Planck-Society Workshop, Ringberg, Germany.

2004 Invited review talk: “First Stars”, 203rd AAS meeting, Atlanta.

2004 Invited review talk: “The First Stars and Their Impact on Cosmology”, 22nd Texas Symposium on Relativistic Astrophysics, Stanford.

2001-2008 Selected colloquia and seminar talks: Oxford University, Cambridge University, MIT, Yale, Harvard (Institute for Theory and Computation), Caltech, University of Chicago, Berkeley (Theoretical Astrophysics Center), Space Telescope Science Institute, NASA Goddard Space Flight Center, Institute for Advanced Study, University of Minnesota, NYU, University of Arizona, University of Heidelberg, University of Munich, University of Groningen, University of Utrecht.

### **Professional Services**

Referee for *Astrophysical Journal*, *Astronomy & Astrophysics*, *Monthly Notices of the Royal Astronomical Society*, *Publications of the Astronomical Society of Japan*, *Space Science Reviews*, *Science*, *Nature*

Panelist for NSF grant proposal review

Proposal review for: German, Swiss, Dutch, French and Israeli Science Foundation

Member Astrophysics Editorial Board: *Scientific Reports* (a Nature subsidiary)

Chair of Conference on *The First Stars and Galaxies: Challenges for the Next Decade*, University of Texas 2010, Austin, TX.

Co-chair of Joint Discussion Symposium on *The First Galaxies – Theoretical Predictions and Observational Clues*, IAU General Assembly 2009, Rio de Janeiro

Member SOC: Ringberg 2005; Bash Symposium 2005; Chamonix 2007; IAU Symposium 254, Copenhagen; First Stars III (Santa Fe 2007) and IV (Kyoto 2012); Richard Larson Fest, Yale 2012; EWASS ‘Local Group Cosmology’ 2013.

Member Science Working Group: Cosmic Inflation Probe (CIP); Joint Astrophysics Nascent Universe Satellite (JANUS); Single Aperture Far Infrared Observatory (SAFIR).

Chair of American Astronomical Society (AAS) Nomination Committee for its High-Energy Astrophysics Division (HEAD) Officer Election.

NASA appointed U.S. Member (45 total) of European Space Agency’s EUCLID dark energy mission.