

Biographical Sketch

Zoltan Haiman

- Present Position** Associate Professor, *Department of Astronomy, Columbia University*
- Education** 1998 Ph.D., Astronomy, Harvard University
1995 Postgraduate Certificate, Physics & Chemistry, Cambridge University
1994 M.A., Astronomy, Harvard University
1993 B.S., Physics, MIT
1993 B.S., Electrical Engineering, MIT
- Previous Positions**
- 2003-2006 Assistant Professor, *Department of Astronomy, Columbia University*
1999-2002 Hubble Fellow, *Astrophysics Department, Princeton University*
1998-1999 Research Associate, *Fermi National Accelerator Laboratory*
- Awards and Honors**
- 2004 New York City Mayor's Award for Excellence in Science and Technology, finalist
2002 Brilliant 10, Popular Science Magazine (top 10 young US scientists)
1997-1998 Merit Fellowship, Harvard University
1994-1995 Isaac Newton Studentship, Cambridge University
1994-1995 Cambridge European Trust Overseas Research Scholarship
1993 Sigma Pi Sigma, Phi Beta Kappa, and Eta Kappa Nu Honor Societies, MIT
- PhD Students** *Supervised 4 PhD students who graduated over the past 5 years:*
Mark Dijkstra (2005; postdoctoral fellow, ITC, Harvard University)
Andrei Mesinger (2006; Hubble Fellow, Princeton University)
Sheng Wiley Wang (2007; postdoctoral fellow, Kavli Center, University of Chicago)
Bence Kocsis (2007; postdoctoral fellow, IAS, Princeton).
Co-supervised 2 additional PhD students:
Jun Zhang (2006; with Lam Hui, postdoctoral fellow, UC Berkeley)
David Spiegel (2008; with Kristen Menou, postdoc, Princeton Univ).
I am currently supervising four other Astronomy and Physics PhD students
- Teaching** Classroom teaching at Columbia University has included graduate and undergraduate Cosmology, a graduate class on Radiative Processes in Astrophysics, a seminar on Extra-Solar Planets, and an introductory undergraduate course, Frontiers in Astronomy.
- Grants** PI on five successful NSF and NASA grants, totaling \$1.7 million over past 5 years
- Other Activities** Co-director of new Eötvös International Research School in Astrophysics in Budapest, Hungary (2007-)
Co-Investigator for DECS: a JDEM proposal for a new X-ray satellite (2003)
Proposal for Mid-IR camera for the James Webb Space Telescope (1999-2001)
Long term participant, galaxy formation workshop, Santa Barbara, CA (2000)
Galaxy Formation Winter School, Hebrew University, Jerusalem, Israel (1998)
Science Working Group for the James Webb Space Telescope (1996-97)
- Publications** 112 peer-reviewed publications in major Astronomy and Astrophysics journals (the majority on topics related to the first stars and quasars, and reionization)
Over 100 invited talks, including conferences, colloquia, and seminars

Selected Recent Invited Conference Talks

Jul 2008: Inaugural Workshop on Reionization at the Kavli Institute, Beijing, China
Dec 2007: First Subaru International Conference, Hayama, Japan
Sep 2007: Astrophysics in the Next Decade, Conference in Tucson, AZ
Jun 2007: HI Survival Through Cosmic Times, Conference in Spineto, Italy
Dec 2006: 23rd Texas Symposium on Relativistic Astrophysics, Melbourne, Australia (review talk)
May 2006: The History of Nuclear Black Holes in Galaxies, Harvard University, Cambridge, MA
Oct 2005: Workshop on AGN and Galaxy Evolution, Castel Gandolfo, Italy (review talk)
Aug 2005: Quasar Host Galaxy Workshop, Lorentz Center at Leiden University, Holland (review talk)
Aug 2005: Open Questions in Cosmology, Max Planck Institute, Munich, Germany (review talk)
Jun 2005: The Fabulous Destiny of Galaxies, Conference in Marseille, France (review talk)
Mar 2005: Oxford-Princeton Workshop on Astrophysics and Cosmology, Princeton University
Nov 2004: Yukawa Memorial Symposium, Nishinomiya, Japan (review talk)
Jul 2004: Plumian Chair 300th Anniversary Conference, Cambridge, UK
Jun 2004: Growing Black Holes, München, Germany
Jan 2004: Fifth International Conference on Gravitation and Cosmology, Cochin, India
Oct 2003: Multiwavelength Mapping of Galaxy Formation and Evolution, Venice, Italy
Sep 2003: Cosmology with Sunyaev-Zeldovich Cluster Surveys, Chicago, IL (opening review)
Aug 2003: From First Light to the Milky Way, ETH, Zürich, Switzerland
Aug 2003: New Deal in European Astronomy: Trends and Perspectives, JENAM'03, Budapest, Hungary
Jun 2003: Cosmology and Astrophysics with Galaxy Clusters, Aspen, Colorado
Jun 2003: Eötvös Summer School, Balatonfüred, Hungary
Mar 2003: Cosmic Inflation Conference, Davis, CA

Selected Colloquia and Other Invited Talks

Nov 2008: Carnegie Observatories, Pasadena, CA, Colloquium
Nov 2008: University of California, Santa Barbara, CA, Seminar
Oct 2008: Harvard University, Cambridge, MA, ITC Colloquium
Jun 2008: ETH, Zurich, Switzerland, Colloquium
May 2008: University of Gröningen, The Netherlands, Colloquium
Feb 2008: Princeton University, Dept. of Astrophysics, Colloquium
Nov 2007: Socorro, NM, Astronomy Colloquium
Nov 2007: Rutgers University, NJ, Astronomy Colloquium
Jul 2007: Oxford University, UK, Cosmology Seminar
Apr 2007: University of Maryland, College Park, MD, Astronomy Colloquium
Nov 2006: University of Arizona, Tucson, Astrophysics Colloquium
Oct 2006: University of Massachusetts, Amherst, Astronomy Colloquium
May 2006: Caltech, Pasadena, CA, Astronomy Tea Talk
May 2006: Caltech, Pasadena, CA, Theoretical Astrophysics Seminar
Apr 2006: Stanford, CA, Astrophysics Seminar
Dec 2005: Raman Research Institute, Bangalore, India, Astrophysics Seminar
Nov 2005: McGill University, Montreal, Canada, Astrophysics Colloquium
Apr 2005: University of Toronto, Astronomy Colloquium
Apr 2005: Upenn, Philadelphia, Astrophysics Seminar
Mar 2005: UC Berkeley, Theoretical Astrophysics Seminar
Jan 2005: Harvard University, Joint Tufts/CfA/MIT Cosmology Seminar
Nov 2004: Physics Colloquium, Columbia, New York
May 2004: Eötvös Loránd University, Budapest, Hungary, Astrophysics Seminar
Apr 2004: Astrophysics Colloquium, NYU, New York
Mar 2004: NOVA Colloquia in Leiden and in Gröningen, The Netherlands

Invited Review Papers

5. Z. Haiman and E. Quataert, “How and When Did the First AGN Form?”, Chapter 5 in “Supermassive Black Holes in the Distant Universe”, a book edited by A. Barger for Kluwer Academic Publishers (2005).
4. Z. Haiman, “Galaxy Formation: Caught in the Act?”, *Nature, News & Views*, 430, 979 (2004).
3. Z. Haiman, “The First Nonlinear Structures and the Reionization of the Universe”, *Carnegie Observatories Astrophysics Series, Vol. 1: Coevolution of Black Holes and Galaxies*, ed. L. C. Ho (Cambridge: Cambridge Univ. Press), pp. 67–87 (2004).
2. T. Abel and Z. Haiman, “The Role of H₂ Molecules in Cosmological Structure Formation”, in *Molecular Hydrogen in Space*, eds. F. Combes and G. P. des Forets, Cambridge University Press, pp. 237-246 (2000).
1. Z. Haiman and L. Knox, “Reionization of the Intergalactic Medium and its Effect on the CMB”, in *Microwave Foregrounds*, eds. A. de Oliveira-Costa and M. Tegmark, ASP Press, San Francisco, pp. 227–250 (1999).

Refereed Journal Publications

112. A. Mesinger, G. L. Bryan and Z. Haiman, “Radiative Feedback in Relic HII Regions at High-Redshift”, *M. N. R. A. S.*, submitted December (2008).
111. S. M. Molnar, N. Hearn, Z. Haiman, G. Bryan, A. E. Evrard, and G. Lake, “Accretion Shocks in Clusters of Galaxies and their SZ Signature from Cosmological Simulations”, *Ap. J.*, submitted, September (2008).
110. T. Tanaka and Z. Haiman, “The Assembly of Supermassive Black Holes at High Redshifts”, *Ap. J.*, submitted July (2008).
109. Z. Haiman, B. Kocsis and K. Menou, “Gravitational Radiation Driven Supermassive Black Hole Binary Inspirals as Periodically Variable Electromagnetic Sources”, *Ap. J.*, submitted July (2008).
108. Z. Lippai, Z. Frei and Z. Haiman, “On the Occupation Fraction of Seed Black Holes in High-Redshift Dark Matter Halos”, *Ap. J.*, submitted February (2008).
107. J. Greiner et al., “GRB 080913 at redshift 6.7”, *Ap. J.*, in press, submitted October (2008)
106. F. Shankar, M. Bernardi and Z. Haiman, “The Evolution of the M(bh)-sigma relation Inferred from the Age Distribution of Local Early-Type Galaxies and AGN Evolution”, *Ap. J.*, in press, submitted April (2008).
105. S. Wang, Z. Haiman, and M. May, “Constraining Cosmology with High Convergence Regions in Weak Lensing Surveys”, *Ap. J.*, **691**, 547–559 (2009).
104. W. Fang, S. Wang, W. Hu, Z. Haiman, L. Hui and M. May, “Challenges to the DGP Model from Horizon-Scale Growth and Geometry”, *Phys. Rev. D*, **78**, issue 10, id. 103509 (2008).
103. M. Dijkstra, Z. Haiman, A. Mesinger and J. S. B. Wyithe, “Fluctuations in the High-Redshift Lyman-Werner Background: Close Halo Pairs as the Origin of Supermassive Black Holes”, *M. N. R. A. S.*, **391**, 1961–1972 (2008).
102. K. Omukai, R. Schneider and Z. Haiman, “Can Supermassive Black Holes Form in Metal-Enriched High-Redshift Protogalaxies?”, *Ap. J.*, **686**, 801–814 (2008).
101. S. Furlanetto, Z. Haiman and S. Peng Oh, “Fossil Ionized Bubbles Around Dead Quasars During Reionization”, *Ap. J.*, **686**, 25–40 (2008).
100. Z. Lippai, Z. Frei and Z. Haiman, “Prompt Shocks in the Gas Disk Around a Recoiling Supermassive Black Hole Binary”, *Ap. J. (Lett.)*, **676**, 5–8 (2008).
99. B. Kocsis, Z. Haiman and K. Menou, “Pre-Merger Localization of Gravitational-Wave Standard Sirens With LISA: Triggered Search for an Electromagnetic Counterpart”, *Ap. J.*, **684**, 870–887 (2008).

98. R. H. Kramer and Z. Haiman, “The Thickness of High-Redshift Quasar Ionization Fronts as a Constraint on the Ionizing Spectral Energy Distribution”, *M. N. R. A. S.*, **385**, 1561-1575 (2008).
97. W. Fang and Z. Haiman, “An Evolving Entropy Floor in the Intracluster Gas?”, *Ap. J.*, **680**, 200–213 (2008).
96. C. Hernandez-Monteagudo, Z. Haiman, L. Verde and R. Jimenez, “Oxygen pumping II: Probing the Inhomogeneous Metal Enrichment at the Epoch of Reionization with High Frequency CMB Observations”, *Ap. J.*, **672**, 33–39 (2008).
95. C. Shang, A. Crofts and Z. Haiman, “Constraints on the Abundance of Highly Ionized Proto-Cluster Regions from the Absence of Large Voids in the Lyman Alpha Forest”, *Ap. J.*, **671**, 136–145 (2007).
94. S. Sethi and Z. Haiman, “Can We Detect the Anisotropic Shapes of Quasar HII Regions During Reionization Through The Small-Scale Redshifted 21cm Power Spectrum?”, *Ap. J.*, **673**, 1–13 (2008).
93. S. Wang, L. Hui, M. May and Z. Haiman, “Is Modified Gravity Required by Observations? An Empirical Consistency Test of Dark Energy Models”, *Phys. Rev. D*, **76**, issue 6, id. 063503 (2007).
92. D. S. Spiegel, Z. Haiman and B. S. Gaudi, “On constraining a transiting exoplanet’s rotation rate with its transit spectrum”, *Ap. J.*, **669**, 1324–1335 (2007).
91. B. Kocsis, Z. Haiman, K. Menou and Zs. Frei, “Pre-Merger Localization of Gravitational-Wave Standard Sirens With LISA I: Harmonic Mode Decomposition”, *Phys. Rev. D*, **76**, issue 2, id. 022003 (2007).
90. C. Hernandez-Monteagudo, Z. Haiman, R. Jimenez and L. Verde, “Oxygen Pumping: Mapping the Reionization Epoch with the CMB”, *Ap. J. (Lett.)*, **660**, pp. 85-88 (2007).
89. W. Fang and Z. Haiman, “Constraining Dark Energy by Combining Cluster Counts and Shear-Shear Correlations in a Weak Lensing Survey”, *Phys. Rev. D*, **75**, issue 4, id. 043010 (2007).
88. M. Dijkstra, S. B. Wyithe and Z. Haiman, “The Luminosity Function of Lyman Alpha Emitting Galaxies and Cosmic Reionisation of Hydrogen”, *M. N. R. A. S.*, **379**, pp. 253-259 (2007).
87. R. Jimenez, M. Bernardi, Z. Haiman, B. Panter and A. F. Heavens, “The ages, metallicities and star formation histories of early-type galaxies in SDSS”, *Ap. J.*, **658**, 721-730 (2007).
86. A. Mesinger and Z. Haiman, “Constraints on Reionization and Source Properties from the Absorption Spectra of $z > 6.2$ Quasars”, *Ap. J.*, **660**, 923–932 (2007).
85. J. Zhang, Z. Haiman and L. Hui, “A Linear Perturbation Theory of Inhomogeneous Reionization” *M. N. R. A. S.*, **375**, 324–336 (2007).
84. Y. Li, Z. Haiman and M.-M. MacLow, “Correlations Between Central Massive Objects And Their Host Galaxies From Bulgeless Spirals to Ellipticals”, *Ap. J.*, **663**, 61–70 (2007).
83. Z. Haiman, R. Jimenez and M. Bernardi, “Reconstructing the Cosmic Evolution of Quasars from the Age Distribution of Local Early-Type Galaxies”, *Ap. J.*, **658**, 721–730 (2007).
82. J. D. Younger, Z. Haiman, G. L. Bryan and S. Wang, “Breaking Cosmological Degeneracies in Galaxy Cluster Surveys with a Physical Model of Cluster Structure”, *Ap. J.*, **653**, 27–42 (2006).
81. Z. Haiman and G. L. Bryan, “Was Star-Formation Suppressed in High-Redshift Minihalos?”, *Ap. J.*, **650**, 7–11 (2006).
80. R. Kramer, Z. Haiman and S. Peng Oh, “Feedback from Clustered Sources During Reionization”, *Ap. J.*, **649**, 570–578 (2006).
79. M. Dijkstra, Z. Haiman and M. Spaans, “Lyman Alpha Radiation From Collapsing Protogalaxies II: Observational Evidence for Gas Infall”, *Ap. J.*, **649**, 37–47 (2006).
78. M. Dijkstra, Z. Haiman and M. Spaans, “Lyman Alpha Radiation From Collapsing Protogalaxies I: Characteristics of the Emergent Spectrum”, *Ap. J.*, **649**, 14–36 (2006).

77. A. Mesinger, G. L. Bryan and Z. Haiman, “UV Radiative Feedback on High-Redshift Proto-Galaxies”, *Ap. J.*, **648**, 835–851 (2006).
76. G. T. Richards, Z. Haiman, B. Pindor, M. A. Strauss, X. Fan., D. Eisenstein, D. P. Schneider, N. A. Bahcall, J. Brinkmann and M. Fukugita, “A Snapshot Survey for Gravitational Lenses Among $z \geq 4$ Quasars: II. Constraints on the $4.0 < z < 4.5$ Quasar Population”, *Astron. J.*, **131**, 49–54 (2006).
75. R. Jimenez and Z. Haiman, “Significant primordial star formation at redshifts $z = 3-4$ ”, *Nature*, **440**, 501-504 (2006).
74. A. Mesinger, B. Johnson and Z. Haiman, “Probing Reionization with the Redshift Distribution of Distant Supernovae”, *Ap. J.*, **637**, 80–90 (2006).
73. B. Kocsis, Zs. Frei, Z. Haiman and K. Menou, “Finding the Electromagnetic Counterparts of Cosmological Standard Sirens”, *Ap. J.*, **637**, 27–37 (2006).
72. S. Wang, Z. Haiman, W. Hu, J. Khoury and M. May, “Weighing Neutrinos with Galaxy Cluster Surveys”, *Phys. Rev. Letters*, **95**, 011302 (2005).
71. D. S. Spiegel, M. Zamojski, A. Gersch, J. Donovan and Z. Haiman, “Can We Probe the Atmospheric Composition of an Extrasolar Planet from its Reflection Spectrum in a High-Magnification Microlensing Event?”, *Ap. J.*, **628**, 478–486 (2005).
70. S. Malhotra, J. E. Rhoads, N. Pirzkal, Z. Haiman, C. Xu, et al., “An Overdensity of Galaxies at $z=5.9 \pm 0.2$ in the Ultra Deep Field Confirmed Using the ACS Grism”, *Ap. J.*, **626**, 666–679 (2005).
69. M. Dijkstra, Z. Haiman and C. Scharf, “On Detecting the X-ray Silhouette of a Damped Lyman Alpha System”, *Ap. J.*, **624**, 85–93 (2005).
68. B. Kocsis, Z. Haiman and Zs. Frei, “Can Virialization Shocks be Detected Around Galaxy Clusters Through the Sunyaev-Zel’dovich Effect?”, *Ap. J.*, **623**, 632–649 (2005).
67. Z. Haiman and R. Cen, “Constraining Reionization with the Evolution of the Luminosity Function of Lyman Alpha Emitting Galaxies”, *Ap. J.*, **623**, 627–631 (2005).
66. A. Mesinger, R. Perna and Z. Haiman, “Constraints on the Small-Scale Power Spectrum of Density Fluctuations From High-Redshift Gamma-Ray Bursts”, *Ap. J.*, **623**, 1–10 (2005).
65. J. E. Rhoads, et al., “A Redshift $z = 5.4$ Lyman α Emitting Galaxy With Linear Morphology in the GRAPES/UDF Field”, *Ap. J.*, **621**, 582–586 (2005).
64. C. R. Keeton, M. Kuhlen and Z. Haiman, “Gravitational lensing magnification without multiple imaging”, *Ap. J.*, **621**, 559–573 (2005).
63. R. Cen, Z. Haiman, and A. Mesinger, “Implications of the Lyman Alpha Emission Line from a Candidate $z=10$ Galaxy”, *Ap. J.*, **621**, 89–94 (2005).
62. S. Wang, J. Khoury, Z. Haiman and M. May, “Constraining the Evolution of Dark Energy with a Combination of Galaxy Cluster Observables”, *Phys. Rev. D*, **70**, issue 12, id.123008 (2004).
61. K. Menou and Z. Haiman, “On The Dark Side of Quasar Evolution”, *Ap. J.*, **615**, 130–134 (2004).
60. N. Pirzkal, et al., “GRAPES, Grism Spectroscopy of the Hubble Ultra Deep Field: Description and Data Reduction”, *Ap. J. (Suppl.)*, **154**, 501–508 (2004).
59. M. Dijkstra, Z. Haiman and A. Loeb, “A Limit from the X-ray Background on the Contribution of Quasars to Reionization”, *Ap. J.*, **613**, 646–654 (2004).
58. Z. Haiman, “Constraints from Gravitational Recoil on the Growth of Supermassive Black Holes at High Redshift”, *Ap. J.*, **613**, 36–40 (2004).
57. A. Mesinger, Z. Haiman and R. Cen, “Probing the Reionization History Using the Spectra of High-Redshift Sources”, *Ap. J.*, **613**, 23–35 (2004).
56. Z. Haiman, E. Quataert and G. Bower, “Modeling the Counts of Faint Radio Loud Quasars: Constraints on the Supermassive Black Hole Population and Predictions for High Redshift”, *Ap. J.*, **612**, 698–705 (2004).

55. A. Mesinger and Z. Haiman, “Evidence for a Boundary of the Cosmological Strömgren Sphere and for Significant Neutral Hydrogen Surrounding the Quasar SDSS J1030+0524”, *Ap. J. (Lett.)*, **611**, 69–72 (2004).
54. G. T. Richards, M. A. Strauss, B. Pindor, Z. Haiman, X. Fan., D. Eisenstein, et al., “A Snapshot Survey for Gravitational Lenses Among $z > 4$ Quasars: I. The $z > 5.7$ Sample”, *Astron. J.*, **127**, 1305–1312 (2004).
53. Z. Haiman, L. Ciotti and J. P. Ostriker, “Reasoning From Fossils: Learning From the Local Black Hole Population About the Evolution of Quasars”, *Ap. J.*, **606**, 763–773 (2004).
52. D. W. Savin, P. S. Krstic, Z. Haiman and P. C. Stancil, “Rate Coefficient for $H^+ + H_2(X^1\Sigma_g^+, \nu = 0, J = 0) \rightarrow H(1s) + H_2^+$ Charge Transfer and Some Cosmological Implications” *Ap. J.*, **606**, 167–170 (2004).
51. M. Dijkstra, Z. Haiman, M. J. Rees, and D. H. Weinberg, “Photoionization Feedback in Low-Mass Galaxies at High Redshift”, *Ap. J.*, **601**, 666–675 (2004).
50. S. M. Molnar, Z. Haiman, M. Birkinshaw and R. F. Mushotzky, “Constraints on the Energy Content of the Universe From a Combination of Galaxy Cluster Observables”, *Ap. J.*, **601**, 22–27 (2004).
49. S. P. Oh and Z. Haiman, “Fossil HII Regions: Self-Limiting Star Formation at High Redshift”, *M. N. R. A. S.*, **346**, 456–472 (2004).
48. W. Hu and Z. Haiman, “Redshifting Rings of Power”, *Phys. Rev. D*, **68**, Issue 6, id. 063004
47. S. H. Hansen and Z. Haiman, “Do We Need Stars to Reionize the Universe at High Redshifts? Early Reionization by Decaying Heavy Sterile Neutrinos”, *Ap. J.*, **600**, 26–31 (2004).
46. M. G. Santos, A. Cooray, Z. Haiman, L. Knox and C.-P. Ma, “Small-scale CMB Temperature and Polarization Anisotropies due to Patchy Reionization”, *Ap. J.*, **598**, 756–766 (2003).
45. L. Hui and Z. Haiman, “Thermal Memory of the Reionization History”, *Ap. J.*, **596**, 9–18 (2003).
44. G. P. Holder, Z. Haiman, M. Kaplinghat, L. Knox, “The Reionization History at High Redshifts II: Estimating the Optical Depth to Thomson Scattering from CMB Polarization”, *Ap. J.*, **595**, 13–18 (2003).
43. Z. Haiman and G. P. Holder, “The Reionization History at High Redshifts I: Physical Models and New Constraints from CMB Polarization”, *Ap. J.*, **595**, 1–12 (2003).
42. X. Fan et al. (for the SDSS collaboration), “A Survey of $z > 5.8$ Quasars in the Sloan Digital Sky Survey II: Discovery of Three Additional Quasars at $z > 6$ ”, *Astron. J.*, **125**, 1649–1659 (2003).
41. Z. Haiman, D. N. Spergel and E. L. Turner, “Predictions for the Counts of Faint, High-Redshift Galaxies in the Mid-Infrared”, *Ap. J.*, **585**, 630–637 (2003).
40. M. Kaplinghat, M. Chu, Z. Haiman, G. Holder, L. Knox and C. Skordis, “Probing the Reionization History of the Universe Using the Cosmic Microwave Background Polarization” *Ap. J.*, **583**, 24–32 (2003).
39. L. Verde, Z. Haiman and D. N. Spergel, “Are Clusters Standard Candles? Galaxy Cluster Scaling Relations With the Sunyaev-Zeldovich Effect”, *Ap. J.*, **581**, 5–19 (2002).
38. J. Comerford, Z. Haiman and J. Schaye, “Constraining the Redshift $z = 6$ Quasar Luminosity Function Using Gravitational Lensing” *Ap. J.*, **580**, 63–72 (2002).
37. Z. Haiman and R. Cen, “A Constraint on the Gravitational Lensing Magnification and Age of the Redshift $z=6.28$ Quasar SDSS 1030+0524”, *Ap. J.*, **578**, 702–707 (2002).
36. Z. Haiman, “The Detectability of High Redshift Lyman α Emission Lines Prior to the Reionization of the Universe”, *Ap. J. (Lett.)*, **576**, 1–4 (2002).
35. Stoughton, C., et al. (for the SDSS collaboration), “Sloan Digital Sky Survey: Early Data Release”, *Astron. J.*, **123**, 485–548 (2002).
34. S. P. Oh and Z. Haiman, “Second-Generation Objects in the Universe: Radiative Cooling and Collapse of Halos with Virial Temperatures Above 10^4 Kelvin”, *Ap. J.*, **569**, 558–572 (2002).

33. P. Hall, et al. (for the SDSS collaboration), “Unusual Broad Absorption Line Quasars from the Sloan Digital Sky Survey” *Ap. J. (Suppl.)*, **171**, 267–309 (2002).
32. L. Hui, Z. Haiman, M. Zaldarriaga and T. Alexander “Connections between the Cosmic Baryon Fraction, the Extragalactic Ionizing Background and Lyman Break Galaxies” *Ap. J.*, **564**, 525–533 (2002).
31. X. Fan et al. (for the SDSS collaboration), “A Survey of $z > 5.8$ Quasars in the Sloan Digital Sky Survey I: Discovery of Three New Quasars and the Spatial Density of Luminous Quasars at $z \approx 6$ ”, *Astron. J.*, **122**, 2833–2849 (2001).
30. G. P. Holder, Z. Haiman and J. J. Mohr, “Constraints on Ω_M , Ω_Λ , and σ_8 from Galaxy Cluster Redshift Distributions”, *Ap. J.*, **560**, 111–114 (2001).
29. K. Menou, Z. Haiman and V. Narayanan, “The Merger History of Supermassive Black Holes in Galaxies”, *Ap. J.*, **558**, 535–542 (2001).
28. R. Barkana, Z. Haiman and J. P. Ostriker, “Constraints on Warm Dark Matter from Cosmological Reionization”, *Ap. J.*, **558**, 482–496 (2001).
27. Z. Haiman and M. Rees, “Extended Lyman Alpha Emission Around Young Quasars: A Constraint on Galaxy Formation”, *Ap. J.*, **556**, 87–92 (2001).
26. Z. Haiman, J. J. Mohr and G. P. Holder, “Constraints on Cosmological Parameters from Future Galaxy Cluster Surveys”, *Ap. J.*, **553**, 545–561 (2001).
25. S. P. Oh, Z. Haiman and M. Rees, “HeII Recombination Lines From the First Luminous Objects”, *Ap. J.*, **553**, 73–77 (2001).
24. Z. Haiman and A. Loeb, “What is the Highest Plausible Redshift of Luminous Quasars?”, *Ap. J.*, **552**, 459–463 (2001).
23. Z. Haiman, T. Abel and P. Madau, “Ionizing Photon Consumption by Cosmological Mini-halos”, *Ap. J.*, **551**, 599–607 (2001).
22. L. Knox, A. Cooray, D. Eisenstein, and Z. Haiman, “Probing Early Structure Formation with Far-Infrared Background Correlations”, *Ap. J.*, **550**, 7–20 (2001).
21. Z. Haiman and L. Hui, “Constraining the Lifetime of Quasars from their Spatial Clustering”, *Ap. J.*, **547**, 27–38 (2001).
20. R. Cen and Z. Haiman, “Quasar Strömgren Spheres Before Cosmological Reionization”, *Ap. J. (Lett.)*, **542**, 75–78 (2000).
19. X. Fan et al. (for the SDSS collaboration), “The Discovery of a Luminous $z=5.80$ Quasar from the Sloan Digital Sky Survey”, *Astron. J.*, **120**, 1167–1174 (2000).
18. Z. Haiman, M. Spaans and E. Quataert, “Lyman- α Cooling Radiation from High Redshift Halos”, *Ap. J. (Lett.)*, **537**, 5–8 (2000).
17. Z. Haiman, T. Abel and M. Rees, “The Radiative Feedback of the First Cosmological Objects”, *Ap. J.*, **534**, 11–21 (2000).
16. A. Aguirre and Z. Haiman, “Cosmological Constant or Intergalactic Dust? Constraints from the Cosmic Far Infrared Background”, *Ap. J.*, **532**, 28–40 (2000).
15. Z. Haiman and K. Menou, “On the Cosmological Evolution of the Luminosity Function and the Accretion Rate of Quasars”, *Ap. J.*, **531**, 42–51 (2000).
14. Z. Haiman and L. Knox, “Correlations in the Far Infrared Background”, *Ap. J.*, **530**, 124–132 (2000).
13. Z. Haiman and A. Loeb, “X-Ray Emission from the First Quasars”, *Ap. J. (Lett.)*, **521**, 9–12 (1999).
12. Z. Haiman and A. Loeb, “Determining the Redshift of Reionization From the Spectra of High-Redshift Sources”, *Ap. J.*, **519**, 479–485 (1999).
11. Z. Haiman and M. Spaans, “Models for Dusty Lyman α Emitters at High Redshift”, *Ap. J.*, **518**, 138–144 (1999).
10. Z. Haiman, P. Madau and A. Loeb, “Constraints from the Hubble Deep Field on High Redshift Quasar Models”, *Ap. J.*, **514**, 535–543 (1999).

9. Z. Haiman and A. Loeb, “Observational Signatures of the First Quasars”, *Ap. J.*, **503**, 505–517 (1998).
8. A. Loeb and Z. Haiman, “Signatures of Intergalactic Dust From the First Supernovae”, *Ap. J.*, **490**, 571–576 (1997).
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