

Biographical Statement: Smita Mathur

Education: Ph.D. (Physics), Indian Institute of Science, Bangalore, India. The work for Ph.D. was done at Tata Institute of Fundamental Research, Bombay. Thesis: “Effect of a QSO on its Host Galaxy” (1991).

Master of Science (Physics), Indian Institute of Technology, Bombay, India (1983).

Publications: 177 papers in refereed journals
(3 of these with over 200 citations, 19 more over 100, including a single author paper)
“h index” = 49

Research Interests: Observational Cosmology: Circumgalactic and Inter-galactic Medium.
Quasars & Active Galaxies: Black Holes, Outflows, Host galaxies

Positions Held :

2008-present: Professor at the Ohio State University.
2002-2008: Associate Professor at the Ohio State University.
1999-2002: Research Scientist at the Ohio State University.
1993-2000: Associate of Harvard College Observatory
1991-2000: Astrophysicist at High Energy Astrophysics Division (HEAD), Harvard-Smithsonian Center for Astrophysics.
1990-1991: Research assistant at HEAD, CfA.
1984-1990: Ph.D. research work at Tata Institute of Fundamental Research.

Grants/Awards:

Chandra Co-Investigator on one proposal (cycle 19)
HST Co-Investigator on one proposal (cycle 25)
Swift Co-Investigator on one proposal (2017)
Chandra Co-Investigator on four proposals (cycle 18)
(§120k to Mathur plus \$35k pending TOO trigger).
NuSTAR Principal Investigator on one proposal (\$40k)
HST Principal Investigator on one proposal (\$80k).
HST Co-Investigator on one proposal (22 orbits)
ADAP Principal Investigator on one proposal (\$208k)
Swift Co-Investigator on one proposal
XMM Co-Investigator on one proposal (840k seconds)
Chandra Co-Investigator on one proposal (2014)
HST Co-Investigator on two proposals. (2014)
XMM Co-Investigator on one proposal (1.6M seconds) (2014)
Suzaku Co-Investigator on one proposal (2014)
Chandra Co-Investigator on one proposal (2013)
HST Co-Investigator on one proposal (2014)
Suzaku Co-Investigator on one proposal (2014)
Chandra Principal Investigator on one proposal (2012)
Chandra Co-Investigator on one proposal (2012)
HST Principal Investigator on one proposal (2013)
HST Co-Investigator on two proposals (2013)
XMM Co-Investigator on one proposal (2013)
XMM Co-Investigator on two proposals (2012)
Chandra Co-Investigator on one proposal (2011)
HST Co-Investigator on one proposal (2012)
Swift Co-Investigator on one proposal (2011)
XMM Principal Investigator on one proposal (2011)
XMM Co-Investigator on three proposals (2011)
HST Co-Investigator on one proposal (2011)
XMM Principle Investigator on one proposal (2010)
XMM Co-Investigator on one proposal (2010)
Chandra Principal Investigator on one grant (2010)
Chandra Co-Investigator on two grants (2010)
ADP Principal Investigator on one grant (2010)
XMM Principal Investigator on one proposal (2009)
XMM Co-Investigator on one proposal (2009)
Chandra Principal Investigator on one grant (2009)
Chandra Principal Investigator on one E/PO grant (2009)
XMM Principle Investigator on one proposal (2008)
XMM Co-Investigator on one proposal (2008)
Chandra Principal Investigator on one grant (2008)
Suzaku Co-Investigator on one grant (2008)

Grants (continued):

XMM Principal Investigator on one proposal (2007)
XMM Co-Investigator on one proposal (2007)
Suzaku Co-Investigator on one grant (2007)
XMM Principal Investigator on one grant (2006)
XMM Co-Investigator on one grant (2006)
Chandra Principal Investigator on one E/PO grant (2006)
Chandra Principal Investigator on one grant (2006)
Spitzer Co-Investigator on one grant (2006)
XMM Principal Investigator on one grant (2005)
Chandra Co-Investigator on two grants (2005)
FUSE Principal Investigator on one grant (2005)
ASTRO-E Principal Investigator on one grant (2005) (program cancelled)
ASTRO-E Co-Investigator on one grant (2005) (program cancelled)
XMM Co-Investigator on one grant (2004)
Chandra Principal Investigator on one grant (2004)
Chandra Co-Investigator on one grant (2004)
HST Principal Investigator on one grant (2004)
LTSA Co-Investigator on one grant (2003) (\$600K)
XMM Principal Investigator on three grants (2003)
XMM Co-Investigator on two grants (2003)
Chandra Co-Investigator on three grants (2003)
FUSE Principal Investigator on one grant (2002)
Chandra Principal Investigator on one grant (2002)
Chandra Co-Investigator on one grant (2002)
HST Principal Investigator on one grant (2002)
XMM-Newton Principal Investigator on three grants (2002)
XMM-Newton Co-Investigator on one grant (2002)
HST Co-Investigator on two grants (2001)
Chandra Co-Investigator on two grants (2001)
Chandra Principal Investigator on one grant (2000) (0.5 Million seconds)
Chandra Co-Investigator on three grants (2000) (800 ksec total)
FUSE Principal Investigator on one grant (2000)
FUSE Co-Investigator on one grant (2000)
RXTE Co-Investigator on one grant (2000)
XMM Principal Investigator on two grants (2000)
XMM Co-Investigator (2000)
HST Co-Investigator (2000)
Beppo-SAX Co-Investigator (2000)
ADP Principal Investigator (1999)

Grants (continued):

SAX Co-Investigator (1999)
ASCA Principal Investigator (1999)
HST Co-Investigator (1999)
AXAF Co-Investigator (1999)
ASCA Co-Investigator (1998)
ASCA Co-Investigator (1997)
SAX Co-Investigator on one core program (1996)
SAX Co-Investigator on three GO programs (1996)
XTE Co-Investigator (1996)
ASCA Principal Investigator (1996)
ASCA Co-Investigator on two grants (1996)
HST Principal Investigator on two grants (1996)
HST Co-Investigator (1996)
LTSA Principal Investigator (1995) (\$ 0.5 Million, 5 years)
XTE Principal Investigator (1995)
HST Principal Investigator (1995)
ISO Co-Investigator (1995)
ASCA Co-Investigator (1994)
ROSAT Principal Investigator (1993)
IUE Co-Investigator (1993)
IUE Co-Investigator (1992)
ROSAT Co-Investigator on two grants (1992)

Ground based programs:

1. “THE MILLIMETRIC EMISSION PROCESSES OF RADIO-QUIET QUASARS FROM THE PALOMAR GREEN SAMPLE”, 10hrs on LMT.
2. “A Deep Search for HI Signatures of the Circumgalactic Medium”, 66hr of GBT time.
3. “Confirmation of a high-redshift water maser”, 10hr of Arecibo time.
4. “Obtaining spectroscopic redshifts for galaxies close to UV- and X-ray bright QSOs”, 5 nights on MDM (2013)
5. “High S/N MODS Spectrum of a High-Redshift Quasar”, 2hr of LBT time (2012)
6. “A sensitive search for HI 21cm absorption in high-z DLAs”, 72hr of GMRT time. (2011)
7. LBT observations of high redshift quasars 2009–2011
8. “Searching for low luminosity AGNs in nearby spiral galaxies”, 40 hrs. of GMRT observations (2008)
9. “Dust in compact HVCs: Small scale HI structure”, 30 hrs. of GBT observations (2006)
10. “Black Hole Growth and the M-sigma relation” 22hrs of Gemini time (2004)
11. “Low-frequency observations of high-redshift giant radio sources” GMRT observations (2004)
12. “Star formation in narrow line Seyfert 1 galaxies from SDSS”: A VLA proposal. We observed 9 NLS1s for a total of 8 hours. (2003)
13. We were awarded 3 nights on NTT to observe H β range of high redshift BALQSOs. (2003)
14. “A search for high-z water vapor masers in obscured AGNs”, 40hrs of Arecibo time. (2003)
15. “Coronal lines in soft X-ray selected AGNs.” MDM proposal (2003)
16. “Reverberation mapping of a narrow line Seyfert 1 galaxy.” MDM proposal (2000)

17. "Optical followup of selected high latitude Chandra fields." NOAO proposal (2000)
18. "Optical imaging survey of Chandra fields." NOAO proposal (1999)
19. "Optical imaging of selected Chandra fields." several MHO proposals (1999)
20. Several MMT proposals 1992 through 1994.

Invited Talks:

1. *Tidal disruption events (TDEs)*, at the “Wide band X-ray timing and spectral studies of cosmic X-ray sources” conference at TIFR, India, Jan. 2017.
2. *Radio loud Narrow-line Seyfer 1 galaxies*, at the “Data analysis and LAXPC science” workshop at TIFR, India, Jan. 2017.
3. *Relics of AGN feedback in our Milky Way*, at the “AGN Winds” meeting on Jekyll island, June 2017.
4. *All the X-Ray Colors of the Milky Way*, Whereabouts and Physics of the Roaming Baryons in the Universe, Sexten, Italy, June 2017 (presented by F. Nicastro on my behalf).
5. *Missing metals and baryons in galaxies: Clues from our Milky Way*, seminar at Georgia Tech, October, 2017.
6. *Missing metals and baryons in galaxies: Clues from our Milky Way*, Colloquium at the Rutgers University, October, 2016.
7. *Missing metals and baryons in galaxies: Clues from our Milky Way*, seminar at NYU, October, 2016.
8. *Missing metals and baryons in galaxies: Clues from our Milky Way*, Observatory of Rome, July 2015
9. *Missing metals and baryons in galaxies: Clues from our Milky Way*, Delhi University, July 2015.
10. *AGN Unification: the multi-wavelength perspective*, at the workshop “AGN science with Astrosat”, TIFR, India, July 2015.
11. *Missing metals and baryons in galaxies: Clues from our Milky Way*, colloquium at Georgia State University, September 2015.
12. *Missing metals and baryons in galaxies: Clues from our Milky Way*, Colloquium at University of South Carolina, October 2014.
13. *Probing AGN outflows with variability*, invited talk at conference “The restless nature of AGNs: variability as a probe of the central engine”, held in Naples, Italy, May 2013
14. *Discovery of relativistic outflows in active galactic nuclei*, seminar at TIRF, Mumbai, India, July 2013.

15. *The baryonic halo of the Milky Way*, seminar at S. N. Bose National Centre for Basic Sciences, Kolkata, India. July 2013.
16. *Where is the matter: Hide and Seek in the Universe*, A public lecture. at the Nehru Planetarium, Delhi, India. August 2013.
17. *Black hole–galaxy coevolution: Making a case for paradigm change*, Colloquium at University of Virginia, October 2013.
18. *The Warm Hot Intergalactic Medium*”, Review talk at the “Half a century of X-ray astronomy” conference, September 2012, Greece.
19. *Black hole–galaxy coevolution: Making a case for paradigm change*, April 2012, Colloquium at University of Michigan.
20. *Black hole–galaxy coevolution: Making a case for paradigm change*, April 2012, Colloquium at the Michigan State University.
21. *Alternative tracks of black hole – galaxy co-evolution*, November 2011, Colloquium, Ohio State University.
22. *Black hole–galaxy coevolution: Making a case for paradigm change*, July 2011, Univ. of Waterloo, Canada
23. *Black hole–galaxy coevolution: Making a case for paradigm change*, Jan. 2011, at ‘Wideband X-ray Astronomy’ workshop at IUCAA, Pune, India
24. *Where are the baryons? Hide and seek in the Universe*, Dec. 2010, Joint Munich Colloquium, Garching, Germany.
25. *Metallicity in AGNs*, October 2010, at “High energy view of accreting objects: AGN and X-ray binaries” workshop, Crete, Greece
26. *Demographics of black holes in the local Universe*, July 2010, a colloquium at IUCAA, Pune, India.
27. *AGN Feedback: Does it work*, August 2010, a colloquium at NCRA, Pune, India
28. *Demographics of black holes in the local Universe*, July 2010, at “Accretion Processes Around Compact Objects” workshop, Bangalore, India
29. *AGN Feedback: Does it work*, April 2010, a colloquium at Indiana
30. *Chandra to IXO*, September 2009, at SISSA, Trieste, Italy

31. *Chandra to IXO*, May 2009, at the Gooddard Space Flight Center
32. *High resolution X-ray spectroscopy*, February 2009, in the X-ray Astronomy School held at IUCAA, Pune, India.
33. *Finding Local Low-mass Supermassive Black Holes*, February 2008, in “Observational Evidence of Black Holes in the Universe”, conference held in Kolkata, India.
34. *Where are the baryons? Hide and seek in the Universe*, January 2008, a colloquium at McGill University.
35. *Where are the baryons? Hide and seek in the Universe*, November 2007, a colloquium at University of Virginia.
36. *Where are the baryons? Hide and seek in the Universe*, November 2007, a colloquium at Johns Hopkins University.
37. *Lost baryons at low redshift*, June 2007, in IAU 244 *Dark Galaxies and Lost Baryons*, held at Cardiff, UK.
38. *X-ray and UV observations of the Warm-Hot IGM*, May 2007, A seminar presented at the Carnegie-Mellon University.
39. *X-ray and UV observations of the Warm-Hot IGM*, January 2007, A colloquium presented at the Delhi University.
40. *X-ray and UV observations of the Warm-Hot IGM*, November 2006, A colloquium presented at the University of Texas at Austin.
41. *X-ray/FUV Absorption Line Spectroscopy of Warm-hot Gas around the Galaxy*, June 2006, at the AAS meeting in Calgary, Canada
42. *X-ray and UV observations of the Warm-Hot IGM*, February 2006, A colloquium presented at Carnegie Observatories
43. *X-ray and UV observations of the Warm-Hot IGM*, December 2005, A colloquium presented at University of Chicago
44. *X-ray and UV observations of the Warm-Hot IGM*, December 2004, A colloquium presented at the University of Oklahoma.
45. *Black Hole Growth by Accretion*, November 2004, at “AGN Physics” workshop held at Ringberg Castle, Germany.

46. *X-ray and UV observations of the Warm-Hot IGM*, September 2003, A colloquium presented at Tata Institute of Fundamental Research, Mumbai, India.
47. *X-ray and UV observations of the Warm-Hot IGM*, October 2003, A colloquium presented at Yale.
48. *X-ray and UV observations of the Warm-Hot IGM*, November 2003, A seminar presented at the Goddard Space Flight Center.
49. *X-ray and UV observations of the Warm-Hot IGM*, March 2003, an invited talk presented at the High Energy Astrophysics Meeting of the AAS, Mt. Tremblant, Canada.
50. *X-ray and UV observations of the Warm-Hot IGM*, December 2002, A colloquium presented at NRAO, Socorro.
51. *Warm Absorbers in AGNs*, 2001, an invited talk presented at the international conference on “Multicolour Universe”, held at TIFR, Mumbai, India.
52. *Recent Chandra Results on AGNs & Future Prospects*, 2001, an invited talk presented at “Chandra at Sharp Focus”, held at St. Paul, MN, ASP Conf. Series.
53. *Warm Absorbers in Active Galactic Nuclei*, 2001, A Colloquium given at the University of Nebraska.
54. *Absorbing Outflows in Active Galactic Nuclei: Past & Future*, 2001, A Colloquium given at the Georgia State University.
55. *Absorbing Outflows in AGN: New Results*, April 2000, A Colloquium given at University of Pittsburgh.
56. *Absorbing Outflows in AGN*, March 1999, A Colloquium given at Ohio State University
57. *UV and X-ray absorption in AGN and its connection to NLS1s*, 1999, an Invited Talk given at Joint MPE, AIP, ESO workshop on “Observational and theoretical progress in the study of Narrow-line Seyfert 1 galaxies”.
58. A Colloquium at Tata Institute of Fundamental Research, India, 1996.
59. *Absorbing Outflows in AGN*, November 1995, A Colloquium given at Harvard University.
60. A Colloquium at Inter-University Center for Astronomy and Astrophysics, India, 1995.
61. *Quasars: A Multiwavelength View*, December 1995, A Colloquium given at Brown University.

Contributed Talks (in last 5 years):

1. *Relics of AGN feedback in our Milky Way*, AGN Winds meeting, Jekyll Island, Georgia, June 2017.
2. *Chandra solves the mystery: Understanding the UV anomaly discovered by HST*, HEAD meeting in Naples, Florida, April 2016
3. *Probing the Milky way with X-ray absorption*, “Galaxies in Absorption” meeting at the University of Pittsburgh, April 2016.
4. *Circumgalactic medium of galaxies*, “Chandra science for the next decade” meeting in Boston, August 2016.
5. *Missing metals and baryons in galaxies: Clues from our Milky Way*, at “15 Years of Chandra” conference in Boston, November 2014.
6. *The warm-hot gaseous halo of the Milky Way*, OSU-Catolica Workshop, May 2014
7. *Missing metals and baryons in galaxies: Clues from our Milky Way*, “X-ray Universe 2014” in Dublin, Ireland, June 2014
8. *Stringent constraints on the H I spin temperature in two $z > 3$ damped Lyman- α systems*, at the conference “The Metre-wavelength Sky”, Pune, India, December 2013.
9. *Black hole–galaxy co-evolution: Making a case for paradigm change*, November 2011, at “High energy views of galaxies and their nuclei”, Tulum, Mexico.
10. *Black hole–galaxy co-evolution: Making a case for paradigm change*, September 2011, at “Starburst–AGN connection”, Madrid, Spain.
11. *An alternative track of black hole–galaxy coevolution*, August 2011, at “Single and double black holes in galactic nuclei”, Ann Arbor, MI.
12. *Black hole–galaxy co-evolution paradigm: Lessons from narrow line Seyfert 1 galaxies*, April 2011, in “Narrow line Seyfert 1 galaxies and their place in the Universe”, Milan, Italy.
13. *Discovery of a Supermassive Black Hole in a Bulge-less Galaxy*, March 2010, at the HEAD meeting of the AAS, Hawaii.
14. *AGN Feedback: Does it work?*, June 2009, at “The Monster’s Fiery Breath: Feedback in Galaxies, Groups, and Clusters”, Madison, WI.

15. *Demographics of Local Black Holes*, June 2008, at the AGN Workshop in Crete, Greece.
16. *Metallicity Measurements in AGNs*, October 2008, at “Future Directions in Ultraviolet Spectroscopy” conference.
17. *Finding Local Low-mass Supermassive Black Holes*, October 2007, at “Eight Years of Chandra” conference.

Professional Services:

- NASA postdoctoral fellowship review committee (2015)
- STIC member, 2011–present
- AURA representative, 2009–present.
- Arecibo observatory users' committee, 2014–present.
- HST review panel, 2011
- Chair, SOC, Tulum conference, November 2011
- SOC, NLS1 Milan conference, April 2011
- NASA Postdoctoral Program, external Review. 2010
- NSF external reviewer, 2009
- NSF Review Panel 2007.
- Vistas public talk: “*Where is the matter*”, October 2006
- ATP/BEFS review committee 2006
- Chandra Fellowship selection committee 2006
- Chandra Users' Committee 2005–2008
- Vistas public talk: “*The Energetic Universe: Exploring the X-ray Sky*”, October 2004
- Chair, special session on IGM at the AAS meeting in January 2004
- Chair, XMM Review Panel: Cycle 3
- XMM AO3 Chair Persons' meeting, Madrid, June 2003
- XMM Users' Committee

-HST Review Panel: Cycle 9

-Chandra Review Panel: Cycle 1, Cycle 3

-ASCA Review Panel: Cycle 4

-Served as an external reviewer for Ph.D. theses, appointments, promotions, and grant awards.

-Refereed papers for ApJ, ApJL, AJ, A&A and A&A L.

Bibliography

In Refereed Journals:

1. *Possible Phenomena Arising From a Non-Stationary Black Hole*, 1986, *Astrophysical Letters*, **25**, 85. (S. Mathur & S. Shanhbag (**Mathur**)).
2. *QSO Activity and Host Galaxy Evolution*, 1988, *Ap. J.* **334**, 34. (S. Shanhbag (**Mathur**) & A. K. Kembhavi).
3. *Effect of a QSO on the Interstellar Medium of its Host Galaxy*, 1991, *Ap. J.* **367**, 462. (S. Shanhbag (**Mathur**))
4. *A ROSAT Spectrum of the Quasar 3C351: A Warm absorber in an X-ray Quiet Quasar?*, 1993, *Ap.J.*, **415**, 129 (F. Fiore, M. Elvis, **S. Mathur**, B. Wilkes, and J. McDowell)
5. *X-ray Absorption Toward The Red Quasar 3C212*, 1994, *Ap.J.* 425, 103. (M. Elvis, F. Fiore, **S. Mathur** & B. Wilkes)
6. *The X-ray and Ultraviolet Absorbing Outflow in 3C351*, 1994, *Ap. J.*, 434, 493. (**S. Mathur**, B.Wilkes, M.Elvis & F.Fiore)
7. *Absorption in 3C212*, 1994, *Ap. J. Letters*, 431, L75 (**S. Mathur**)
8. *The complex optical to soft X-ray spectrum of low redshift, radio-quiet quasars. II: Comparison with free-free and disk models*, 1995, *Ap. J.*, 449, 74. (F. Fiore, M. Elvis, B. Wilkes, A. Siemiginowska, J. McDowell, & **S. Mathur**)
9. *An Unusual Quasar PG1407-178* 1995, *Ap.J.* 450, 585. (J. C. McDowell, C. Canizares, M. Elvis, A. Lawrence, S. Markoff **S. Mathur** & B. Wilkes)
10. *Testing the Unified X-ray/UV Absorber Models with NGC5548*, 1995, *Ap. J.*, 452, 230. (**S. Mathur**, M. Elvis & B. Wilkes)
11. *GB1508+5714: the First $z > 4$ Radio Selected Quasar in X-rays*, 1995, *AJ*, 110, 1551 (**S. Mathur** & M. Elvis)
12. *Optical Detection of the Hidden Nuclear Engine in NGC 4258*, 1995, *Ap. JL*, 455, L13. (B. Wilkes, G. Schmidt, P. Smith, **S. Mathur** & K. McLeod)
13. *Strong X-ray Absorption in a BALQSO: PHL5200*, 1995, *ApJL*, 455, L9. (**S. Mathur**, M. Elvis & K. P. Singh)

14. *Broad Absorption Line QSOs Observed With ROSAT PSPC*, 1996, Ap. J., 462, 637 (P. Green & **S. Mathur**)
15. *The X-ray Warm Absorber in NGC3516*, 1997, ApJ, 478, 182 (**S. Mathur**, B. Wilkes and T. Aldcroft).
16. *Strong X-ray Absorption in the Einstein Ring Source PKS1830-211*, 1997, ApJ, 484, 140 (**S. Mathur** & S. Nair)
17. *A comparison of the hard ASCA spectral slopes of broad and narrow line Seyfert 1 galaxies*, 1997, MNRAS Letters, 285, 25 (N. Brandt, **S. Mathur** & M. Elvis).
18. *Evidence Against BALs in the X-ray Bright QSO PG1416-129*, 1997, ApJ, 484, 135 (P. Green, T. Aldcroft, **S. Mathur** & N. Schartel).
19. *X-ray absorption by ionized oxygen in ASCA spectra of the infrared quasar IRAS 13349+2438* , MNRAS, 292, 407. (Brandt, N., **Mathur, S.**, Reynolds, C. S. & Elvis, M.)
20. *Discovery of Associated Absorption Lines in an X-ray Warm Absorber: HST Observations of PG 1114+445*, 1998, ApJL, 503, 23 (**S. Mathur** et al.)
21. *NGC7582: The Prototype Narrow-Line X-ray Galaxy*, 1998, ApJL, 503, 123 (J. Schachter, F. Fiore, M. Elvis, **S. Mathur**, H. Awaki & K. Iwasawa).
22. *An investigation of the relation between the spectral energy distributions and the emission lines in low-redshift quasars* , 1999 ApJ, 513, 76 (B. Wilkes, J. Kuraszkiewicz, P. Green, **S. Mathur** & J. McDowell).
23. *Heavy and Complex X-ray Absorption Towards the Nucleus of Markarian 6*, 1999, ApJ, 510, 167 (J. Feldmeier, W. N. Brandt, M. Elvis, A. C. Fabian, K. Iwasawa & **S. Mathur**)
24. *The BeppoSAX Observation of the Seyfert 1.9 Galaxy ESO103-G35*, 1999, Astrophysical Letters and Communications, 39, 85 (Antonelli *et al.* including **S. Mathur**)
25. *What do UV Spectra of Narrow-line Seyfert 1 Galaxies tell us about their broad line regions?*, 2000, ApJ, 542, 692 (J. Kuraszkiewicz, B. Wilkes, B. Czerny & **S. Mathur**)
26. *Multiple Velocity Components in the CIV Absorption Line of NGC5548*, 1999, ApJ, 519, 605 (**S. Mathur**, M. Elvis, & B. Wilkes)
27. *Exploratory ASCA Observations of Broad Absorption Line Quasi-Stellar Objects*, 1999, ApJ, 519, 549 (S. Gallagher, W.N. Brandt, R. Sambruna, **S. Mathur** & N. Yamasaki)

28. *Narrow Line Seyfert 1 Galaxies and the evolution of Galaxies and Active Galaxies*, 2000, MNRAS Letters, 314, L17 (**S. Mathur**)
29. *Thomson Thick X-ray Absorption in a Broad Absorption Line Quasar PG0946+301*, 2000, ApJL, 533, 79 (**S. Mathur et al.**)
30. *150 keV Emission from PKS2149-306 with BeppoSAX: Compton Suppression of a Jet?*, 2000, ApJ, 543, 545 (M. Elvis, F. Fiore, A. Siemiginowska, J. Bechtold, **S. Mathur** & J. McDowell)
31. *X-ray and Optical variability in NGC 4051 and the Nature of Narrow Line Seyfert 1 Galaxies*, 2000, ApJ, 542, 161 (B. Peterson et al. including **S. Mathur**)
32. *The complex absorbers of NGC 3516 X-ray spectrum observed by BeppoSAX*, 2000, ApJ, 544, 283 (E. Costantini, F. Nicastro, **S. Mathur, et al.**)
33. *The Chandra X-ray Observatory Resolves The X-ray Morphology and Spectra of a Jet and Knots in PKS0637-752*, 2000, ApJ, 542, 655 (G. Chartas *et al.* , including **S. Mathur**)
34. *Chandra Discovery of a 50 kpc X-ray Jet in PKS0637-752*, 2000, ApJL, 540, 69 (D. Schwartz *et al.* including **S. Mathur**)
35. *BeppoSAX Observations of the Maser AGN ESO103-G35*, 2001, ApJ, 549, 248 (B. Wilkes, **S. Mathur, et al.**)
36. *Heavy X-ray Absorption in Soft X-ray Weak Active Galactic Nuclei*, 2001, ApJ, 546, 795 (S. Gallagher, W.N. Brandt, A. Laor, M. Elvis, **S. Mathur**, B. Wills, & N. Iyomoto)
37. *Evolution of Active Galaxies: Black Hole Mass – Bulge Mass Relation for Narrow Line Objects*, 2001, New Astronomy, 6, 321. (**S. Mathur**, J. Kuraszekiewicz & B. Czerny)
38. *Structure of X-ray Emission from the Jet of 3C273*, 2001, ApJL, 549, 167 (H. Marshall *et al.* including **S. Mathur**)
39. *Surprises from a Deep ASCA Observation of the Prototype BALQSO PHL5200*, 2001, ApJL, 551, L13 (**S. Mathur**, G. Matt, P. Green, M. Elvis, & K.P. Singh)
40. *The BeppoSAX view of the X-ray active nucleus of NGC4258*, 2001, ApJ, 556, 150 (F. Fiore *et al.* including **S. Mathur.**)
41. *A Chandra Survey of BALQSOs*, 2001, ApJ, 558, 109 (P. Green, T. Aldcroft, **S. Mathur**, B. Wilkes, & M. Elvis)

42. *Discovery of Associated Absorption Lines in an X-ray Warm Absorber: HST Observations of MR 2251-178*, 2001, ApJ, 559, 675 (E. Monier, **S. Mathur**, B. Wilkes, M. Elvis)
43. *Multiwavelength Monitoring of the Narrow-Line Seyfert 1 Galaxy Akn 564. I. ASCA Observations and the Variability of the X-ray Spectral Components*, 2001, ApJ, 561, 131 (T.J.Turner, P.Romano, I.M.George, R. Edelson, S.J. Collier, **S. Mathur**, B.M.Peterson)
44. *Multiwavelength Monitoring of the Narrow-Line Seyfert 1 Galaxy Akn 564. II. Ultraviolet Continuum and Emission-line Variability*, 2001, ApJ, 561, 146 (S. Collier *et al.* including **S. Mathur**.)
45. *Multiwavelength Monitoring of the Narrow-Line Seyfert 1 Galaxy Akn 564. III. Optical Observations and the Optical–UV–X-ray Connection*, 2001, ApJ, 561, 162 (O.Shemmer *et al.* including **S. Mathur**.)
46. *Supersolar metal abundances and the Broad Line Region of Narrow-line Seyfert 1 galaxies*, 2001, A&A, 374, 914 (S. Komossa & **S. Mathur**)
47. *The $z=5.8$ Quasar SDSSp J1044-0125: A Peek At Quasar Evolution?*, 2001, AJ, 122, 1688 (**S. Mathur**)
48. *HST STIS Observations of PG 0946+301: The Highest Quality UV Spectrum of a BALQSO*, 2001, ApJ, 561, 118 (N. Arav *et al.* including **S. Mathur**)
49. *A 12 day ASCA Observation of the Narrow Line Seyfert 1 Galaxy Ton S180: Time-Selected Spectroscopy*, 2002, ApJ, 564, 162 (P. Romano, T.J. Turner, **S. Mathur** & I.M. George)
50. *Reddening, Emission-Line, and Intrinsic Absorption Properties in the Narrow-Line Seyfert 1 Galaxy Arakelian 564*, 2002, ApJ, 566, 187 (M. Crenshaw *et al.* including **S. Mathur**)
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Other Publication:

1. *Quasars*: in Encyclopedia of Science and Technology, Third Edition. Academic Press (B.M. Peterson, **S. Mathur**, P.S. Osmer, and M. Vestergaard)
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Publicity

CXC, the Chandra X-ray Center, issued five press releases based on our work. Articles reporting our work are published in: Washington Post, Boston Globe, The Atlanta Journal, Sydney Morning Herald, Channel NewsAsia, Toledo Blade, Calgary Herald, Boulder's Daily Camera, United Press International, space.com, Deutsche Presse-Agentur, and Ohio State's OnCampus. An interview was aired on WVXU-FM.

News articles based on our Nature paper on missing baryons were published in numerous newspapers around the world. It was on radio news, including NPR Science Friday. An article was published in Physics Today.

A new press release was issued in September 2012 highlighting our work on the discovery of a large reservoir of hot gas around the Milky Way, accounting for a large fraction of the missing baryons of our Galaxy. This again got world-wide attention including news papers in Mexico, Italy, and India. It also got reported in many on-line news media including the Discovery channel.

NASA also released an image of NGC 3627, based in part on our Chandra work (Grier et al. 2011).