

Mitchell Craig Begelman

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Personal:

Born March 14, 1953, New York City
U. S. Citizen

Education:

Ph.D. in Theoretical Astrophysics, University of Cambridge, December 1978
Thesis Title: Aspects of Accretion Theory
A.M. in Physics, Harvard University, June 1974
A.B. in Physics, Harvard University, June 1974
Graduated from Bronx High School of Science, June 1970

Appointments:

Distinguished Professor, University of Colorado, 2020-present.
Professor of Distinction, College of Arts & Sciences, University of Colorado Boulder, 2018-present

Department of Astrophysical and Planetary Sciences (formerly Astrophysical, Planetary and Atmospheric Sciences), University of Colorado, Boulder, Colorado

Professor, August 1991-present
Chair, July 1995-June 1998 and October 2008-June 2014
Associate Professor, August 1987-August 1991
Assistant Professor, August 1982-August 1987
Associate Chair, July 1989-June 1990 and July 1992-June 1995
Acting Chair, July-December 1989

JILA (formerly Joint Institute for Laboratory Astrophysics), University of Colorado and National Institute of Standards and Technology, Boulder, Colorado

Fellow, March 1984-present
Member, August 1982-March 1984

Member, Center for Astrophysics and Space Astronomy, University of Colorado, January 1986-present
Postgraduate Research Astronomer, University of California, Berkeley, March 1979-June 1982
Science Research Council Research Fellow, Institute of Astronomy, Cambridge, England, October 1978-March 1979 and July 1981-December 1982
Visiting Scientist, N. Copernicus Astronomical Center, Warsaw, Poland, Winter 1980

Honors and Awards:

Biermann Lecturer, Max-Planck Institut für Astrophysik, Garching, Germany, 2016
University of Colorado, College of Arts & Sciences College Scholar, 2014-2016

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Trinity College, Cambridge, Visiting Fellow Commoner, 2005-2006
University of Colorado Faculty Fellowship, 2005-2006
First Boldt Lecturer, NASA/Goddard Space Flight Center, 2004
Boulder Faculty Assembly Award for Excellence in Research, Scholarly, and Creative Work, 1999-2000
Guggenheim Fellowship, 1998-1999
University of Colorado Faculty Fellowship, 1998-1999
American Institute of Physics Science Writing Award, 1996
University of Colorado Faculty Fellowship, 1990-1991
Helen B. Warner Prize of the American Astronomical Society, 1988
Alfred P. Sloan Foundation Research Fellowship, 1987
Presidential Young Investigator Award, 1984
Isaac Newton Studentship, 1977-1978
National Science Foundation Graduate Fellowship, 1974-1977
Phi Beta Kappa, 1974
Harvard National Scholar, 1970-1974
Westinghouse Science Talent Search Scholarship, third national award, 1970-1974
National Merit Scholar, 1970-1974

Professional Organizations:

Member, International Astronomical Union
Member, American Astronomical Society
Fellow, Royal Astronomical Society
Fellow, Cambridge Philosophical Society

Professional Service:

Panelist, NASA Astrophysics Theory Program proposal review, 2013, 2017, 2019 (chair)
Panelist, National Science Foundation Astronomy & Astrophysics Proposal Review, 2017, 2020
Reviewer, National Academy of Sciences Mid-Decadal Report on Astronomy & Astrophysics, 2016
Pundit and Chair, X-ray Visionary and Big project Panels, NASA Chandra X-Ray Observatory Cycle 15 Proposal Review, 2013
Past Chair, High Energy Astrophysics Division, American Astronomical Society, 2010-2012
Vice-Chair, National Academy of Sciences Astro 2010 Science Frontiers Panel on Galaxies Across Cosmic Time, 2009-2010
Member, International X-ray Observatory Study Coordination Group and Science Definition team, 2008-2009
Chair, High Energy Astrophysics Division, American Astronomical Society, 2008-2010
Chair, Panel on Galactic Astronomy, GLAST Cycle I Guest Investigator Proposal Review (NASA), 2007
Vice-Chair, High Energy Astrophysics Division, American Astronomical Society, 2006-2008
Member, National Research Council Committee on Astronomy and Astrophysics, 2005-2008
Member, NASA Chandra Fellowship Selection Committee, 2005
Member, AGN/GRB Panel, NASA Astrophysics Theory Program proposal review, 2002
Panelist-at-large, ("Pundit"), Merging Panel, NASA Chandra X-Ray Observatory Cycle 3 Proposal Review, 2001
Member, High Energy Astrophysics Division Executive Committee, American Astronomical Society, 2000-2001
Member, NASA Hubble Space Telescope Cycle 10 Proposal Review Panel, 2000
Member, NASA Constellation-X Mission Facility Science Team, 1998-2008
Member, Natural Sciences and Engineering Research Council of Canada review committee for Canadian Institute for Theoretical Astrophysics, 1998

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Chair, NSF proposal review panel for AGNs, and QSOs, Extragalactic Astronomy and Cosmology Program, 1998

Chair, Warner/Pierce Prize Committee, American Astronomical Society, 1997-1998

Member, 1996-1998

Member, NASA Hubble Fellowship Selection Committee, 1997

Member, NASA Space Interferometry Mission Science Working Group, 1996 - 1998

Chair, Panel on Active Galactic Nuclei, NASA Long-Term Space Astrophysics Research Program Proposal Review, 1994

Member, NASA Hubble Space Telescope Cycle 5 Proposal Review Panel, 1994

Member, NASA Small Explorer Peer Review Panel, 1993

Member, Space Interferometry Science Working Group (NASA), 1992-1994

Member, Long-Term Space Astrophysics Program Review Panel (NASA), 1992, 1994

Member, National Science Foundation Selection Panel for 1989 Presidential Young Investigators in Astronomy

Chair, Panel on Active Galactic Nuclei, ROSAT Guest Observer Program Proposal Review (NASA), 1989

Member, Interferometry Panel, National Research Council Astronomy and Astrophysics Survey Committee ("Bahcall Committee"), 1989-1990.

Member, National Science Foundation Advisory Committee for Astronomical Sciences, 1985-1988

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Publications:

Books

1. Mitchell Begelman and Martin Rees, *Gravity's Fatal Attraction: Black Holes in the Universe* (W. H. Freeman: Scientific American Library Series No. 58, New York, 1996), 246 pp.
Winner of the 1996 American Institute of Physics Science Writing Award.
Named one of the Outstanding Academic Books of 1996 by Choice Magazine.

Mitchell Begelman and Martin Rees, *Gravity's Fatal Attraction: Black Holes in the Universe* (paperback edition) (W. H. Freeman: Scientific American Library Series No. 58, New York, 1998).

Mitchell Begelman and Martin Rees, *Schwarze Löcher Im Kosmos: Die magische Anziehungskraft der Gravitation*, German translation, translated by Margit Röser (Spektrum Akademischer Verlag, Heidelberg, 1997).

Mitchell Begelman and Martin Rees, *L'Attrazione Fatale della Gravità: I buchi neri dell' Universo* Italian translation, translated by Giusi Galli (Nuovi Classici della Scienza, Zanichelli Editore, Bologna, 1997).

Mitchell Begelman and Martin Rees, *Zwarte Gatzen In Het Heelal*, Dutch translation, translated by Tom Korbeek (Vertaling: Riet Rutten-Vonk, 1998).

Mitchell Begelman and Martin Rees, *Ta sila fatalna, Czarne dziury we Wszelkim wiecie*, Polish translation, translated by Piotr Amsterdamski (Prószyński i S-ka, Warsaw, 1999).
2. Mitchell Begelman, *Turn Right at Orion: Travels Through the Cosmos* (Perseus Publishing: Helix Books, Cambridge, MA, 2000), 264 pp.

Mitchell Begelman, *Turn Right at Orion: Travels Through the Cosmos*, Complex Chinese translation (Taiwan: Owl Publishing House, a division of Cite Publishing Ltd., 2009).
3. Mitchell Begelman and Martin Rees, *Gravity's Fatal Attraction: Black Holes in the Universe, Second Edition* (Cambridge University Press, Cambridge, 2010), 302 pp.

Mitchell Begelman and Martin Rees, *Osudová Přitažlivost Gravitace: Černé Díry ve Vesmíru*, Czech translation, translated by Pavel Paloncý (Argo/Dokořán, Prague, 2013).
4. Mitchell Begelman and Martin Rees, *Gravity's Fatal Attraction: Black Holes in the Universe, Third Edition* (Cambridge University Press, Cambridge, 2020), 350 pp.

Papers in Refereed Journals

1. M. C. Begelman and M. J. Rees, "Can cosmic clouds cause climatic catastrophes?" *Nature* **261**, 298-299 (1976).
2. M. C. Begelman, "Nearly collisionless spherical accretion," *Mon. Not. R. Astr. Soc.* **181**, 347-363 (1977).
3. M. C. Begelman, "Black holes in radiation-dominated gas: An analogue of the Bondi accretion problem," *Mon. Not. R. Astr. Soc.* **184**, 53-67 (1978).

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4. M. C. Begelman, "Accretion of $> 5/3$ gas by a Schwarzschild black hole," *Astr. Astrophys.* 70, 583-584 (1978).
5. M. C. Begelman and M. J. Rees, "The fate of dense stellar systems," *Mon. Not. R. Astr. Soc.* 185, 847-859 (1978).
6. M. C. Begelman, "Can a spherically accreting black hole radiate very near the Eddington limit?" *Mon. Not. R. Astr. Soc.* 187, 237-251 (1979).
7. M. C. Begelman, M. J. Rees and R. D. Blandford, "A twin-jet model for radio trails," *Nature* 279, 770-773 (1979).
8. M. C. Begelman, C. L. Sarazin, S. P. Hatchett, C. F. McKee and J. Arons, "Beam models for SS 433," *Astrophys. J.* 238, 722-730 (1980).
9. C. L. Sarazin, M. C. Begelman and S. P. Hatchett, "Disk-driven precession in SS 433," *Astrophys. J. Lett.* 238, L129-132 (1980).
10. M. C. Begelman, R. D. Blandford and M. J. Rees, "Massive black hole binaries in active galactic nuclei," *Nature* 287, 307-309 (1980).
11. S. P. Hatchett, M. C. Begelman and C. L. Sarazin, "A new look at the dynamics of twisted accretion disks," *Astrophys. J.* 247, 677-685 (1981).
12. M. C. Begelman and D. L. Meier, "Thick accretion disks: Self-similar, supercritical models," *Astrophys. J.* 253, 873-896 (1982).
13. M. J. Rees, M. C. Begelman, R. D. Blandford and E. S. Phinney, "Ion-supported tori and the origin of radio jets," *Nature* 295, 17-21 (1982).
14. M. C. Begelman, C. F. McKee and G. A. Shields, "Compton heated winds and coronae above accretion disks. I. Dynamics," *Astrophys. J.* 271, 70-88 (1983).
15. M. C. Begelman and C. F. McKee, "Compton heated winds and coronae above accretion disks. II. Radiative transfer and observable consequences," *Astrophys. J.* 271, 89-112 (1983).
16. M. C. Begelman and M. J. Rees, "The cauldron at the core of SS 433," *Mon. Not. R. Astr. Soc.* 206, 209-220 (1984).
17. M. C. Begelman, R. D. Blandford and M. J. Rees, "Theory of extragalactic radio sources," *Rev. Mod. Phys.* 56, 255-351 (1984); Russian translation in *Fizika Vnegalakticheskikh Istochnikov Radioizlucheniya (Physics of Extragalactic Radio Sources)*, R. D. Dagkesamansky and S. S. Komissarov, translators (Mir Publishers, Moscow, 1987), pp. 9-295.
18. M. C. Begelman, "The effects of X-rays from an active galactic nucleus on the interstellar medium of the host galaxy," *Astrophys. J.* 297, 492-506 (1985).
19. G. A. Shields, C. F. McKee, D. N. C. Lin and M. C. Begelman, "Compton-heated winds and coronae above accretion disks. III. Instability and oscillations," *Astrophys. J.* 306, 90-106 (1986).
20. M. C. Begelman and C. L. Sarazin, "SN1985f: Death of a Wolf-Rayet Star," *Astrophys. J. Lett.* 302, L59-L62 (1986).

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21. M. C. Begelman, "Cooling flows in ellipticals and the nature of radio galaxies," *Nature* 322, 614-615 (1986).
22. J. H. Krolik and M. C. Begelman, "An X-ray heated wind in NGC 1068," *Astrophys. J. Lett.* 308, L55-L58 (1986).
23. P. A. Becker and M. C. Begelman, "Comptonization in supercritical winds. I. Spectral evolution," *Astrophys. J.* 310, 534-551 (1986).
24. P. A. Becker and M. C. Begelman, "Comptonization in supercritical winds. II. Dynamics and observational diagnostics," *Astrophys. J.* 310, 552-560 (1986).
25. M. C. Begelman, M. Sikora and M. J. Rees, "Thermal and dynamical effects of pair production on two-temperature accretion flows," *Astrophys. J.* 313, 689-698 (1987).
26. G. M. Voit, J. M. Shull and M. C. Begelman, "Broad, variable absorption lines in the Seyfert galaxy NGC 3516: Probing the structure of the emission line regions," *Astrophys. J.* 316, 573-583 (1987).
27. M. Sikora, J. G. Kirk, M. C. Begelman and P. Schneider, "Electron injection by relativistic protons in active galactic nuclei," *Astrophys. J. Lett.* 320, L81-L85 (1987).
28. M. C. Begelman and M. Sikora, "Inverse Compton scattering of ambient radiation by a cold relativistic jet: A source of beamed polarized continuum in blazars?" *Astrophys. J.* 322, 650-661 (1987).
29. I. Shlosman and M. C. Begelman, "Self-gravitating accretion disks in active galactic nuclei," *Nature* 329, 810-812 (1987).
30. M. C. Begelman and R. D. Blandford, "Luminous arcs from galactic bow shocks," *Nature* 330, 46-48 (1987).
31. J. H. Krolik and M. C. Begelman, "Molecular tori in Seyfert galaxies: Feeding the monster and hiding it," *Astrophys. J.* 329, 702-711 (1988).
32. M. C. Begelman and T. Chiueh, "Thermal coupling of ions and electrons by collective effects in two-temperature accretion flows," *Astrophys. J.* 332, 872-890 (1988).
33. M. de Kool, M. C. Begelman and M. Sikora, "Self-absorbed synchrotron sources in active galactic nuclei," *Astrophys. J.* 337, 66-77 (1989).
34. I. Shlosman, J. Frank and M. C. Begelman, "Bars within bars: A mechanism for fuelling active galactic nuclei," *Nature* 338, 45-47 (1989).
35. M. de Kool and M. C. Begelman, "The production of self-absorbed synchrotron spectra steeper than $<^{-5/2}$," *Nature* 338, 484-485 (1989).
36. M. Sikora, M. C. Begelman and B. Rudak, "Relativistic neutrons in active galactic nuclei," *Astrophys. J. Lett.* 341, L33-L36 (1989).
37. I. Shlosman and M. C. Begelman, "Evolution of self-gravitating accretion disks in active galactic nuclei," *Astrophys. J.* 341, 685-691 (1989).
38. M. de Kool and M. C. Begelman, "Effects of thermal plasma on self-absorbed synchrotron sources in active galactic nuclei," *Astrophys. J.* 345, 135-139 (1989).

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39. M. C. Begelman and D. F. Cioffi, "Overpressured cocoons in extra-galactic radio sources," *Astrophys. J. Lett.* 345, L21-24 (1989).
40. M. C. Begelman and J. G. Kirk, "Shock-drift particle acceleration in superluminal shocks: A model for hot spots in extragalactic radio sources," *Astrophys. J.* 353, 66-80 (1990).
41. M. C. Begelman and A. C. Fabian, "Turbulent mixing layers in the interstellar and intracluster medium," *Mon. Not. R. Astr. Soc.* 244, 26P-29P (1990).
42. I. Shlosman, M. C. Begelman and J. Frank, "The fuelling of active galactic nuclei," (Review Article), *Nature* 345, 679-686 (1990).
43. M. C. Begelman and C. F. McKee, "Global effects of thermal conduction on two-phase media," *Astrophys. J.* 358, 375-391 (1990).
44. C. F. McKee and M. C. Begelman, "Steady evaporation and condensation of isolated clouds in hot plasma," *Astrophys. J.* 358, 392-398 (1990).
45. M. C. Begelman, B. Rudak and M. Sikora, "Consequences of relativistic proton injection in active galactic nuclei," *Astrophys. J.* 362, 38-51 (1990); Erratum: 370, 791 (1991).
46. P. A. Becker and M. C. Begelman, "Dynamical effects of annihilation in pair-dominated winds," *Astrophys. J.* 364, 203-211 (1990).
47. M. Loewenstein, E. G. Zweibel and M. C. Begelman, "Cosmic ray heating of cooling flows: A critical analysis," *Astrophys. J.* 377, 392-402 (1991).
48. T. Chiueh, Z. Li and M. C. Begelman, "Asymptotic structure of hydromagnetically-driven relativistic winds," *Astrophys. J.* 377, 462-466 (1991).
49. M. C. Begelman, M. de Kool and M. Sikora, "Outflows driven by cosmic-ray pressure in broad absorption line QSOs," *Astrophys. J.* 382, 416-432 (1991).
50. Z. Li, M. C. Begelman and T. Chiueh, "The effects of radiation drag on radial, relativistic hydromagnetic winds," *Astrophys. J.* 384, 567-579 (1992).
51. M. Sikora and M. C. Begelman, "Does an orbiting star cause periodic modulation of x-rays from NGC 6814?" *Nature* 356, 224-225 (1992).
52. Z. Li, T. Chiueh and M. C. Begelman, "Electromagnetically driven relativistic jets: A class of self-similar solutions," *Astrophys. J.* 394, 459-471 (1992).
53. M. C. Begelman and Z. Li, "An axisymmetric MHD model for the Crab pulsar wind bubble," *Astrophys. J.* 397, 187-195 (1992).
54. Z. Li and M. C. Begelman, "Formation of the dark bays in the Crab optical synchrotron nebula: Is the Crab pulsar wind bubble interacting with its progenitor's wind?" *Astrophys. J.* 400, 186-191 (1992).
55. N. Arav and M. C. Begelman, "Radiation-viscous boundary layers," *Astrophys. J.* 401, 125-136 (1992).

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56. J. D. Slavin, J. M. Shull and M. C. Begelman, "Turbulent mixing layers in the interstellar medium of galaxies," *Astrophys. J.* 407, 83-99 (1993).
57. Q. C. Wang, Z. Li and M. C. Begelman, "The X-ray-emitting trail of the nearby pulsar PSR 1929+10," *Nature* 364, 127-129 (1993).
58. N. Arav and M. C. Begelman, "Interaction of a jet with a radiation pressure-dominated atmosphere: The case of SS 433," *Astrophys. J.* 413, 700-709 (1993).
59. G. M. Madejski, C. Done, T. J. Turner, R. F. Mushotzky, P. Serlemitsos, F. Fiore, M. Sikora and M. C. Begelman, "Solving the mystery of the x-ray periodicity in the Seyfert galaxy NGC 6814," *Nature* 365, 626-628 (1993).
60. M. C. Begelman, P. Mészáros and M. J. Rees, "Gamma-ray bursts from blast waves around galactic neutron stars," *Mon. Not. R. Astr. Soc.* 265, L13-L16 (1993).
61. M. Sikora, M. C. Begelman and M. J. Rees, "Comptonization of diffuse ambient radiation by a relativistic jet: The source of gamma-rays from blazars?" *Astrophys. J.* 421, 153-162 (1994).
62. M. C. Begelman and Z. Li, "Asymptotic domination of cold relativistic MHD winds by kinetic energy flux," *Astrophys. J.* 426, 269-278 (1994).
63. M. C. Begelman, M. J. Rees and M. Sikora, "Energetic and radiative constraints on highly relativistic jets," *Astrophys. J. Lett.* 429, L57-L60 (1994).
64. M. C. Begelman and E. G. Zweibel, "Acoustic instability driven by cosmic ray streaming," *Astrophys. J.* 431, 689-704 (1994).
65. N. Arav, Z.-Y. Li and M. C. Begelman, "Radiative acceleration in outflows from broad absorption line quasi-stellar objects. II. Wind models," *Astrophys. J.* 432, 62-74 (1994).
66. P. R. Maloney, M. C. Begelman and M. J. Rees, "Radiative excitation of molecules near powerful compact radio sources," *Astrophys. J.* 432, 606-611 (1994).
67. N. Arav and M. C. Begelman, "Modeling the double trough structure observed in broad absorption line QSOs using radiative acceleration," *Astrophys. J.* 434, 479-483 (1994).
68. B. E. Stern, M. C. Begelman, M. Sikora and R. Svensson, "A large particle Monte Carlo code for stimulating nonlinear high-energy processes near compact objects," *Mon. Not. R. Astr. Soc.* 272, 291-307 (1995).
69. B. E. Stern, J. Poutanen, R. Svensson, M. Sikora and M. C. Begelman, "On the geometry of the x-ray emitting region in Seyfert galaxies," *Astrophys. J. Lett.* 449, L13-L17 (1995).
70. N. Arav, K. T. Korista, T. A. Barlow and M. C. Begelman, "Radiative acceleration of gas in quasars," *Nature*, 376, 576-578 (1995).
71. M. de Kool and M. C. Begelman, "Radiation pressure-driven magnetic disk winds in broad absorption line quasi-stellar objects," *Astrophys. J.* 455, 448-455 (1995).
72. M. C. Begelman, "The acceleration and collimation of jets," *Pub. Natl. Acad. Sci.* 92, 11442-11446 (1995).

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73. M. Sikora, H. Sol, M. C. Begelman and G. Madejski, "Radiation drag in relativistic AGN jets," *Mon. Not. R. Astr. Soc.* 280, 781-796 (1996).
74. J. Poutanen, M. Sikora, M. C. Begelman and P. Magdziarz, "The Compton mirror in NGC4151," *Astrophys. J. Lett.* 465, L107-L110 (1996).
75. G. V. Bicknell and M. C. Begelman, "Understanding the kiloparsec-scale structure of M87," *Astrophys. J.* 467, 597-621 (1996).
76. P. R. Maloney, M. C. Begelman and J. E. Pringle, "Radiation-driven warping: The origin of warps and precession in accretion disks," *Astrophys. J.* 472, 582-587 (1996).
77. M. A. Nowak, R. V. Wagoner, M. C. Begelman, and D. E. Lehr, "The 67 Hz feature in the black hole candidate GRS 1915+105 as a possible 'diskoseismic' mode," *Astrophys. J. Lett.* 477, L91-L94 (1997).
78. C. S. Reynolds and M. C. Begelman, "Intermittent radio galaxies and source statistics," *Astrophys. J. Lett.* 487, L135-L138 (1997).
79. J. B. Dove, J. Wilms and M. C. Begelman, "Self-consistent thermal accretion disk corona models for compact objects: I. Properties of the corona and the spectrum of escaping radiation," *Astrophys. J.* 487, 747-758 (1997).
80. J. B. Dove, J. Wilms, M. Maisack and M. C. Begelman, "Self-consistent thermal accretion disk corona models for compact objects: II. Application to Cygnus X-1," *Astrophys. J.* 487, 759-768 (1997).
81. C. S. Reynolds and M. C. Begelman, "Iron fluorescence from within the innermost stable orbit of black hole accretion disks," *Astrophys. J.*, 488, 109-118 (1997).
82. S. Heinz and M. C. Begelman, "Analysis of the synchrotron emission from the M87 jet," *Astrophys. J.*, 490, 653-663 (1997).
83. P. R. Maloney and M. C. Begelman, "The origin of warped, precessing accretion disks in x-ray binaries," *Astrophys. J. Lett.*, 491, L43-46 (1997).
84. M. C. Begelman, "Instability of toroidal magnetic field in jets and plerions," *Astrophys. J.* 493, 291-300 (1998).
85. S. Heinz, C. S. Reynolds and M. C. Begelman, "X-ray signatures of aging radio galaxies," *Astrophys. J.* 501, 126-136 (1998).
86. J. B. Dove, J. Wilms, M. A. Nowak, B. A. Vaughan and M. C. Begelman, "RXTE observation of Cygnus X-1: I. Spectral analysis," *Mon. Not. R. Astr. Soc.* 298, 729-736 (1998).
87. P. R. Maloney, M. C. Begelman and M. A. Nowak, "Radiation-driven warping: II. Non-isothermal disks," *Astrophys. J.* 504, 77-92 (1998).
88. T. Chiueh, Z.-Y. Li and M. C. Begelman, "A critical analysis of ideal magnetohydrodynamic models for Crab-like pulsar winds," *Astrophys. J.* 505, 835-843 (1998).
89. M. A. Nowak, B. A. Vaughan, J. Wilms, J. B. Dove and M. C. Begelman, "ROSSI X-ray Timing Explorer observation of Cygnus X-1: II. Timing analysis," *Astrophys. J.* 510, 874-891 (1999).

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90. R. D. Blandford and M. C. Begelman, "On the fate of gas accreting at a low rate onto a black hole," *Mon. Not. R. Astr. Soc. Lett.* 303, L1-7 (1999).
91. M. C. Begelman, "A model for the moving 'wisps' in the Crab Nebula," *Astrophys. J.* 512, 755-760 (1999).
92. C. S. Reynolds, A. J. Young, M. C. Begelman and A. C. Fabian, "X-ray iron line reverberation from black hole accretion disks," *Astrophys. J.* 514, 164-177 (1999).
93. M. A. Nowak, J. Wilms, B. A. Vaughan, J. B. Dove and M. C. Begelman, "ROSSI X-ray Timing Explorer observation of Cygnus X-1: III. Implications for Compton corona and advection-dominated accretion flow models," *Astrophys. J.* 515, 726-737 (1999).
94. N. Arav, K. T. Korista, M. de Kool, V. T. Junkkarinen and M. C. Begelman, "Hubble Space Telescope observations of the broad absorption line quasar PG 0946+301," *Astrophys. J.* 516, 27-46 (1999).
95. A. R. King and M. C. Begelman, "Radiatively driven outflows and avoidance of common-envelope evolution in close binaries," *Astrophys. J. Lett.* 519, L169-171 (1999).
96. C. S. Reynolds, S. Heinz, A. C. Fabian and M. C. Begelman, "A Rossi X-ray Timing Explorer study of M87 and the core of the Virgo cluster," *Astrophys. J.* 521, 99-102 (1999).
97. S. Heinz and M. C. Begelman, "A shotgun model for gamma-ray bursts," *Astrophys. J. Lett.* 527, L35-L38 (1999).
98. J. M. Stone, J. E. Pringle and M. C. Begelman, "Hydrodynamical non-radiative accretion flows in two dimensions," *Mon. Not. R. Astr. Soc.* 310, 1002-1016 (1999).
99. A. R. King, R. E. Taam and M. C. Begelman, "The evolutionary status of SS 433," *Astrophys. J. Lett.* 530, L25-L28 (2000).
100. S. Heinz and M. C. Begelman, "Jet acceleration by tangled magnetic fields," *Astrophys. J.* 535, 104-117 (2000).
101. M. A. Nowak, J. Wilms, W. A. Heindl, K. Pottschmidt, J. B. Dove and M. C. Begelman, "A good long look at the black hole candidates LMC X-1 and LMC X-3," *Mon. Not. R. Astr. Soc.* 320, 316-326 (2001).
102. J. Wilms, M. A. Nowak, K. Pottschmidt, W. A. Heindl, J. B. Dove and M. C. Begelman, "Discovery of recurring soft to hard state transitions in LMC X-3," *Mon. Not. R. Astr. Soc.* 320, 327-340 (2001).
103. C. S. Reynolds, S. Heinz and M. C. Begelman, "Shocks and sonic booms in the intracluster medium: X-ray shells and radio galaxy activity," *Astrophys. J. Lett.* 549, L179-L182 (2001).
104. M. C. Begelman, "Super-Eddington atmospheres that do not blow away," *Astrophys. J.* 551, 897-906 (2001).
105. M. Sikora, M. Blażejowski, M. C. Begelman and R. Moderski, "Modeling the production of flares in gamma-ray quasars," *Astrophys. J.* 554, 1-11 (2001).

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106. J. Wilms, C. S. Reynolds, M. C. Begelman, J. Reeves, S. Molendi, R. Staubert and E. Kendziorra, "XMM-EPIC observation of MCG!6-30-15: Direct evidence for the extraction of energy from a spinning black hole?" *Mon. Not. R. Astr. Soc.* 328, L27-L31 (2001).
107. M. C. Begelman, "Super-Eddington fluxes from thin accretion disks?" *Astrophys. J. Lett.* 568, L97-L100 (2002).
108. S. Heinz, Y.-Y. Choi, C. S. Reynolds and M. C. Begelman, "Chandra ACIS-S observations of Abell 4059: Signs of dramatic interaction between a radio galaxy and a galaxy cluster," *Astrophys. J. Lett.* 569, L79-L82 (2002).
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