

Li-Xin Li

Max-Planck-Institut für Astrophysik
Karl-Schwarzschild-Str. 1
85741 Garching
Germany

Phone: +49-89-30000-2247
Fax: +49-89-30000-2235
lxl@mpa-garching.mpg.de
<http://www.mpa-garching.mpg.de/~lxl>

CURRENT POSITION

Long-Term Postdoc Fellow, Max-Planck-Institut für Astrophysik, Garching, Germany

EDUCATION

- **Ph.D.**, Astrophysical Sciences, Princeton University, 2001
Thesis: Extracting Energy from Black Holes: The Blandford-Znajek Mechanism and Related Problems
Advisor: Bohdan Paczyński
- **M.Sc.**, Physics, Beijing Normal University, China, 1993
Thesis: Black Holes, Wormholes, and Time Machines
Advisor: Liao Liu
- **B.Sc.**, Physics, Peking University, China, 1990
Thesis: The Squeezed State of Light and Its Application
Advisor: Changqi Cao

HONORS AND AWARDS

- Chandra Fellowship, Chandra X-Ray Observatory (sponsored by NASA), 2001
- Harold W. Dodds Fellowship, Princeton University, 2000
- Merit Fellowship, Princeton University, 1997
- Presidential Award, Beijing Normal University, China, 1995
- First Award, Chinese Society of Gravity and Relativistic Astrophysics, 1994
- Best Graduate Student Honor, Beijing Normal University, China, 1993

RESEARCH INTERESTS

- **High Energy Astrophysics:** black holes, accretion disks, X-ray binaries and QPOs, gamma-ray bursts and supernovae, AGN and jets
- **Cosmology:** gravitational lensing, dark matter and dark energy, brane world and extra dimensions
- **Astrophysical Fluid Dynamics:** hydrodynamic and magnetohydrodynamic waves and instabilities
- **General Relativity:** closed timelike curves and quantum fields

RESEARCH EXPERIENCE

- Long-Term Postdoc Fellow, Max-Planck-Institut für Astrophysik, 2004 – Present
 - *Black Holes and Accretion Disks*
 - *X-Ray Binaries*
 - *Gamma-Ray Bursts*
 - *Supernovae*
 - *Instability of Astrophysical Fluids*
 - *Gravitational Lensing and Cosmology*
 - *Double-Peaked Broad Emission Lines in AGN*
 - *Brane World and Large Extra Dimensions*
- Chandra Fellow, Harvard University, 2001 – 2004
 - *Black Holes and Accretion Disks*
 - *Instability of Astrophysical Fluids*
 - *Gravitational Lensing and Cosmology*
 - *Double-Peaked Broad Emission Lines in AGN*
- Research Assistant, Princeton University, 1997 – 2001
 - *Black Holes, Accretion Disks, and Magnetic Fields*
 - *Gravitational Lensing and Cosmology*
 - *Gamma-Ray Bursts and Related Problems*
 - *General Relativity and Topology of the Universe*
- Researcher, Beijing Normal University, China, 1993 – 1997
 - *Topological Structure of Spacetime*
 - *Black Hole Physics and Cosmology*
- Research Assistant, Beijing Normal University, China, 1990 – 1993
 - *Black Hole Physics and Cosmology*
- Research Assistant, Peking University, China, 1989 – 1990
 - *Quantum Optics and Detection of Gravitational Waves*

TEACHING EXPERIENCE

- Assistant in Instruction, Princeton University, 2000
 - *Introduction to Modern Astrophysics*
- Lecturer, Beijing Normal University, China, 1994 – 1995
 - *General Physics*
 - *Quantum Field Theory in Curved Spacetime*
 - *Quantum Cosmology*
- Lab Instructor, Beijing Normal University, China, 1993 – 1994
 - *General Physics Lab*
- Teaching Assistant, Beijing Normal University, China, 1992 – 1994
 - *General Physics*
 - *Theoretical Mechanics*
 - *Global Differential Geometry and General Relativity*
 - *Quantum Field Theory*

OTHER EXPERIENCE

- Software Development: KERRBB for XSPEC X-Ray Data Analysis Package, Harvard University, MA, 2004
- Summer Project Supervisor, Harvard University, MA, 2004
- X-Ray Astronomy School, Berkeley Springs, WV, 2002
- Visitor, Institute for Advanced Study, NJ, 2002
- Michelson Interferometry Summer School, University of California at Berkeley, CA, 2000
- Visiting Researcher, Institute of Theoretical Physics, Academia Sinica, 1994 – 1995
- Visiting Scientist, International Center for Theoretical Physics, Italy, 1994

PROFESSIONAL AFFILIATIONS

- Member, International Astronomical Union, 2006 – Present
- Member, Chinese Society of Gravity and Relativistic Astrophysics, 1993 – Present
- Member, American Astronomical Society, 2000 – 2004
- Member, American Physical Society, 1998 – 2004

PUBLICATIONS IN REFEREED JOURNALS

1. *Shock Breakout in Type Ibc Supernovae and Application to GRB 060218/SN 2006aj*
L. -X. Li 2007, Mon. Not. R. Astron. Soc., 375, 240
2. *Redshift Degeneracy in the $E_{\text{iso}}-E_{\text{peak}}$ Relation of Gamma-Ray Bursts*
L. -X. Li 2007, Mon. Not. R. Astron. Soc., 374, L20
3. *The Spin of the Near-Extreme Kerr Black Hole GRS 1915+105*
J. E. McClintock, R. Shafee, R. Narayan, R. A. Remillard, S. W. Davis, and L. -X. Li 2006, Astrophys. J., 652, 518
4. *Correlation between the Peak Spectral Energy of Gamma-Ray Bursts and the Peak Luminosity of the Underlying Supernovae: Implication for the Nature of GRB-SN Connection*
L. -X. Li 2006, Mon. Not. R. Astron. Soc., 372, 1357
5. *Improved Correlation between the Variability and Peak Luminosity of Gamma-Ray Bursts*
L. -X. Li and B. Paczyński 2006, Mon. Not. R. Astron. Soc., 366, 219
6. *Estimating the Spin of Stellar-Mass Black Holes via Spectral Fitting of the X-ray Continuum*
R. Shafee, J. E. McClintock, R. Narayan, S. W. Davis, L. -X. Li, and R. A. Remillard 2006, Astrophys. J. Lett., 636, L113
7. *Vacuum Polarization in an Anti-de Sitter Space as an Origin for a Cosmological Constant in a Brane World*
L. -X. Li 2005, Mod. Phys. Lett. A, 20, 733
8. *Multi-Temperature Blackbody Spectrum of a Thin Accretion Disk around a Kerr Black Hole: Model Computations and Comparison with Observations*
L. -X. Li, E. Zimmerman, R. Narayan, and J. E. McClintock 2005, Astrophys. J. Supp., 157, 335
9. *Energetics of Black Hole-Accretion Disk System with Magnetic Connection: Limit of Low Accretion Rate*
L. -X. Li 2004, Publ. Astron. Soc. Japan., 56, 685
10. *Quasi-Periodic Oscillations from Rayleigh-Taylor and Kelvin-Helmholtz Instability at a Disk-Magnetosphere Interface*
L. -X. Li and R. Narayan 2004, Astrophys. J., 601, 414
11. *Double-Peaked Low-Ionization Emission Lines in Active Galactic Nuclei*
I. V. Strateva, M. A. Strauss, L. Hao, D. J. Schlegel, P. B. Hall, J. E. Gunn, L. -X. Li, Ž. Ivezić, G. T. Richards, N. L. Zakamska, W. Voges, S. F. Anderson, R. H. Lupton, D. P. Schneider, J. Brinkmann, and R. C. Nichol 2003, Astron. J., 126, 1720
12. *Gravitational Lensing by a Compound Population of Halos: Standard Models*
L. -X. Li and J. P. Ostriker 2003, Astrophys. J., 595, 603

13. *Non-Axisymmetric g-Mode and p-Mode Instability in a Hydrodynamic Thin Accretion Disk*
L. -X. Li, J. Goodman, and R. Narayan 2003, *Astrophys. J.*, 593, 980
14. *Disk Accretion Flow Driven by Large-Scale Magnetic Fields: Solutions with Constant Specific Energy*
L. -X. Li 2003, *Phys. Rev. D*, 68, 024022
15. *Evolution of Magnetic Fields around a Kerr Black Hole*
L. -X. Li 2003, *Phys. Rev. D*, 67, 044007
16. *The Giant X-Ray Flare of NGC 5905: Tidal Disruption of a Star, a Brown Dwarf, or a Planet?*
L. -X. Li, R. Narayan, and K. Menou 2002, *Astrophys. J.*, 576, 753
17. *Observational Signatures of the Magnetic Connection between a Black Hole and a Disk*
L. -X. Li 2002, *Astron. Astrophys.*, 392, 469
18. *Toy Model for the Magnetic Connection between a Black Hole and a Disk*
L. -X. Li 2002, *Phys. Rev. D*, 65, 084047
19. *Accretion Disk Torqued by a Black Hole*
L. -X. Li 2002, *Astrophys. J.*, 567, 463
20. *Semi-Analytical Models for Lensing by Dark Halos: I. Splitting Angles*
L. -X. Li and J. P. Ostriker 2002, *Astrophys. J.*, 566, 652
21. *Jet Collimation by Small-Scale Magnetic Fields*
L. -X. Li 2002, *Astrophys. J.*, 564, 108
22. *Two Open Universes Connected by a Wormhole: Exact Solutions*
L. -X. Li 2001, *J. Geom. Phys.*, 40, 154
23. *Making Clean Energy with a Kerr Black Hole: a Tokamak Model for Gamma-Ray Bursts*
L. -X. Li 2000, *Astrophys. J.*, 544, 375
24. *Extracting Energy from a Black Hole through the Transition Region*
L. -X. Li 2000, *Astrophys. J.*, 540, L17
25. *Extracting Energy from Accretion into a Kerr Black Hole*
L. -X. Li and B. Paczyński 2000, *Astrophys. J.*, 534, L197
26. *Extracting Energy from a Black Hole through Its Disk*
L. -X. Li 2000, *Astrophys. J.*, 533, L115
27. *Electromagnetic Energy for a Charged Kerr Black Hole in a Uniform Magnetic Field*
L. -X. Li 2000, *Phys. Rev. D*, 61, 084033
28. *Screw Instability and the Blandford-Znajek Mechanism*
L. -X. Li 2000, *Astrophys. J.*, 531, L111

29. *Toy Model for the Blandford-Znajek Mechanism*
L. -X. Li 2000, Phys. Rev. D, 61, 084016
30. *Time Machines Constructed from Anti-de Sitter Space*
L. -X. Li 1999, Phys. Rev. D, 59, 084016
31. *Transient Events from Neutron Star Mergers*
L. -X. Li and B. Paczyński 1998, Astrophys. J., 507, L59
32. *Inflation in Kaluza-Klein Theory: Relation between the Fine-Structure Constant and the Cosmological Constant*
L. -X. Li and J. R. Gott 1998, Phys. Rev. D, 58, 103513
33. *Can the Universe Create Itself?*
J. R. Gott and L. -X. Li 1998, Phys. Rev. D, 58, 023501
34. *Self-Consistent Vacuum for Misner Space and the Chronology Protection Conjecture*
L. -X. Li and J. R. Gott 1998, Phys. Rev. Lett., 80, 2980
35. *Effect of the Global Rotation of the Universe on the Formation of Galaxies*
L. -X. Li 1998, Gen. Rel. Grav., 30, 497
36. *Thermodynamic Properties of Radiation near the Black-Hole Horizon*
L. -X. Li 1997, Gen. Rel. Grav., 29, 973
37. *Must Time Machines Be Unstable against Vacuum Fluctuations?*
L. -X. Li 1996, Class. Quantum. Grav., 13, 2563
38. *Back-Reaction of Kerr Black Hole: a Thermodynamical Approach*
L. -X. Li 1996, Gen. Rel. Grav., 28, 1171
39. *Can Vacuum Foam Structure Solve the Flatness Problem of a Big Bang Universe?*
L. Liu, F. Zhao, and L. -X. Li 1995, Phys. Rev. D, 52, 4752
40. *New Light on Time Machines: Against the Chronology Protection Conjecture*
L. -X. Li 1994, Phys. Rev. D, 50, R6037
41. *Instability of Anti-de Sitter Spacetime*
J. -M. Xu, L. -X. Li, and L. Liu 1994, Phys. Rev. D, 50, 4886
42. *Complex Geometry, Quantum Tunneling, and Time Machines*
L. -X. Li, J. -M. Xu, and L. Liu 1993, Phys. Rev. D, 48, 4735
43. *Properties of Radiation near the Black Hole Horizon and the Second Law of Thermodynamics*
L. -X. Li and L. Liu 1992, Phys. Rev. D, 46, 3296

PUBLICATIONS IN PROCEEDINGS

- *Disk Accretion Driven by Magnetic Fields: Implication for New Models*
L. -X. Li 2004, Focus on Astrophysics Research (Nova Science, New York), P. 201
- *A Large Sample of Double-peaked H_α Lines and AGN Accretion Disks*
I. Strateva, M. Strauss, L. Hao, D. Schlegel, P. Hall, J. Gunn, L. -X. Li, Ž. Ivezić, G. Richards, N. Zakamska, W. Voges, S. Anderson, R. Lupton, D. Schneider, J. Brinkmann, and R. Nichol 2004, AGN Physics with the Sloan Digital Sky Survey (San Francisco, ASP), P. 189
- *The Giant X-Ray Flare of NGC 5905: Tidal Disruption of a Star, a Brown Dwarf, or a Planet?*
L. -X. Li, R. Narayan, and K. Menou 2002, American Astronomical Society Meeting 201, #54.03
- *3-D General Relativistic MHD Simulations of Generating Jets*
K. -I. Nishikawa, G. Richardson, R. Preece, G. J. Fishman, S. Koide, K. Shibata, T. Kudoh, H. Sol, L. -X. Li, J. P. Hughes, P. Hardee, and R. Blandford 2002, Active Galactic Nuclei: from Central Engine to Host Galaxy (Meudon, France)
- *A Tokamak Model for Gamma-Ray Bursts*
L. -X. Li 2001, American Astronomical Society Meeting 199, #161.22
- *Magnetic Connection between a Black Hole and a Disk*
L. -X. Li 2001, X-Ray Emission from Accretion onto Black Holes (Johns Hopkins University)

CONFERENCE AND INVITED TALKS

- *Shock breakout in type Ibc Supernovae and application to GRB 060218/SN 2006aj*
L. -X. Li 2007, Invited Talk, the National Astronomical Observatories, Beijing, China
- *Shock breakout in type Ibc Supernovae and application to GRB 060218/SN 2006aj*
L. -X. Li 2006, Institute Seminar, Max-Planck-Institut für Astrophysik, Garching, Germany
- *Growth of Black Holes by Super-Eddington Accretion during Galaxy Merger*
L. -X. Li 2006, the 7th Sino-German Workshop on “Galaxies, Super-massive Black Holes and the Cosmic Web”, Shanghai Astronomical Observatory, Shanghai, China
- *Improved Correlation between the Variability and Peak Luminosity of Gamma-Ray Bursts*
L. -X. Li 2005, High Energy Seminar, Max-Planck-Institut für Astrophysik, Garching, Germany
- *Effects of Vacuum Polarization in a Universe with Extra Dimensions*
L. -X. Li 2005, Cosmology Seminar, Max-Planck-Institut für Astrophysik, Garching, Germany
- *Probing Cosmology with Strong Lensing: Semi-Analytical Models*
L. -X. Li 2005, Lensing Seminar, Max-Planck-Institut für Astrophysik, Garching, Germany

- *Magnetic Interaction between a Black Hole and an Accretion Disk and Its Observational Signatures*
L. -X. Li 2004, Institute Seminar, Max-Planck-Institut für Astrophysik, Garching, Germany
- *Multi-Temperature Blackbody Spectrum of a Thin Accretion Disk around a Kerr Black Hole: Model Computations and Comparison with Observations*
L. -X. Li 2004, High Energy Seminar, Max-Planck-Institut für Astrophysik, Garching, Germany
- *Magnetic Interaction between a Black Hole and an Accretion Disk and Its Observational Signatures*
L. -X. Li 2004, Invited Talk, University of Waterloo, Waterloo, Ontario, Canada
- *Effects of Vacuum Polarization in a Universe with Extra Dimensions*
L. -X. Li 2004, Invited Talk, Perimeter Institute for Theoretical Physics, Waterloo, Ontario, Canada
- *Magnetic Interaction between a Black Hole and an Accretion Disk and Its Observational Signatures*
L. -X. Li 2004, Invited Talk, McGill University, Montreal, Quebec, Canada
- *Magnetic Interaction between a Black Hole and an Accretion Disk and Its Observational Signatures*
L. -X. Li 2003, Invited Talk, Columbia University, New York
- *Instability in Accretion Disks and Quasi-Periodic Oscillations in X-Ray Binaries*
L. -X. Li 2003, Chandra Fellows Symposium, Smithsonian Astrophysical Observatory, Cambridge, MA
- *Disk Accretion Flow Driven by Magnetic Fields: Solutions with Constant Specific Energy*
L. -X. Li 2003, Theoretical Astrophysics Division Seminar, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA
- *The Giant X-Ray Flare of NGC 5905: Tidal Disruption of a Star, a Brown Dwarf, or a Planet?*
L. -X. Li 2002, Chandra Fellows Symposium, Smithsonian Astrophysical Observatory, Cambridge, MA
- *Giant X-Ray Flares from Tidal Disruption of a Star by a Supermassive Black Hole*
L. -X. Li 2002, Tuesday Lunch, Institute for Advanced Study, Princeton, NJ
- *Disk Powered by a Black Hole through Magnetic Connection*
L. -X. Li 2001, Chandra Fellows Symposium, Smithsonian Astrophysical Observatory, Cambridge, MA
- *Extracting Energy from Black Holes: The Blandford-Znajek Mechanism and Related Problems*
L. -X. Li 2001, Astronomy Colloquium, Princeton University, Princeton, NJ

- *Topics on the Blandford-Znajek Mechanism*
L. -X. Li 1999, Invited Talk, the State University of New York at Stony Brook, Stony Brook, NY
- *Time Machines and Chronology Protection Conjecture*
L. -X. Li 1995, Invited Lecturer, Spring School on Quantum Gravity, CCAST (World Laboratory), Beijing, China
- *On the Chronology Protection Conjecture*
L. -X. Li 1994, International Conference on Gravity and Relativistic Astrophysics, Shanghai, China
- *Time Machines with Complex Geometry*
L. -X. Li 1993, Annual National Conference on Gravity and Relativistic Astrophysics, Ganshu, China