

Thomas J. Loredo

Astronomer, physicist, statistician

PERSONAL DATA

FULL NAME: Thomas Joseph Loredo
DATE OF BIRTH: 7 May 1962
PLACE OF BIRTH: Bayonne, New Jersey
CITIZENSHIP: United States
MARITAL STATUS: Single

CONTACT INFORMATION

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Cornell University
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EDUCATION

1984–1990 University of Chicago, Ph.D. in Astronomy
Thesis adviser: Prof. Donald Q. Lamb
Topic: *From Laplace to Supernova SN 1987A: Bayesian Inference in Astrophysics*
Thesis defended August 1990; degree awarded June 1995 upon submission of thesis article for publication

1980–1984 Massachusetts Institute of Technology, S.B. in Physics
Thesis Adviser: Prof. Saul A. Rappaport (co-adviser, Dr. George Ricker)
Topic: *Optical Observations of the Millisecond Pulsars PSR 1937+214 and PSR 1953+29*
Degree awarded June 1984

FELLOWSHIPS

1991–1994 NASA Compton Gamma Ray Observatory Fellow
October 1991 to September 1994

1989–1990 William R. Harper Fellow, University of Chicago
October 1989 to September 1990

1987–1990 NASA Graduate Student Traineeship
July 1987 to June 1990

1984–1987 University fellowships, University of Chicago
McCormick Fello 1984 to 1987, Farr Fellow 1984 to 1986

ACADEMIC POSITIONS

- Current* | Senior Research Associate
Center for Astrophysics and Planetary Science (CCAPS)
Cornell University
June 1997 to present
- Current* | Field Member and Lecturer
Department of Statistical Sciences
Cornell University
2013 to present
- 2006 | Visiting Research Associate
Statistical and Applied Mathematical Sciences Institute ([SAMSI](#))
January – May 2006
Co-organizer of the 2006 Astrostatistics Program; organizer of the Exoplanets Working Group, organizer and group leader of the Surveys and Population Studies Working Group, organizer and principal lecturer for 3-day Bayesian Astrostatistics school; see [2006 SAMSI Astrostatistics Program web site](#)
- 1994–2005 | Instructor
Department of Physics and School of Applied & Engineering Physics
Cornell University
Single-semester appointments: Fall 1994, Fall 2002, Spring 2004 & 2005
Taught or co-taught third-year physics courses; see below
- 1990–1997 | Research Associate and Postdoctoral Fellow
Department of Astronomy, Cornell University
September 1990 – June 1997
Supervisor: Prof. Ira Wasserman
- 1985–1986 | Summer Research Assistant
Los Alamos Scientific Laboratory
Summer, 1985 & 1986
1985: Worked on spectral calibration of the Pioneer Venus Orbiter gamma-ray burst detector; supervised by Dr. Ray Klebesadel
1986: Developed method for nonparametric deconvolution of gamma-ray burst spectral data; supervised by Dr. Richard Epstein

TEACHING EXPERIENCE

Undergraduate and Graduate Teaching

- SPRING 2015 | Department of Statistical Sciences, Cornell University
Created and taught a new course, Bayesian Data Analysis: Principles and Practice, for advanced undergraduates, statistics masters students, and PhD students in various disciplines; course included an extensive lab component teaching Python, Git and GitHub
- SPRING 2005,
SPRING 2004 | Instructor, Intermediate Mechanics
Department of Physics, Cornell University
Co-taught third-year mechanics course at the level of Marion's Classical Dynamics of Particles and Systems with Prof. J. C. Seamus Davis; handled \approx 25% of lectures, all recitations, grading & office hours
- FALL 2002 | Instructor, Computer Instrumentation Lab
School of Applied & Engineering Physics, Cornell University
Assisted Prof. Terrill A. Cool (lecturer); led lab supervision & grading with a team of TAs; advised students on laboratory reports satisfying the university writing requirement; taught basic digital electronics, assembly language, LabView and Matlab programming in a lab setting
- FALL 1994 | Instructor, Intermediate Electromagnetism
Department of Physics, Cornell University
Complete responsibility for third-year electromagnetism course at the level of Griffiths's Introduction to Electrodynamics but with original lectures, using David Hestenes's geometric calculus and heavily influenced by his modeling-theory approach to physics instruction

Graduate and Post-Graduate Instruction

SUMMERS, 2006–PRESENT	Summer School in Statistics for Astronomers Penn State University Center for Astrostatistics (CASt) <i>Presented a 3–4 hour introduction to Bayesian statistics during each year’s week-long summer school</i> <i>Lecture notes available at summer school web site</i>
SUMMER 2011	Bayesian Computation: MCMC and All That CASt <i>Co-organizer and lecturer for a full-day tutorial program following the 2011 CASt summer school, and prior to the 2011 conference, Statistical Challenges in Modern Astronomy; co-organizers: David van Dyk, Alan Heavens</i> <i>Agenda & lecture notes available at tutorial web site</i>
SUMMER 2010	Statistics and Computation for Astronomical Surveys CASt <i>Organizer and principal lecturer for a two-day supplement to the annual summer school, supported by a special NSF grant supplement funded by the American Recovery and Reinvestment Act</i> <i>Agenda & lecture notes available at summer school web site</i>
FALL 2009	INPE Advanced Course on Astrophysics: Astrostatistics INPE Division of Astrophysics, São José dos Campos, Brazil <i>Provided a six-hour introduction to Bayesian statistics to students at the third Advanced Course on Astrophysics hosted by Brazil’s National Institute for Space Research (INPE); other lecturers: Eric Feigelson, Hedibert Lopez, Esther Salazar</i> <i>Lecture notes available at the INPE course web site</i>
WINTER 2006	SAMSI/CASt Winter School on Bayesian Astrostatistics Statistical and Applied Mathematical Sciences Institute <i>Organizer and principal lecturer of an intensive three-day school on Bayesian statistics for astronomers</i> <i>Program content is online at SAMSI and CASt</i>
FALL 2002	Bayesian Inference in Astronomy and Astrophysics: A Short Course Max Planck Institute for Plasma Physics (IPP), Garching, Germany <i>Course of five 90-minute lectures hosted by Prof. Volker Dose’s data analysis group at IPP, with attendees from IPP and the Max Planck Institute for Astrophysics (MPA)</i>
VARIOUS DATES	Tutorial lectures at conferences <i>Frequent tutorial lecturer on Bayesian statistics and experimental design at Max-Ent workshops and astrostatistics conference sessions; see the list of selected talks below</i>

RECENT MAJOR GRANTS

- Current* Time Series Explorer
NASA Astrophysics Data Analysis Program (ADAP)
2016–2018; \$480,360 to Cornell
Funds a collaboration between Loredo and NASA Ames Research Center civil servant Dr. Jeffrey Scargle
- Current* Functional Data Analysis for Synoptic Time-Domain Astronomy
NSF Astronomy and Astrophysics Research Grants (AAG)
2013–2017; \$560,614
Funds a collaboration between Loredo, Cornell statistician Prof. David Ruppert, and University of Glasgow astronomer Prof. Martin Hendry; Loredo PI
- 2009–2013 Multilevel Modeling of Active Galaxy Populations
NSF Astronomy and Astrophysics Research Grants (AAG)
2009–2013; \$668,600
Funds a collaboration between Cornell astronomers (Loredo, Prof. Ira Wasserman, Prof. David Chernoff), Cornell statistician Prof. David Ruppert, and University of Glasgow astronomer Prof. Martin Hendry; Loredo PI
- 2009–2013 Quantified Uncertainty: Flexible Probabilistic Modeling of Dynamic Spectra and Other Astronomical Data
NASA Applied Information Systems Research Program (AISR)
2009–2013; \$674,700
Funds a collaboration between astronomers at Cornell (Loredo), University of Chicago (Dr. Carlo Graziani), and College of Charleston (Prof. Jon Hakkila), and Duke University statistician Prof. Robert Wolpert; Loredo PI
- 2005–2009 Adaptive Experimental Design for Astronomical Exploration
NSF Mathematical Sciences Priority Area–Astronomy (MSPA-AST)
2005–2009; \$620,000 (\$354,200 to Cornell)
Funded a collaboration between Cornell astronomers (Loredo, Prof. David Chernoff) and Duke University statisticians (Prof. Merlise Clyde, Prof. James Berger); Loredo PI, Clyde Co-PI
- 2002–2005 Astrostatistical Tools in Python
NASA Applied Information Systems Research Program (AISR)
2002–2005; \$366,500
Funded a collaboration between astronomers Loredo and Dr. Alanna Connors (Eureka Scientific), and software engineer Dr. Travis Oliphant (Brigham Young University; Enthought, Inc.); Loredo PI
- 1996–2001 Development and Application of New Tools For Statistical Analysis of Discrete Astrophysical Data
NASA Long-Term Space Astrophysics Program (LTSA)
1996–2001; approx. \$500,000
Sole investigator

SERVICE & SUPPORT ACTIVITIES

Associate Editor, *Annals of Applied Statistics*, Fall 2007 – present

Handle submissions in physical sciences, under the management of editors Prof. Michael Stein (through 2010) and Prof. Tilmann Gneiting (2011–present)

Co-chair and core team member, Large Synoptic Survey Telescope (LSST) Informatics and Statistics Science Collaboration (ISSC), Fall 2009–present

Lead author and organizer of the 2009 proposal creating this collaboration, comprised of a core team of seven scientists (co-chaired by Loredó and CMU statistician Chad Schafer), leading a team of ≈ 35 active and ≈ 20 consulting astronomers, statisticians, and computer scientists

Panel member, NASA Review of Astrophysics programs for Research, Analysis and Enabling Technology, November 2010 – May 2011

One of 14 panelists advising NASA as part of a senior-level review of its Astrophysics Research and Analysis (APRA) programs, in response to the Astro2010 decadal survey; panel overseen by Dr. Linda Sparke and Dr. Jon Morse, NASA Headquarters; see [online review description](#)

Guest Editor, *Statistical Methodology* (Elsevier), Summer/Fall 2007 and Fall 2010 – Winter 2011

Help organize and edit special issues on astrostatistics associated with the Astronomical Data Analysis (ADA) conferences; co-editors Professors Fionn Murtagh and Jean-Luc Starck

Lead author, advocacy documents on astrostatistics

Organized collaborations of astronomers and information scientists to produce documents advocating for support of interdisciplinary research in astrostatistics, for the Exoplanet Task Force in 2007 (White Paper, 15 signers), and the 2010 Astronomy & Astrophysics Decadal Survey (Position Paper, 78 signers)

Scientific Organizing Committee member, numerous conferences & workshops

E.g., Statistical Challenges in Modern Astronomy series; SAMSI programs and working groups; International Workshop on Maximum Entropy and Bayesian Methods in Science & Engineering series; CosmoStats 2009; PHYSTAT workshops

MEMBERSHIPS

Associate, Center for Astrostatistics (CASt) at Pennsylvania State University (2004–present)

Member, American Astronomical Society (AAS)

Member, International Society for Bayesian Analysis (ISBA)

Associate Member, Audio Engineering Society (AES)

PUBLICATIONS

A number of the publications listed below may be found online via [NASA ADS](#) and [MathSciNet](#) author queries; PDF versions of some publications are available at [Loredo's reprint page](#).

Refereed publications and invited chapters (through 2013)

1. Final spin and radiated energy in numerical simulations of binary black holes with equal masses and equal, aligned or anti-aligned spins (D. A. Hemberger, G. Lovelace, T. J. Loredo, L. E. Kidder, M. A. Scheel, B. Szilágyi, N. W. Taylor, S. A. Teukolsky), submitted to *Phys. Rev. D*, (2013); arXiv:1305.5991 (13pp).
2. Multilevel Bayesian Framework for Modeling the Production, Propagation and Detection of Ultra-High Energy Cosmic Rays (Kunlaya Soiaporn, David F. Chernoff, T. J. Loredo, David Ruppert, Ira Wasserman), to appear in *Ann. Appl. Stat.*, 40pp plus online supplement, (2013); arXiv:1206.4569 (56pp).
3. Bayesian Astrostatistics: A Backward Look to the Future (T. J. Loredo), invited chapter in *Astrostatistical Challenges for the New Astronomy*, ed. Joseph M. Hilbe (New York: Springer), pp. 15–40 (2013).
4. Transit and Eclipse Analyses of the Exoplanet HD 149026b Using BLISS Mapping (S. Nymeyer & 17 coauthors) *Ap.J.* **754**, 136 (23pp) (2012).
5. Bayesian Methods for Analysis and Adaptive Scheduling of Exoplanet Observations (T. J. Loredo, James O. Berger, David F. Chernoff, Merlise A. Clyde, Bin Liu), *Statistical Methodology* **9**, 101–114 (special issue on Astrostatistics) (2012).
6. On the Orbit of Exoplanet WASP-12b (C. Campo, J. Harrington, R. Hardy, K. B. Stevenson, S. Nymeyer, Darin Ragozzine, N. B. Lust, David R. Anderson, Andrew Collier Cameron, J. Blecic, C. B. T. Britt, W. C. Bowman, Peter J. Wheatley, Thomas J. Loredo, D. Deming, Leslie Hebb, Coel Hellier, Pierre F. L. Maxted, Don Pollacco, Richard G. West), *Ap.J.* **727**, 125 (12pp) (2011).
7. Rotating Stars and Revolving Planets: Bayesian Exploration of the Pulsating Sky (with Discussion) (T. J. Loredo; discussion by Peter Mueller), invited contribution to *Bayesian Statistics 9*, ed. José Bernardo et al. (Oxford University Press), p. 91–114 (2011) (arXiv:1107.5805).
8. *Spitzer* Secondary Eclipses of WASP-18b (S. Nymeyer, J. Harrington, C. Campo, R. Hardy, K. B. Stevenson, N. B. Lust, Andrew Collier Cameron, T. J. Loredo, J. Blecic, C. B. T. Britt, W. C. Bowman, Peter J. Wheatley, D. Deming, Leslie Hebb, Coel Hellier, Pierre F. L. Maxted, Don Pollacco, Richard G. West), submitted to *Ap.J.* (2010).

9. Bayesian Multilevel Modelling of Cosmological Populations (T. J. Loredo, Martin A. Hendry), invited chapter in *Bayesian Methods in Cosmology*, ed. Mike Hobson, Andrew Jaffe, Andrew Liddle, Pia Mukherjee, and David Parkinson, Cambridge University Press, 245–264 (2009).
10. Size Distribution of Multikilometer Transneptunian Objects (J.-M. Petit, J. J. Kavelaars, B. Gladman, T. J. Loredo), invited review chapter in *The Solar System Beyond Neptune*, ed. A. Barucci, H. Boehnhardt, D. Cruikshank, and A. Morbidelli, University of Arizona Press, 71–87 (2008).
11. Analyzing Data From Astronomical Surveys: Issues and Directions (T. J. Loredo), in *Statistical Challenges in Modern Astronomy IV, Statistical Challenges in Modern Astronomy IV*, ed. G. J. Babu and E. D. Feigelson, ASP Conference Series, **371**, 121–138 (2007).
12. Current Challenges in Bayesian Model Choice (M. A. Clyde, J. O. Berger, F. Bullard, F. E. B. Ford, W. H. Jefferys, R. Luo, R. Paulo, T. J. Loredo), in *Statistical Challenges in Modern Astronomy IV, Statistical Challenges in Modern Astronomy IV*, ed. G. J. Babu and E. D. Feigelson, ASP Conference Series, **371**, 224–245 (2007).
13. The Kuiper Belt’s luminosity function from $m_R=22-25$ (J.-M. Petit, M. J. Holman, B. Gladman, JJ Kavelaars, H. Scholl, T. J. Loredo), *M.N.R.A.S.*, **365**, 429–438 (2006).
14. Accounting for Source Uncertainties in Analyses of Astronomical Survey Data (T. J. Loredo), in *Bayesian Inference And Maximum Entropy Methods In Science And Engineering: 24th International Workshop; Garching, Germany, 2004*, ed. Rainer Fischer, Roland Preuss, and Udo von Toussaint; AIP Conference Proceedings series, **735**, 195–206 (2004).
15. Bayesian Adaptive Exploration (with Discussion) (T. J. Loredo and D. F. Chernoff; discussion by D. van Dyk), in *Statistical Challenges in Astronomy*, ed. E.D. Feigelson and G.J. Babu (New York: Springer-Verlag) pp. 57–69 (2003).
16. Search for High-Frequency Periodicities in BATSE TTE Data From Gamma-Ray Bursts and Soft Gamma Repeaters (A. Kruger, T. J. Loredo and I. M. Wasserman), *Ap. J.* **576**, 932–941 (2002) (astro-ph/0112192).
17. Bayesian Analysis of Neutrinos from Supernova SN 1987A (T. J. Loredo and D. Q. Lamb), *Phys. Rev. D* **65**, 063002, 39 pp. (2002) (astro-ph/0107260).
18. The Structure of the Kuiper Belt: Size Distribution and Radial Extent (B. Gladman, JJ Kavelaars, J.-M. Petit, A. Morbidelli, M. J. Holman, T. J. Loredo), *Astron. J.*, **122**, 1051–1066 (2001).
19. Type Ia Supernovae, Evolution, and the Cosmological Constant (P. S. Drell, T. J. Loredo, and I. M. Wasserman), *Ap. J.*, **530**, 593–617 (2000).
20. Resonant Cyclotron Radiation Transfer Model Fits to Spectra from Gamma-Ray Burst GRB 870303 (P. E. Freeman, D. Q. Lamb, J. C. L. Wang, I. Wasserman, T. J. Loredo, E. E. Fenimore, T. Murakami, A. Yoshida), *Ap. J.*, **524**, 772–793 (1999).
21. Statistical Analysis of Spectral Line Candidates in Gamma-Ray Burst GRB 870303 (P. E. Freeman, C. Graziani, D. Q. Lamb, T. J. Loredo, E. E. Fenimore, T. Murakami, A. Yoshida), *Ap. J.*, **524**, 753–771 (1999).
22. Pencil-Beam Surveys for Faint Trans-Neptunian Objects (B. Gladman, JJ Kavelaars, P. D. Nicholson, T. J. Loredo, and J. A. Burns), *Astron. J.*, **116**, 2042–2054 (1998).
23. Inferring the Spatial and Energy Distribution of Gamma-Ray Burst Sources. III. Anisotropic Models (T. J. Loredo and I. M. Wasserman), *Ap. J.*, **502**, 108–129 (1998).

24. Inferring the Spatial and Energy Distribution of Gamma-Ray Burst Sources. II. Isotropic Models (T. J. Loredo and I. M. Wasserman), *Ap.J.*, **502**, 75–107 (1998).
25. Bayesian Analysis of the Polarization of Distant Radio Sources: Limits on Cosmological Birefringence (T. J. Loredo, E. E. Flanagan, and I. M. Wasserman), *Phys. Rev.*, **D56**, 7507–7512 (1997).
26. Bayesian Periodic Signal Detection: Analysis of ROSAT Observations of PSR 0540-693 (P. C. Gregory and T. J. Loredo), *Ap.J.*, **473**, 1059–1066 (1996).
27. Inferring the Spatial and Energy Distribution of Gamma-Ray Burst Sources. I. Methodology (T. J. Loredo and I. M. Wasserman), *Ap. J. Suppl.*, **96**, 261–301 (1995).
28. A New Method for the Detection of a Periodic Signal of Unknown Shape and Period (P. C. Gregory and T. J. Loredo (principal author)), *Ap.J.*, **398**, 146–168 (1992).
29. The Promise of Bayesian Inference for Astrophysics (with Discussion) (T. J. Loredo; discussion by M. West) in *Statistical Challenges in Modern Astronomy*, ed. E.D. Feigelson and G.J. Babu (New York: Springer-Verlag) pp. 275–297 (1992).
30. Cyclotron Resonant Scattering in the Spectra of Gamma-Ray Bursts (J. C. L. Wang, D. Q. Lamb, T. J. Loredo, I. M. Wasserman, E. E. Salpeter, J. P. Conner, R. I. Epstein, R. W. Klebesadel, J. G. Laros, A. Yoshida, M. Fujii, K. Hayashida, M. Itoh, T. Murakami, J. Nishimura, T. Yamagami, I. Kondo, and N. Kawai) *Phys. Rev. Lett.*, **63**, 1550-1553 (1989).
31. Analyzing Gamma-Ray Burst Spectral Data (T. J. Loredo and R. I. Epstein) *Ap.J.*, **336**, 896-919 (1989).

Other academic publications

1. Commentary: Bayesian Analysis Across Astronomy (T. J. Loredo), invited discussion paper, in *Statistical Challenges in Modern Astronomy V*, ed. E.D. Feigelson and G.J. Babu (New York: Springer-Verlag) pp. 225–236 (2012).
2. Commentary: On Statistical Cross-Identification in Astronomy (T. J. Loredo), invited discussion paper, in *Statistical Challenges in Modern Astronomy V*, ed. E.D. Feigelson and G.J. Babu (New York: Springer-Verlag) pp. 303–308 (2012).
3. Statistical Foundations and Statistical Practice (T. J. Loredo), invited contribution to ‘Panel Discussion: The Future of Astrostatistics’ (compiled by J. G. Babu), in *Statistical Challenges in Modern Astronomy V*, ed. E.D. Feigelson and G.J. Babu (New York: Springer-Verlag) pp. 456–461 (2012).
4. Sines, Steps and Droplets: Semi-parametric Bayesian Modelling of Arrival Time Series (T. J. Loredo), in *New Horizons in Time-Domain Astronomy, Proceedings of the International Astronomical Union, IAU Symposium 285*, ed. R.E.M. Griffin, R.J. Hanisch & R. Seaman, Cambridge U. Press, 87–90 (2012) (arXiv:1201.4114).
5. The Astronomical Information Sciences: A Keystone for 21st-Century Astronomy (T. J. Loredo lead author; 80 co-signers), Position Paper for the Astro2010 Decadal Survey ([online access](#)), 12pp (2009).
6. Posterior-Guided Importance Sampling for Calculating Marginal Likelihoods with Application to Bayesian Exoplanet Searches (J. L. Crooks, J. O. Berger, T. J. Loredo), Duke Dept. of Statistical Science Discussion Paper 2007-26 ([online access](#)), 18pp (2007).

7. A Statistics Research Priority for Exoplanet Studies (T. J. Loredo, lead author; 11 astronomer and 3 statistician co-authors), white paper for the NSF/NASA Extrasolar Planet Task Force (ExoPTF), 7pp (2007).
8. Bayesian Adaptive Exploration in a Nutshell (T. J. Loredo), in *Statistical Problems in Particle Physics, Astrophysics, and Cosmology*, ed. L. Lyons, R. Mount & R. Reitmeyer (Stanford: SLAC eCONF C030908, SLAC-R-703) 162–165 (2004).
9. Bayesian Adaptive Exploration (T. J. Loredo), in *Bayesian Inference And Maximum Entropy Methods In Science And Engineering: 23rd International Workshop; Jackson Hole, Wyoming, 2003*, ed. G. J. Erickson and Y. Zhai (AIP Conference Proceedings 707) 330–346 (2004).
10. Bayesian Harmonic Analysis for Audio Testing and Measurement (T. J. Loredo), Proceedings of the 111th Convention of the Audio Engineering Society ([online access](#)), (2001).
11. Computational Technology for Bayesian Inference (T. J. Loredo), in ASP Conference Series, Vol. 172, *Astronomical Data Analysis Software and Systems VIII*, ed. D. M. Mehringer, R. L. Plante, and D. A. Roberts (San Francisco: Astronomical Society of the Pacific), 297–306 (1999).
12. Likelihood Analysis of GRB Repetition (S. Luo, T. J. Loredo, and I. M. Wasserman), in *Gamma-Ray Bursts, 3rd Huntsville Symposium*, ed. C. Kouveliotou, M. F. Briggs, and G. J. Fishman (New York: American Institute of Physics), pp. 477–481 (1996).
13. The Return of the Prodigal: Bayesian Inference for Astrophysics (T. J. Loredo), 37 page paper appeared in preliminary printed proceedings distributed to participants of the Fifth Valencia Meeting on Bayesian Statistics, ed. J. Bernardo, 1994; omitted from published version due to page limitations ([online version](#)).
14. New Techniques in the Fitting of Gamma-Ray Burst Cyclotron Lines (P. E. Freeman, C. Graziani, D. Q. Lamb, and T. J. Loredo), in *Gamma-Ray Bursts, Second Workshop, Huntsville, AL 1993*, ed. G. J. Fishman, J. J. Brainerd, and K. Hurley (New York: American Institute of Physics), pp. 677–681.
15. Establishing the Existence of Harmonically-Spaced Lines in Gamma-Ray Burst Spectra Using Bayesian Inference (C. Graziani, D. Q. Lamb, T. J. Loredo, E. E. Fenimore, T. Murakami, and A. Yoshida), in *Compton Gamma Ray Observatory, St. Louis, MO 1992*, AIP Conf. Proc., No. 280, pp. 897–901 (1993).
16. Sensitivity of the BATSE Spectroscopy Detector to Gamma-Ray Burst Spectral Lines Like Those Seen In Ginga (P. E. Freeman, D. Q. Lamb, E. E. Fenimore, and T. J. Loredo), in *Compton Gamma Ray Observatory, St. Louis, MO 1992*, AIP Conf. Proc., No. 280, pp. 922–926 (1993).
17. Inferring the Spatial and Energy Distribution of Burst Sources From Peak Count Rate Data (T. J. Loredo and I. M. Wasserman), in *Compton Gamma Ray Observatory, St. Louis, MO 1992*, ed. M. Friedlander, N. Gehrels, and D.J. Macomb (New York: American Institute of Physics), pp. 749–753 (1993).
18. Establishing the Existence of Lines in γ -Ray Bursts (T. J. Loredo and D. Q. Lamb), in *Gamma-Ray Bursts, Huntsville, AL 1991*, ed. W.S. Paciesas and G.J. Fishman (New York: American Institute of Physics), pp. 414–415 (1992).
19. Cyclotron Resonant Scattering in Gamma-Ray Bursts: Further Analysis of GRB 880205 (P. E. Freeman, D. Q. Lamb, J. C. L. Wang, T. J. Loredo, E. E. Fenimore, T. Murakami, A. Yoshida), in *Gamma-Ray Bursts, Huntsville, AL 1991*, ed. W.S. Paciesas and G.J. Fishman (New York: American Institute of Physics), pp. 216–220 (1992).

20. Line Strength Variations in Gamma-Ray Burst GRB 870303: Possible Evidence of Neutron Star Rotation (C. Graziani, E. E. Fenimore, T. Murakami, A. Yoshida, D. Q. Lamb, J. C. L. Wang, and T. J. Loredo), in *Gamma-Ray Bursts, Huntsville, AL 1991*, ed. W.S. Paciesas and G.J. Fishman (New York: American Institute of Physics), pp. 211–215 (1992).
21. Cyclotron Line Strength Variations in Gamma-Ray Burst GRB 870303: Possible Evidence of Neutron Star Rotation (C. Graziani, E. E. Fenimore, T. Murakami, A. Yoshida, D. Q. Lamb, J. C. L. Wang, and T. J. Loredo), in *Gamma-Ray Bursts: Observations, Analyses and Theories*, ed. C. Ho, R.I. Epstein, and E.E. Fenimore (Cambridge: Cambridge University Press), pp. 407–414 (1992).
22. A Bayesian Method for the Detection of a Unknown Periodic and Nonperiodic Signals in Binned Time Series (P. C. Gregory and T. J. Loredo), in *Maximum Entropy and Bayesian Methods, Paris, France, 1992*, ed. A. Mohammad-Djafari and G. Demoment (Dordrecht, The Netherlands: Kluwer Academic Publishers), 225–232 (1993).
23. A Bayesian Method for the Detection of a Periodic Signal of Unknown Shape and Period (P. C. Gregory and T. J. Loredo), in *Maximum Entropy and Bayesian Methods, Seattle, 1991*, ed. C. R. Smith, G. J. Erickson and P. O. Neudorfer (Dordrecht, The Netherlands: Kluwer Academic Publishers), 79–103 (1992).
24. Implications of the SN 1987A Neutrinos for Supernova Theory and the Mass of $\bar{\nu}_e$ (T. J. Loredo and D. Q. Lamb), in *Supernovae: The Tenth Santa Cruz Summer Workshop in Astronomy and Astrophysics*, ed. S. E. Woosley (New York: Springer-Verlag) pp. 405–407 (1991).
25. New Tools for Gamma-Ray Burst Data Analysis (D. Hartmann, G. R. Blumenthal, R. I. Epstein, J. J. Gonzalez, K. Hurley, T. J. Loredo, and S. E. Woosley), in *Proceedings of the Gamma Ray Observatory Science Workshop*, ed. W. Neil Johnson (Washington, D.C.: Naval Research Laboratory) pp. 4-427 – 4-435 (1990).
26. From Laplace to Supernova SN 1987A: Bayesian Inference in Astrophysics (T. J. Loredo), in *Maximum-Entropy and Bayesian Methods, Dartmouth, 1989*, ed. P. Fougère (Dordrecht, The Netherlands: Kluwer Academic Publishers) pp. 81–142 (1990).
27. Cyclotron Resonant Scattering in the Spectra of Gamma-Ray Bursts (D. Q. Lamb, J. C. L. Wang, T. J. Loredo, I. Wasserman, and E. E. Fenimore), in *Proceedings of the Fourteenth Texas Symposium on Relativistic Astrophysics*, ed. E. Fenyves, *Ann. N. Y. Acad. Sci.*, **571**, 460-481 (1989).
28. Neutrinos from SN 1987A: Implications for Cooling of the Nascent Neutron Star and the Mass of the Electron Antineutrino (T. J. Loredo and D. Q. Lamb), in *Proceedings of the Fourteenth Texas Symposium on Relativistic Astrophysics*, ed. E. Fenyves, *Ann. N. Y. Acad. Sci.*, **571**, 601-630 (1989).
29. Neutrinos from SN 1987A and Cooling of the Nascent Neutron Star (D. Q. Lamb, F. Melia, and T. J. Loredo), in *Supernova 1987A in the Large Magellanic Cloud* (Proceedings of the George Mason Workshop, 11-14 October, 1987), ed. M. Kafatos (Cambridge: Cambridge U. Press), pp. 204-207 (1988).
30. Optical Observations of the Millisecond Pulsars PSR 1937+214 and PSR 1953+29 (T. J. Loredo, G. R. Ricker, S. A. Rappaport, and J. Middleditch), in *Birth and Evolution of Neutron Stars: Issues Raised by Millisecond Pulsars*, ed. S. P. Reynolds and D. R. Stinebring (Green Bank, WV: NRAO), pp. 48-58 (1984).

Semipopular publications

1. Entries for “Data Analysis,” “Experimental Errors,” “Random Errors,” and “Systematic Errors” in the *Macmillan Encyclopedia of Physics*, J. S. Rigden (ed.), Macmillan Publishing Company (1997).
2. ‘What are Gamma-Ray Bursters?’, first prize essay in 1987 McDonald Observatory Astronomy Essay Contest, published in *Star Date*, **16**, No. 5, July/August 1988, p. 16.

SELECTED PROFESSIONAL TALKS

‘Graphical Models on Graphics Processors: Toward Faster Multilevel Modeling of Cosmic Populations,’ at the Program on Modern Statistical and Computational Methods for Analysis of Kepler Data, SAMSI, Research Triangle Park, NC (June 2013).

‘Possessing the Field: Alanna Connors and the Future of Principled Data Analysis,’ invited memorial presentation at the 13th Meeting of the High Energy Astrophysics Division, Monterey, CA (April 2013).

‘Population Modeling with Big Data: A Bayesian Perspective,’ at the Astrostatistics Workshop, held as part of the 2012–1013 Program on Statistical and Computational Methodology for Massive Datasets, SAMSI, Research Triangle Park, NC (September 2012).

‘Bayesian Multilevel Modeling of Cosmic Populations Truths, Subtle Truths, and Hierarchical Bayes,’ invited talk at the Imperial Centre for Inference and Cosmology (ICIC) Inaugural Workshop, Imperial College, London, UK (August 2012).

‘Directional Coincidence Assessment in Astronomy With Bayesian Multilevel Models,’ invited session talk at the Joint Statistical Meetings, San Diego, CA (July 2012).

‘Big Data: Handle With Care!’, at the Workshop on Solar Statistics, Harvard-Smithsonian Center for Astrophysics Cambridge, MA (February 2012).

‘Guilt By Association: Assessing Directional Coincidences in Astronomy’ (co-presented with David Ruppert), invited case study presented at Case Studies in Bayesian Statistics and Machine Learning, Carnegie Mellon University (October 2011).

‘Bayesian Analysis Across Astronomy’ (commentary), ‘Statistical Cross-Identification’ (commentary), and ‘The Future of Astrostatistics: Statistical Foundations and Statistical Practice’ (panel presentation), invited presentations at Statistical Challenges in Modern Astronomy V, Pennsylvania State University, University Park, PA (June 2011).

‘Sines, Steps, and Droplets: Semiparametric Bayesian Modeling of Arrival Time Series,’ at IAU Symposium No. 285: New Horizons in Time Domain Astronomy, University of Oxford, UK (September 2011).

‘Chains of Discovery in Astronomy: An Astrostatistical Perspective,’ invited talk at the Banff particle physics/astronomy/statistics workshop, Statistical issues relevant to significance of discovery claims, Banff, Canada (July 2010).

Statistics and Computation for Astronomical Surveys, two-day supplement to the 2010 Summer School in Statistics for Astronomers, organized by T.J.L. (including four lectures by T.J.L.); hosted by the Center for Astrostatistics, Pennsylvania State University, University Park, PA (June 2010).

'Rotating Stars and Revolving Planets: Bayesian Exploration of the Pulsating Sky,' invited talk (with discussion by Peter Mueller) at the Ninth Valencia International Meeting on Bayesian Statistics and 2010 World Meeting of the International Society for Bayesian Analysis, Benidorm, Spain (June 2010).

'Bayesian methods for exoplanet science: Planet detection, orbit estimation, and adaptive observing,' keynote address at Astronomical Data Analysis 6, Monastir, Tunisia (May 2010).

'Bayesian inference and experimental design for exoplanet studies,' invited talk at Statistical Frontiers of Astrophysics, Institute for the Physics and Mathematics of the Universe, University of Tokyo (Kashiwa) (September/October 2009).

'Bayesian statistics: A primer,' 4-lecture course presented at the INPE Advanced Course on Astrophysics: Astrostatistics, São José dos Campos, Brazil (September 2009).

'No Free Lunch: Challenging Problems for Frequentist & Bayesian Approaches (Coming to grips with high dimensionality),' invited talk at CosmoStats09, Ascona, Switzerland (July 2009).

'Decision, Information, and Experimental Design,' tutorial at the 29th International Workshop on Bayesian Inference and Maximum Entropy Methods in Science and Engineering, University of Mississippi, Oxford, MS (July 2009).

'Bayesian methods for exoplanet science: Planet detection, orbit estimation, and adaptive observing,' invited talk at the 2009 International Workshop on Objective Bayes Methodology (OBayes09), University of Pennsylvania, Philadelphia, PA (June 2009).

'Handling Source Uncertainties in Surveys via Multilevel Modeling,' invited talk for special session, 'Meaning from Surveys and Population Studies: BYOQ,' at the 213th American Astronomical Society meeting, Long Beach, CA (January 2009).

'Multilevel Bayesian Modeling for Astronomical Surveys,' invited talk for a session on 'Methodological Advances in Astronomy and Astrophysics' (hosted by the ASA Section on Bayesian Statistical Science), at the 2008 Joint Statistical Meetings, Denver, CO (August 2008).

'Introduction to Bayesian Inference,' lectures at the Center for Astrostatistics Summer School in Statistics for Astronomers and Physicists, annually from 2006–2008.

'21st-Century Statistical Computation for Exoplanet Studies,' 27th International Workshop on Bayesian Inference and Maximum Entropy Methods in Science and Engineering, Saratoga Springs, NY (July 2007).

'Analyzing Data From Astronomical Surveys: Issues and Directions,' invited talk, Statistical Challenges in Modern Astronomy IV, Penn State U. (June 2006).

'Bayesian Astrostatistics,' 3-day school opening the Spring 2006 Astrostatistics Program at SAMSI, organized by Loredo who contributed 6 of the 12 lectures (January 2006).

'Bayesian Astrostatistics,' invited review talk, Dark Matter 2005 (interdisciplinary workshop between astronomers, statisticians, and philosophers of science), U. of Michigan (October 2005).

'The Perils & Promise of Statistics With Large Data Sets & Complicated Models,' invited talk, GravStat: Statistics for Gravitational Wave Data Analysis (May 2005), and Center for Astrostatistics Summer School, Penn State U. (June 2005).

'The Statistics of the Future,' invited talk on the occasion of the retirement of Volker Dose, Director, Max Planck Inst. for Plasma Physics, Garching, Germany (Feb 2005).

'Inference at the Edge of the Solar System: Bayesian Analysis of Astronomical Survey Data,' invited talk, 23rd International Workshop on Maximum Entropy and Bayesian Methods, Max Planck Inst. for Plasma Physics, Garching, Germany (August 2004).

'Bayesian Computation: A Tutorial,' invited talk, 23rd International Workshop on Maximum Entropy and Bayesian Methods, Jackson Hole, WY (August 2003).

'Bayesian Inference in Astronomy and Astrophysics: A Short Course,' invited lecture series at Max Planck Inst. for Plasma Physics (5 1-1/2 hour lectures), Garching, Germany (October 2002).

'Bayesian Inference for Astrophysical Poisson Processes,' invited talk, Joint Statistical Meetings, Atlanta, GA (August 2001).

'Bayesian Adaptive Exploration,' invited talk, Statistical Challenges in Modern Astronomy III, Penn State U. (July 2001).

'Bayesian Inference: A Practical Primer,' opening talk, International Workshop on Maximum Entropy and Bayesian Methods, CNRS, Gif-sur-Yvette, France (July 2000).

'Bayesian Inference: What's the Difference?,' physics colloquium, Wayne State University, Detroit, MI (September 1999).

'Bayesian Inference: A Developer's Perspective,' invited talk, Astronomical Data Analysis and Software Systems (ADASS VIII) conference, University of Illinois, Urbana (November 1998).

'Systematic Errors in Supernova Cosmology: Indications for Evolution?' Type Ia Supernovae Workshop, University of Chicago, (October 1998).

'The Intuitive Appeal of Bayesian Inference,' Edwin T. Jaynes memorial symposium, Washington University, St. Louis, MO (October 1998).

'The Screwy Statistics of Screwy Light,' invited introductory talk, and 'Do Gamma Ray Bursts Repeat,' contributed talk, International Workshop on Maximum Entropy and Bayesian Methods, Boise State University, Boise, Idaho (August 1997).

'Learning How To Count: The Statistics of Gamma-Ray Bursts,' Astrophysics Colloquium, University of North Carolina (February 1995); University of Rochester (November 1995); Center for Astrophysics, Cambridge, MA (September 1996).

'Learning How To Count: The Statistics of Gamma-Ray Bursts,' Astrophysics Colloquium, California Institute of Technology (December 1994).

'Inference With the Poisson Distribution: Astrophysical Problems, Bayesian Solutions,' joint Dept. of Statistics/Physics Dept. colloquium, Carnegie-Mellon University, Pittsburgh, PA (October 1994).

'The Return of the Prodigal: Bayesian Inference for Astrophysics,' invited talk at Fifth Valencia meeting on Bayesian Statistics, Alicante, Spain (June 1994).

'Bayesian Inference for Astrophysics,' invited talk at 1st annual meeting of the International Society for Bayesian Analysis, San Francisco, CA (August 1993).

'Inference With the Poisson Distribution' and 'What (Where) are Gamma-Ray Bursters?,' invited talks, 13th International Workshop on Maximum Entropy and Bayesian Methods, Santa Barbara, CA (August 1993).

'Bayesian Inference in Astrophysics' (Division seminar) and 'Bayesian Inference With the Poisson Distribution' (3-hr group seminar), Marshall Space Flight Center, Huntsville, AL (April 1993).

'Bayesian Inference in Astrophysics,' Department of Statistics Colloquium, Perdue University (1992).

'Hot Compton Reflection and the X-Ray Paucity Constraint,' contributed talk at the Gamma-Ray Burst Workshop, Huntsville, AL (October 1991).

'The Promise of Bayesian Inference for Astrophysics,' invited talk at the Statistical Challenges in Modern Astronomy conference, Penn State University (July 1991).

'Probability, Frequency, and Entropy: Relationships and Distinctions' (3hr tutorial) and 'Inference with the Poisson Distribution,' invited talks at the 11th International Workshop on Maximum Entropy and Bayesian Methods, Seattle University (June 1991).

'Supernova Neutrinos and Probability Theory,' Physics Colloquium, and 'Statistical Techniques for the Analysis of Experimental Data,' (two tutorial lectures), Arizona State University (November 1990).

'Supernova Neutrinos and Probability Theory,' Theory Seminar, Physics Dept., University of British Columbia (November 1990).

'The Promise of Bayesian Inference for Astrophysics,' invited talk at the 10th International Workshop on Maximum Entropy and Bayesian Methods, University of Wyoming (August 1990).

'The Supernova Neutrinos: Lessons in Physics, Lessons in Statistics,' seminar at the Institute for Advanced Study, Princeton (November 1989).

'Supernova Neutrinos and Probability Theory: The Case for Bayesian Inference in Astrophysics,' contributed talk at the 9th International Workshop on Maximum Entropy and Bayesian Methods, Dartmouth College (August 1989).

'Neutrinos from SN 1987A: Present and Future Implications for Neutrino Masses,' invited talk at the UCLA Symposium on the Next Supernova, Santa Monica, CA (February 1989).

'Analyzing Gamma-Ray Burst Spectral Data,' Astronomy Seminar, Northwestern University (June 1988).

'The Direct Inversion of Gamma-Ray Spectra,' invited seminar as a Special Consultant to the University of Alabama/Marshall Space Flight Center Gamma Ray Observatory collaboration (contact: Dr. Gerald Fishman), MSFC, Huntsville, AL (October 1986).

'Optical Observations of the Millisecond Pulsars,' contributed talk at the NRAO conference, *Birth and Evolution of Neutron Stars: Issues Raised by Millisecond Pulsars*, Green Bank, WV (June 1984).