

## Leonardo J. Milano

### Research Scientist

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### Education

- 1999: **Ph.D. in Physics**, University of Buenos Aires.  
Thesis: Impulsive and Steady Mechanisms for Energy Release in the Solar Corona  
Advisor: Prof. Daniel O. Gómez
- 1996: Licenciado en Ciencias Físicas (**M.S. in Physics** equivalent), University of Buenos Aires.  
Graduation thesis: A Study of Magnetohydrodynamic Turbulence in Solar Coronal Loops.  
Advisor: Prof. Daniel O. Gómez

### Professional Experience

#### Research

- Feb 2003-present: **Research Scientist**, Bartol Research Institute (BRI), University of Delaware.  
*Analyzed time-series of satellite electromagnetic data; developed a C++/Python in house package for the project. Developed a spectral model, based on Fourier analysis, for the saturation of a turbulent dynamo. Compared the results with direct numerical simulations. Wrote several NASA research proposals. Co-organized Fluids and Plasma Seminars. Supervisor: W.H. Matthaeus.*
- 2000-Feb 2003: **Post-Doctoral Research Fellow**, BRI, University of Delaware.  
*Studied anisotropy induced by the locally-averaged magnetic field in a turbulent magnetofluid. Co-developed phenomenological and numerical models of turbulent heating in open regions of the solar corona, involving low frequency, wave-like forcing from the photosphere. Studied transport of MHD fluctuations by smooth, inhomogeneous background fields in the solar corona. Co-developed a quasilinear theory for charged particle diffusion by MHD turbulent fields. Found an analytical expression, later confirmed by observations, for the probability distribution function of the induced electric field in the solar wind. Developed C++, IDL and Python code for data analysis. Supervisor: W.H. Matthaeus.*
- 1999-2000: **Staff Scientist**, Cambridge Research and Instrumentation, Inc., Boston, MA  
*Observational position at the National Solar Observatory (NSO) - Sacramento Peak, NM. Stark effect measurements of coronal electric fields. Processed CaK images as part of a study of solar irradiance variability. Debugged and adapted an in-house C++ package for data acquisition and processing. Supervisor: P. Foukal*
- 1997: **Summer Research Assistant**, NSO - Sacramento Peak, NM.  
*Identification of solar flare precursors using correlation tracking techniques on H $\alpha$  images. Used and wrote IDL scripts for image processing and correlation tracking. Advisors: K.S. Balasubramaniam and S.L. Keil*
- 1996-1999: **Research Assistant**, Instituto de Astronomía y Física del Espacio, Buenos Aires.  
*Worked on phenomenological models for turbulent heating in solar coronal loops. Developed a numerical model for reconnection and a turbulent transient in reduced MHD. Implemented a Chebyshev collocation method in a Fortran pseudo-spectral code. Wrote several IDL routines. Designed and maintained the webpage for the group. Advisor: D.O. Gómez*

### Teaching

- 2002: **Instructor** for Phys 810: Electromagnetic Theory, spring semester, University of Delaware. *Responsible for lectures, grading and course development of this graduate course.*
- 1999: **Advisor** for the Summer Student Program, at the National Solar Observatory. *Co-advised three of the Summer Students on their observational research*
- 1992-1999: **Teaching Assistant**, University of Buenos Aires, CBC/Depart. of Mathematics. *Taught several undergraduate courses: Algebra, Calculus and Introductory Mathematics. The position required to give lectures, grade and prepare course materials.*
- 1993-1996: **Teacher** at ETENA Technical High School, Buenos Aires, Argentina. *Taught English and Computing. Acquired important pedagogical skills.*

### Funding

- **PI.** *Reynolds Tensors: The Contribution of Small Scale Turbulence to the Large Scale Evolution of the Solar Wind Plasma*  
L.J. Milano, W.H. Matthaeus, S. Dasso, C.W. Smith, C.W. Farrugia, B. Breech  
NASA SEC-GIP-04, Pending.
- **PI.** *Study of Anisotropies of the Solar Wind MHD Turbulence*  
L.J. Milano, W.H. Matthaeus, S. Dasso, C.W. Smith  
NASA SHP-03, Pending.
- **Collaborator.** *The role of Solar Transient Phenomena in the Sun-Earth coupling,*  
C.H. Mandrini, S. Dasso, L.J. Milano et. al.,  
University of Buenos Aires UBACyT X329, 2004-2006.
- **CO-I.** *Dynamics of plasma, Electromagnetic Fields and Energetic Particle in the Solar and Heliospheric System,*  
W.H. Matthaeus, M. Goldstein et. al.,  
NASA SEC-TP-04, Pending.
- **CO-I.** *Statistical Characterization of Solar Wind Turbulence and Shocks at 1AU using Cluster Mission data,*  
W.H. Matthaeus, G.P. Zank, L.J. Milano et. al.,  
NASA SEC-GIP-04, Pending.

### Peer Review

Referee for the following international journals: *Astronomy and Astrophysics Letters, Europhysics Letters, Physics of Plasmas, Annales Geophysicae.*

### Memberships, Fellowships and Honors

- Member: American Geophysical Union
- 1996-1999: CONICET Research fellowship, Science and Technology Council of Argentina.
- 1998: AGU Travel Grant, American Geophysical Union.
- 1997: IAU Travel Grant, International Astronomical Union.
- 1997: AURA Internship for NSO/Summer Student Program, Assoc. of Univ. for Research in Astron.

### Computer Skills

- **Programming Languages:** C/C++, Fortran, Python/Tkinter, UNIX Shells.
- **Markup Languages:** T<sub>E</sub>X, L<sup>A</sup>T<sub>E</sub>X, HTML, CSS.
- **Operating systems:** UNIX (Linux, Solaris), VMS, Windows.
- **Data and Image processing:** IDL, PV-Wave, NumericPython.
- **Software Version Control:** CVS (use and administration).
- Author of *latex2slides*, slide-presentation software, <http://latex2slides.sourceforge.net/>

### Selected Scientific Meetings

- Chair and speaker, Session SH11B, “AGU Fall meeting”, San Francisco, California, December 8-12, 2003.
- Co-Organizer of the “Workshop on Space and Astrophysical Turbulence: Theory and Simulation”, Laguna Beach, California, February 12-17, 2003.
- Invited speaker, IGPP Annual Conference on “Waves and turbulence in Interplanetary and Interstellar Space: Theory, Observations and Ramifications”, Palm Springs CA, February 9 - 12 2003.
- Co-Organizer of the “Miniconference on Plasma Turbulence in the Corona, Heliosphere and Interstellar Medium”, Long Beach CA, October 29 - November 2, 2001.

### Miscellaneous

- Languages: Spanish (native), English, Italian (basic).
- 1999: Volunteer Tour Guide at the NSO, Sacramento Peak.
- 1999: Member, Sunspot Volunteer Fire Department.
- 1998: Member, Computer Resources Committee, IAFE.

## Publications

- “Energetic charged particle transport and energization in Quasi-Static Two-Dimensional turbulence”, le Roux J.A., Zank G.P., Milano L.J. and Matthaeus W.H. 2004, *Astrophys. J.*, 602, 396.
- “Electric field statistics in the Solar Wind”, Breech B., Milano L.J., Matthaeus W.H. and Smith C.W. 2003, *AIP Conf. Series*, 679, 343.
- “Coronal MHD transport and Phenomenology”, Milano L.J., Matthaeus W.H., Dmitruk P. and Oughton S. 2003, *AIP Conf. Series*, 679, 542.
- “Cross helicity correlations in the Solar Wind”, Dasso S., Milano L.J., Matthaeus W.H., Smith C.W. 2003, *AIP Conf. Series*, 679, 546.
- “Generalized magnetic helicity, large-scale magnetic field, and dynamo saturation”, Milano L.J., Matthaeus W.H. and Dmitruk P. 2003, *Phys. Plasmas*, 10, 2287-2295.
- “Dynamo Activity In Imposed DC Magnetic Fields”, Montgomery D.C., Matthaeus W.H., Milano L.J. and Dmitruk P. 2003, *AIP Conf. Series*, 669, 781.
- “Probability Distributions of the Induced Electric Field of the Solar Wind”, Breech B., Matthaeus W.H., Milano L.J. and Smith C.W. 2003, *J. Geophys. Res.*, 108, 1153.
- “MHD turbulence and heating of the open-line solar corona”, Matthaeus W.H., Mullan D.J., Dmitruk P., Milano L.J. and Oughton S. 2003, *Nonlin. Proc. Geophys.*, 10, 93-100.
- “Coronal heating distribution due to low-frequency wave-driven turbulence”, Dmitruk P., Matthaeus W.H., Milano L.J., Oughton S., Zank G.P. and Mullan D.J. 2002, *Astrophys. J.*, 575, 571.
- “Miniconference on Plasma Turbulence in the Corona, Heliosphere and Interstellar Medium”, Matthaeus W.H., Dmitruk P. and Milano L.J. 2002, *Phys. Plasmas*, 9, 2440.
- “A quasi-linear kinetic theory for charged particle transport in two-dimensional turbulence”, le Roux J.A., Zank G.P., Milano L.J. and Matthaeus W.H. 2002, *Astrophys. J. Lett.*, 567, L155.
- “Apparent suppression of turbulent magnetic dynamo action by a DC magnetic field”, Montgomery D.C., Matthaeus W.H., Milano L.J. and Dmitruk P. 2002, *Phys. Plasmas*, 9, 1221.
- “One-point statistics of the induced electric field in quasinormal magnetofluid turbulence”, Milano L.J., Matthaeus W.H., Breech B. & Smith C.W. 2002, *Phys. Rev. E*, 65, 6310.
- “Magnetic Reconnection in Reduced Magnetohydrodynamics”, Gómez, D.O., Dmitruk, P., Milano, L.J., & Matthaeus, W.H. 2001, *Magnetic Fields Across the Hertzsprung-Russell Diagram*, ASP Conf. Proc. Vol. 248. Ed. by G. Mathys, S. K. Solanki, and D. T. Wickramasinghe. San Francisco: ASP, 2001., p.157.
- “Local anisotropy in incompressible magnetohydrodynamic turbulence”, Milano L.J., Matthaeus W.H., Dmitruk, P. and Montgomery, D.C. 2001,

*Phys. Plasmas*, 8, 2673.

- “Conditions for sustainment of magnetohydrodynamic turbulence driven by Alfvén waves”, Dmitruk P., Matthaeus W. H., Milano L. J. & Oughton S. 2001, *Phys. Plasmas*, 8, 2377
- “A Reduced MHD Model of Coronal Heating in Open Magnetic Regions Driven by Reflected Low-Frequency Alfvén Waves”, Oughton S., Matthaeus W.H., Dmitruk P., Milano L.J., Zank G.P. and Mullan D.J. 2001, *Astrophys. J.*, 551, 565.
- “A Measurement of the Quiet Network Contribution to Solar Irradiance Variation”, Foukal P. and Milano L.J. 2001, *Geophys. Res. Lett.* Vol. 28, No. 5, 883.
- “Wave-driven turbulent coronal heating in open field regions: nonlinear phenomenological model”, Dmitruk P., Milano L.J. and Matthaeus W.H. 2001, *Astrophys. J.* 548, 482.
- “Recent Theoretical Results on Coronal Heating”, Gómez D.O., Dmitruk P. and Milano L.J. 2000, *Solar Phys.* 195, 299.
- “A Measurement of the Quiet Network Contribution to Solar Irradiance Variation”, Foukal P., and Milano L.J. 2000, AAS/Solar Physics Division Meeting, 32, 0805
- “Dynamical Motions as Precursors to Activity”, Keil S.L., Balasubramaniam K.S., Milano L.J., Jones J. & Clark J. 1999, *ASP Conf. Ser.* 183: High Resolution Solar Physics: Theory, Observations, and Techniques, 540.
- “Quasi-Separatrix Layers in a Reduced Magnetohydrodynamic Model of a Coronal Loop”, Milano L.J., Dmitruk P., Mandrini C.H.P., Gómez D.O., and Demoulin P. 1999, *Astrophys. J.* 521, 889.
- “Turbulent magnetic reconnection and quasi-separatrix layers”, Mandrini C.H., Milano L.J., Dmitruk P., Gomez D.O. y Demoulin P. 1998, *Proc. VIII LAWPP*, Contributed Paper, p III-2.10
- “H $\alpha$  Synoptic Observations of Flare-Mass Ejection Complex 1997 April 6-7”, Balasubramaniam K.S., Milano L.J. and Keil S.L. 1998, *ASP Conf. Ser.* 140: Synoptic Solar Physics, 189
- “Solar Coronal Heating: AC vs DC”, Milano L.J., Gómez D.O. and Martens P.C.H. 1997, *Astrophys. J.* 490, 442.