

Nicolas A. Pereyra, Ph.D.

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**Curriculum Vitae**

Place / Date of Birth: Caracas, Venezuela, March 23, 1967

Citizenship: Venezuela

Permanent Residency: USA

**Education:**

- 1997        **Doctor of Philosophy (Ph.D. in Physics)**  
*University of Maryland at College Park, College of Computer, Math, & Physical  
Sciences, Department of Physics  
College Park, Maryland, USA*
- 1995        **Master of Science (M.S. in Physics)**  
*University of Maryland at College Park, College of Computer, Math, & Physical  
Sciences, Department of Physics  
College Park, Maryland, USA*
- 1991        **Major in Physics**  
*Universidad Central de Venezuela, College of Science, Physics Department  
Caracas, Venezuela*

**Research Experience:**

- 1990-1991    **Physicist-Computer Programmer**  
Development of numerical models for the simulation of oil transport through pipe-lines for a research project financed by the Venezuelan Oil Companies. Part of my work here was presented as my undergraduate thesis “Transient Flux of Compressible Crude Oil in an Elastic Pipeline due to Closure of End Valve”.  
*PROSERVFACICA (Projects and Services of the College of Science Co., Fundación de la Universidad Central de Venezuela)*  
Caracas, Venezuela
- 1993-1998    **Research Assistant I-II, Research Associate in Computational Astrophysics**  
Development of one-dimensional analytic hydrodynamic models of Line-Driven Winds (LDWs) from accretion disks in Cataclysmic Variables (CVs).  
Development of 2.5-dimensional isothermal numerical time-dependent hydrodynamic models of LDWs in CVs.  
Development of 2.5-dimensional adiabatic hydrodynamic models of LDWs from  $\alpha$  disks in CVs. Calculations of CIV line profiles at different observation angles.  
*NASA, Goddard Space Flight Center, Laboratory of High Energy Astrophysics / University of Maryland at College Park, College of Computer, Math, & Physical Sciences, Department of Astronomy*  
Greenbelt, Maryland, USA
- 1998-2001    **Research Associate in Computational Physics**  
Development and implementation of local ionization equilibrium and radiative heating and cooling in 2.5-dimensional computational models for line-driven accretion disk winds in Cataclysmic Variables.  
Development of transient hydrodynamic models of solar loops.  
Development of transient models of cool fronts in interstellar medium.  
Development of hydrodynamic models of atmospheric winds in the region of Sur del Lago in Venezuela, in particular for the modeling of microbursts.  
*Universidad de Los Andes, College of Science / CeCalCULA National Center for Scientific Calculations*  
Mérida, Venezuela

2001-2005 **Research Associate in Computational Astrophysics**  
Development of one-dimensional analytic models of radiation driven winds in Quasars and AGNs.  
Development of 2.5-dimensional hydrodynamic models of radiative winds in Quasars and AGNs.  
Study of boundary conditions and self-consistent numerical treatment of energy balance in radiative driven winds in astrophysical systems.  
Development of detailed calculation, from atomic data, of total line-radiation force.  
Development of numerical treatment of line-radiation force with arbitrary radiation source and arbitrary velocity fields.  
Calculation of theoretical absorption wind line profiles.  
Theoretical study of continuum variability of accretion disks within QSOs and comparison with observations.  
Development of criteria analysis for the existence of steady solution in 1D line-driven winds with arbitrary distribution of radiation flux, gravitational force, and area function.  
*University of Pittsburgh, College of Arts and Sciences, Department of Physics and Astronomy*  
Pittsburgh, PA

2005-2007 **Computational Physicist**  
Development of plasma simulation software in general for the Prism applications: *PrimsSPECT*, *HELIOS*, *SPECT3D*, and *PROPACEOS*.  
Software testing, diagnostic, and benchmarking of Prism plasma simulation software.  
Application building and distribution Prism plasma simulation applications for Windows, Mac OS X, and Linux operating systems.  
Development of the optimized line-merging photon energy grid used throughout the Prism plasma simulation software.  
Development of radiative transfer methods based on short-characteristics schemes in cylindrical and Cartesian coordinates for the *SPECT3D* application.  
Development of local radiative heating and cooling computations for the *SPECT3D* application  
*Prism Computational Sciences, Inc.*  
*Madison, WI, USA*

**Teaching Experience:**

- 1988           **Teaching Assistant I of Mathematics**  
Undergraduate courses in Mathematics for students majoring in Physics, Chemistry, Biology, and Computer Science.  
*Universidad Central de Venezuela, College of Science, Department of Mathematics*  
Caracas, Venezuela
- 1989-1990      **Teaching Assistant II of General Physics**  
Undergraduate courses in General Physics for students majoring in Physics, Chemistry, and Biology.  
*Universidad Central de Venezuela, College of Science, Department of Physics*  
Caracas, Venezuela
- 1993           **Teaching Assistant I**  
Undergraduate courses in Physics in the areas of “Modern Physics”, “Fundamentals of Physics”, and “Introductory Physics: Vibrations, Waves, Heat, Fluids, Optics, Light”.  
*University of Maryland at College Park, College of Computer, Math, & Physical Sciences, Physics Department*  
College Park, Maryland, USA
- 1998           **Invited Professor**  
Graduate course in “Radiative Processes in Astrophysics”.  
*Universidad de Los Andes, College of Science, Department of Physics, Graduate School in Fundamental Physics*  
Mérida, Venezuela
- 2000           **Instructor**  
Course in "Parallel Tools in Computational Physics"  
*CeCalCULA (National Center for Scientific Calculations)*  
Mérida, Venezuela
- 2001           **Associate Professor**  
Undergraduate course in "Geometry"  
*Universidad Marítima del Caribe, Department of Basic Science*  
Catia La Mar, Venezuela
- 2007-2009     **Lecturer**  
Undergraduate courses in “Astronomy”  
University of Texas Pan-American  
Edinburg, Texas

2009-present **Assistant Professor**  
Undergraduate courses in “Astronomy”  
University of Texas Pan-American  
Edinburg, Texas

**Administrative Experience:**

2001-2002 **Head of Department of Basic Science**  
Organize and supervise personnel in the Department to forward teaching, research, and outreach programs.  
Development and implementation of undergraduate courses in Basic Science (Mathematics, Physics, Chemistry, and Computer Science).  
Development and implementation of academic science laboratories.  
Hire academic personnel.  
Design and implement outreach programs, such as support for local High-Schools, in the area of Basic Science.  
Development, implementation, and promotion of research activities in general, and in particular in the areas of Basic Science.  
*Universidad Marítima del Caribe*  
Catia La Mar, Venezuela

**Academic Honors and Fellowships:**

1992 **CONICIT Fellowship**  
Banco Interamericano de Desarrollo / Consejo Nacional de Investigaciones Científicas y Tecnológicas  
Washington, D.C., USA / Caracas, Venezuela

1993 **OAS Fellowship**  
Organization of American States  
Washington, D.C., USA

1994 **Orden Jose Felix Ribas** in recognition of outstanding academic achievement.  
*CONICIT (National Council for Scientific and Technological Research)*  
Caracas, Venezuela

1995 **Leon Herreid Memorial Fellowship.**  
*NASA, Goddard Space Flight Center / University of Maryland at College Park*  
Greenbelt, Maryland, USA

1999-2003 **Sistema Promoción al Investigador nivel I**  
*CONICIT (Consejo Nacional para la Investigación Científica y Tecnológica)*  
Caracas, Venezuela

**Publications in Refereed Journals:**

Pereyra, N., Kallman, T., & Blondin, M. 1997, *The Astrophysical Journal*, 477, 368.  
*Hydrodynamical Models of Line-Driven Accretion Disk Winds.*

Pereyra, N., Kallman, T., & Blondin, M. 2000, *The Astrophysical Journal*, 532, 563.  
*Hydrodynamic Models of Line-Driven Disk Winds II: Adiabatic Winds from Nonisothermal Disks.*

Pereyra, N., Kallman, T., & Blondin, M. 2001, *Revista Mexicana de Astronomia y Astrofisica Serie de Conferencias*, 11, 159

*Hydrodynamic Models of Line-Driven Accretion Disk Winds in Cataclysmic Variables*

Pereyra, N., & Kallman, T. 2003, *The Astrophysical Journal*, 582, 984

*Hydrodynamic Models of Line-Driven Disk Winds III: Local Ionization Equilibrium*

Pereyra, N., Owocki, S., Hillier, D., & Turnshek, D. 2004, *The Astrophysical Journal*, 608, 454

*On the Steady Nature of Line Driven Disk Winds*

Pereyra, N., 2005, *The Astrophysical Journal*, 622, 577

*Further Criteria on the Existence of Steady Line-Driven Winds*

Wilhite, B., Vanden Berk, D., Kron, R., Schneider, D., Pereyra, N., Brunner, R., Richards, G., and Brinkmann, J. 2005, *The Astrophysical Journal*, 633, 638

*Spectral Variability of Quasars in the Sloan Digital Sky Survey. I. Wavelength Dependence*

Pereyra, N., Hillier, D., & Turnshek, D. 2006, *The Astrophysical Journal*, 636, 411

*On the Steady Nature of Line Driven Disk Winds: Application to Cataclysmic Variables*

Pereyra, N., Vanden Berk, D., Turnshek, D., Hillier, D., Wilhite, B., Kron, R., Schneider, P., & Brinkman, J.

2006, *The Astrophysical Journal*, 642, 87

*Characteristic QSO Accretion Disk Temperature from Spectroscopic Continuum Variability*

**Contributions to Reference Books**

CRC Dictionary of Geophysics, Astrophysics and Astronomy 2001, Richard Matzner and Colleen McMillon Editors, CRC Press

**Abstracts and Presentations:**

*Transient Flux of Compressible Crude Oil in an Elastic Pipeline due to Closure of End Valve.*  
Universidad Central de Venezuela, College of Science, Department of Physics,  
Caracas, Venezuela, October 1991 (Presented as a requirement for the undergraduate program in  
Physics).

*Hydrodynamic Modeling of Accretion Disk Winds.*  
The 158th Colloquium of the International Astronomical Union: Cataclysmic Variables and  
Related Objects,  
Keele University, Keele, United Kingdom, June 1995.

*Hydrodynamical Models of Line-Driven Accretion Disk Winds.*  
The 163rd Colloquium of the International Astronomical Union: Accretion Phenomena and  
Related Outflows,  
Port Douglas, Australia, July 1996.

*Hydrodynamic Modeling of Line-Driven Accretion Disk Winds.*  
The 189th Meeting of the American Astronomical Society,  
Toronto, Canada, January 1997.

*Hydrodynamic Modeling of Line-Driven Accretion Disk Winds in Cataclysmic Variables.*  
University of Maryland at College Park, College of Computer, Math, & Physical Sciences,  
Department of Physics,  
College Park, Maryland, USA, May 1997 (Presented as a requirement for the Ph.D. program).

*Hydrodynamic Models of Line-Driven Accretion Disk Winds in Cataclysmic Variables.*  
The 8th Annual October Astrophysics Conference in Maryland: "Accretion Processes in  
Astrophysical Systems: Some Like It Hot",  
University of Maryland, College Park, Maryland, USA, October 1997.

*Hydrodynamic Models of Line-Driven Accretion Disk Winds in Cataclysmic Variables.*  
The 191th Meeting of the American Astronomical Society,  
Washington, D.C., USA, January 1998.

*Hydrodynamic Models of Line-Driven Accretion Disk Winds in Cataclysmic Variables.*  
IX Latin-American Regional Reunion of the International Astronomical Union,  
National Institute of Astrophysics, Optics, and Electronics, Tonanzintla, Puebla, Mexico,  
November 1998.

*PETSc: Portable, Extensible, Toolkit for Scientific Computation*  
III Taller Andino de Telecomunicaciones, Paralelismo, y Herramientas de Física Computacional,  
Centro Nacional de Calculo Científico, Mérida, Venezuela, December 2000

*Hydrodynamic Modeling of Cataclysmic Variable Winds and Local Ionization Equilibrium*  
The 200th Meeting of the American Astronomical Society  
Albuquerque, New Mexico, USA, June 2002

*Hydrodynamic Models of QSO Disk Winds*  
The 200th Meeting of the American Astronomical Society  
Albuquerque, New Mexico, USA, June 2002

*Modeling Line-Driven Accretion Disk Winds*  
Carnegie Mellon University  
Department of Physics  
Pittsburgh, Pennsylvania, USA, November 2003

*QSO UV/Optical Continuum Variability and Accretion Disks*  
The 203rd Meeting of the American Astronomical Society  
Atlanta, Georgia, USA, January 2004

*Accretion Disks Surrounding Black Holes*  
University of Pittsburgh  
Allegheny Observatory  
Pittsburgh, Pennsylvania, USA, August 2004

*QSOs and Line-Driven Disk Winds*  
University of Pittsburgh  
Department of Physics and Astronomy  
Pittsburgh, Pennsylvania, USA, April 2005

*PrismSPECT and PEGASYS: Plasma Simulation and Experimental Analysis Codes*  
33<sup>rd</sup> International Conference on Plasma Science  
Traverse City, MI, USA, June 2006

*SPECT3D Post-Processing of LSP PIC Simulations: Application of Short-Pulse Laser Experiments*  
33<sup>rd</sup> International Conference on Plasma Science  
Traverse City, MI, USA, June 2006

*Computational Modeling of Line-Driven Disk Winds*  
Embry-Riddle Aeronautical University at Daytona Beach  
Daytona Beach, FL, USA, February 2007

*The Line-Driven Accretion Disk Wind Scenario in CVs and QSOs: Steady Nature of Wind and Continuum Variability of QSOs*  
University of Texas-Pan American  
Edinburg, TX, USA, February 2007

*Computational Modeling of Line-Driven Disk Winds and The Short-N Characteristic Radiative Transfer Method*

Tech-X Corporation

Boulder, Colorado, USA, March 2007

*University of Texas – Pan American Planetarium*

Texas Space Grant Consortium Fall 2007 Meeting

Houston, Texas, USA, November 2007

*H-E-B Planetarium: A Valuable Tool for Secondary Schools*

University of Texas-Pan American

Edinburg, TX, USA, September 2008

*Computational Modeling of Line-Driven Disk Winds in Cataclysmic Variables and Quasars*

University of Texas-Pan American

Edinburg, TX, USA, March 2009

#### **Approved Research Grants:**

2004 – NASA ATP

“The Formation of Emission and Absorption Lines in QSO Accretion Disk Winds”

\$412,099.00

(Co-I)

2005 – NASA Galex

“The UV Variability of Quasars”

~\$30,000.00

(Co-I)

#### **Approved Educational/Outreach Grants:**

2007 – UTPA

“Reactivation and Self-sustainment of the UTPA Multifunctional Planetarium System”

\$67,000.00

(Co-I)

2009 – NSF LSAMP

“Undergraduate Research Project in Disk Wind Modeling”

\$4,000

(Mentor)

**References:**

Dr. Steven Tidrow  
University of Texas – Pan American  
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Raleigh, NC 27695-8202, USA  
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Dr. Guillermo Miranda  
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