

ANTHONY ARTHUR CHAN
Professor of Physics and Astronomy

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Education

Princeton University, Princeton, New Jersey, 7/84–12/89.

Ph.D. in Astrophysical Sciences, Program in Plasma Physics, 6/91.

Thesis: *Interaction of Energetic Ring Current Protons with Magnetospheric Hydromagnetic Waves.*

Advisors: Liu Chen and Roscoe White.

M.A. in Astrophysical Sciences, Program in Plasma Physics, 5/86.

University of Auckland, Auckland, New Zealand, 2/78–12/83.

M.Sc. (First Class Honours) in Physics, 2/84.

M.Sc. Thesis: *Monte Carlo Calculations for an In Vivo Neutron Activation Analysis System.*

Advisors: Alun Beddoe and Ross Garrett.

Seiichi Waki Prize (Best M.Sc. Thesis in Physics Department), 1983.

B.Sc. in Physics, 2/82. Senior Prize in Physics, 1981. Senior Prize in Pure Mathematics, 1981.

Professional Experience

Rice University, Department of Physics and Astronomy, Professor, 7/07–present.

Rice University, Department of Physics and Astronomy, Associate Professor, 7/00–6/07.

Sabbatical visit to LASP, University of Colorado in Boulder, 1/02–7/02.

Rice University, Department of Space Physics and Astronomy, Associate Professor, 7/99–6/00.

Rice University, Department of Space Physics and Astronomy, Assistant Professor, 4/93–6/99.

Dartmouth College, Department of Physics and Astronomy, Research Associate, 1/90–3/93.

Visitor to STAR Lab, Stanford University, 1/90–6/90.

Princeton University, Plasma Physics Laboratory, Theory Group, Research Assistant, 8/85–12/89.

Princeton University, Plasma Physics Laboratory, TFTR Group, Research Assistant, 7/84–7/85.

University of Auckland Medical School, Department of Surgery, Research Officer, 1/84–6/84.

Teaching

Courses Taught at Rice University:

NSCI 111: *Science Today I: Physics and Astronomy*

ASTR 202: *Exploration of the Solar System*

PHYS 302: *Intermediate Electrodynamics*

SPAC 480: *Introduction to Plasma Physics*

PHYS 519: *Plasma Kinetic Theory*

PHYS 532: *Classical Electrodynamics*

SPAC 602: *Mathematical Methods of Physics*

SPAC 604: *Regular and Chaotic Dynamics*

Princeton University: Teaching assistant for advanced graduate courses in plasma physics, 1986 to 1987. Lectures on the theory of plasma waves for Professor Thomas Stix, Fall 1987.

Code Development

Throughout 2010 and 2011 Professor Anthony Chan and Dr. Scot Elkington (University of Colorado) have been building a comprehensive, large-scale computational model to simulate the dynamics of earth's radiation belts. Extensive development of the code is expected to continue through 2012. The code development is coordinated with the Fall 2012 launch of the NASA Radiation Belt Storm Probes (RBSP) mission.

Publications

1. L. G. Ozeke, I. R. Mann, K. R. Murphy, I. J. Rae, D. K. Milling, S. R. Elkington, A. A. Chan, and H. J. Singer. ULF wave derived radiation belt radial diffusion coefficients. *Journal of Geophysical Research (Space Physics)*, 117:4222, April 2012.
2. I. J. Rae, I. R. Mann, K. R. Murphy, L. G. Ozeke, D. K. Milling, A. A. Chan, S. R. Elkington, and F. Honary. Ground-based magnetometer determination of in situ Pc4-5 ULF electric field wave spectra as a function of solar wind speed. *Journal of Geophysical Research (Space Physics)*, 117:4221, April 2012.
3. G. D. Reeves, A. A. Chan, and C. Rodger. New directions for radiation belt research. *Space Weather*, 7:S07004, 2009. <http://dx.doi.org/10.1029/2008SW000436>.
4. X. Tao, J. M. Albert, and A. A. Chan. Numerical modeling of multidimensional diffusion in the radiation belts using layer methods. *J. Geophys. Res.*, 114:A02215, 2009. doi:10.1029/2008JA013826.
5. X. Tao, A. A. Chan, J. M. Albert, and J. A. Miller. Stochastic modeling of multidimensional diffusion in the radiation belts. *J. Geophys. Res.*, 113:A07212, 2008. doi:10.1029/2007JA012985.
6. M. W. Liemohn and A. A. Chan. Unraveling the causes of radiation belt enhancements. *EoS, Trans. AGU*, 88:425, 2007.
7. Xin Tao, A. A. Chan, and A. J. Brizard. Hamiltonian theory of adiabatic motion of relativistic charged particles. *Phys. Plasmas*, 14:092107, 2007.
8. Y. Fei, A. A. Chan, S. R. Elkington, and M. J. Wiltberger. Radial diffusion and MHD particle simulations of relativistic electron transport by ULF waves in the September 1998 storm. *J. Geophys. Res.*, 111(A10):12209, December 2006. doi: 10.1029/2005JA011211.
9. T. M. Loto'aniu, I. R. Mann, L. G. Ozeke, A. A. Chan, Z. C. Dent, and D. K. Milling. Radial diffusion of relativistic electrons into the radiation belt slot region during the 2003 Halloween geomagnetic storms. *J. Geophys. Res.*, 111:A04218, 2006. doi:10.1029/2005JA011355.
10. P. G. Loubser and A. A. Chan. Prediction of the effect of acute normovolemic hemodilution on the hematological constituents of sequestered autologous whole blood. *Anesthesia and Analgesia*, 102(4):991-997, 2006.
11. G. Toth, I. V. Sokolov, T. I. Gombosi, D. R. Chesney, C. R. Clauer, D. L. De Zeeuw, K. C. Hansen, K. J. Kane, W. B. Manchester, R. C. Oehmke, K. G. Powell, A. J. Ridley, I. I. Roussev, Q. F. Stout, O. Volberg, R. A. Wolf, S. Sazykin, A. A. Chan, Yu B, and J. Kota. Space Weather Modeling Framework: A new tool for the space science community. *J. Geophys. Res.*, 110:A12226, 2005. doi:10.1029/2005JA011126.
12. A. J. Brizard and A. A. Chan. Relativistic quasilinear diffusion in axisymmetric magnetic geometry

- for arbitrary-frequency electromagnetic fluctuations. *Phys. Plasmas*, 11(9):4220–4229, 2004.
13. T. G. Onsager, A. A. Chan, Y. Fei, S. R. Elkington, J. C. Green, and H. J. Singer. The radial gradient of relativistic electron phase-space density at geosynchronous orbit. *J. Geophys. Res.*, 109(A05221):doi:10.1029/2003JA010368, 2004.
 14. S. R. Elkington, M. J. Wiltberger, A. A. Chan, and D. N. Baker. The Center for Integrated Space-weather Modeling (CISM) and physical models of the geospace radiation environment. *J. Atmos. Solar Terres. Phys.*, 66:1371–1388, 2004.
 15. S. R. Elkington, M. K. Hudson, and A. A. Chan. Resonant acceleration and diffusion of outer zone electrons in an asymmetric geomagnetic field. *J. Geophys. Res.*, 108(A3):1116, 2003.
 16. A. J. Brizard and A. A. Chan. Relativistic bounce-averaged quasilinear diffusion equation for low-frequency electromagnetic fluctuations. *Phys. Plasmas*, 8(11):4762–4771, 2001.
 17. H.-J. Kim, A. A. Chan, R. A. Wolf, and J. Birn. Injection of outer-belt relativistic electrons by substorms. In *Proceedings of the Fifth International Conference on Substorms, Saint Petersburg, Russia*. European Space Agency, ESA SP-443, 2000.
 18. H.-J. Kim, A. A. Chan, R. A. Wolf, and J. Birn. Can substorms produce relativistic outer-belt electrons? *J. Geophys. Res.*, 105:7721, 2000.
 19. A. J. Brizard and A. A. Chan. Nonlinear relativistic gyrokinetic Vlasov-Maxwell equations. *Phys. Plasmas*, 6:4548–4558, 1999.
 20. S. R. Elkington, M. K. Hudson, and A. A. Chan. Acceleration of relativistic electrons via drift-resonant interaction with toroidal-mode Pc-5 ULF oscillations. *Geophys. Res. Lett.*, 26:3273, 1999.
 21. A. A. Chan. Noncanonical Hamiltonian methods for particle motion in magnetospheric hydromagnetic waves. *J. Geophys. Res.*, 103(9):20501–20513, 1998.
 22. J. W. Freeman, T. P. O’Brien, A. A. Chan, and R. A. Wolf. Energetic electrons at geostationary orbit during the November 3-4, 1993 storm: Spatial/temporal morphology, characterization by a power-law spectrum and representation by an artificial neural network. *J. Geophys. Res.*, 103:26251, 1998. doi: 10.1029/97JA03268.
 23. H.-J. Kim and A. A. Chan. Fully-adiabatic changes in storm-time relativistic electron fluxes. *J. Geophys. Res.*, 102:22107–22116, 1997.
 24. E. V. Belova, R. E. Denton, and A. A. Chan. Hybrid simulations of the effects of energetic particles on low-frequency MHD waves. *J. Comput. Phys.*, 136:324–336, 1997.
 25. A. A. Chan. Hamiltonian chaos in the interaction of ring current ions with magnetospheric hydromagnetic waves. In T. Chang and J. R. Jasperse, editors, *Physics of Space Plasmas (1993). Proceedings of the 1993 Cambridge Workshop in Geoplasma Physics and 1993 Symposium on the Physics of Space Plasmas "Chaos, Stochasticity, and Strong Turbulence"*, number 13, pages 31–41, Cambridge, Massachusetts, 1995. MIT Center for Theoretical Geo/Cosmo Plasma Physics.
 26. A. A. Chan, M. Xia, and Liu Chen. Anisotropic Alfvén-ballooning modes in Earth’s magnetosphere. *J. Geophys. Res.*, 99:17,351–17,366, 1994.
 27. Xinlin Li, M. K. Hudson, A. A. Chan, and I. Roth. Loss of ring current O^+ ions due to interaction

with Pc 5 waves. *J. Geophys. Res.*, 98:215–231, 1993.

28. Xinlin Li, A. A. Chan, and M. K. Hudson. Ring current ion interactions with micropulsations during the recovery phase of geomagnetic storms. In *Magnetospheric Substorms (AGU Monograph 64)*, page 469. Editors J. R. Kan, T. A. Potemra, S. Kokobun and T. Iijima. American Geophysical Union, 1991.
29. M. K. Hudson, A. A. Chan, X. Li, and I. Roth. Ring current ion interaction with Pc 5 micropulsations. In *Physics of Space Plasmas (1990): Magnetic Fluctuations, Diffusion and Transport in Geoplasmas*, pages 263–276. Editor T. S. Chang. Scientific Publishers, Inc., 1991.
30. A. A. Chan, A. Brizard, and Liu Chen. Hamiltonian test particle dynamics in a perturbed magnetic dipole field. In *Nonlinear and Relativistic Effects in Plasmas*, pages 526–535. Edited by V. Stefan. American Institute of Physics, College Park, Md., 1991.
31. A. A. Chan. *Interaction of Energetic Ring Current Protons with Magnetospheric Hydromagnetic Waves*. PhD thesis, Princeton University, Princeton, N.J., 1991.
32. A. A. Chan, Liu Chen, and R. B. White. Nonlinear interaction of energetic ring current protons with magnetospheric hydromagnetic waves. *Geophys. Res. Lett.*, 16(10):1133–1136, 1989.
33. J. D. Strachan and A. A. Chan. Helium transport in TFTR. *Nucl. Fusion*, 27:1025, 1987.
34. R. Kaita, W. W. Heidbrink, G. W. Hammett, A. A. Chan, A. C. England, H. W. Hendel, S. S. Medley, E. Nieschmidt, A. L. Roquemore, S. D. Scott, J. D. Strachan, G. D. Tait, G. Taylor, C. E. Thomas, , and K. L. Wong. Charge exchange and fusion reaction measurements during compression experiments with neutral beam heating in the tokamak fusion test reactor. *Nucl. Fusion*, 26:863, 1986.
35. K. L. Wong, M. Bitter, G. W. Hammett, W. Heidbrink, H. Hendel, R. Kaita, S. Scott, J. D. Strachan, G. Tait, M. G. Bell, R. Budny, C. Bush, A. A. Chan, J. Coonrod, P. C. Efthimion, A. C. England, H. P. Eubank, E. Fredricson, H. P. Furth, R. J. Goldston, B. Grek, L. Grisham, R. J. Hawryluk, K. W. Hill, D. Johnson, J. Kamperschroer, H. Kugel, C. Ma, D. Mansfield, D. Manos, D. C. McCune, K. McGuire, S. S. Medley, D. Mueller, E. Nieschmidt, D. K. Owens, V. K. Paré, H. Park, A. Ramsey, D. Rasmussen, A. L. Roquemore, J. Schivell, S. Sesnic, G. Taylor, M. D. Williams, and M. C. Zarnstorff. Acceleration of beam ions during major-radius compression in the tokamak fusion test reactor. *Phys. Rev. Lett.*, 55:2587, 1985.
36. J. D. Strachan, A. A. Chan, W. W. Heidbrink, J. Lovberg, T. J. Murphy, E. Nieschmidt, and S. J. Zweben. Confinement of fusion products in tokamaks. In *Basic Physical Processes of Toroidal Fusion Plasmas*, volume 2, pages 699–712. Euratom, 1985.
37. A. A. Chan. Monte Carlo calculations for an *in vivo* neutron activation analysis system. Master’s thesis, University of Auckland, Auckland, New Zealand, 1984.
38. A. A. Chan and A. H. Beddoe. Application of the Monte Carlo technique to the study of radiation transport in a prompt-gamma *in vivo* neutron activation system. *Australasian Physical and Engineering Sciences in Medicine*, 8:22, 1985.

National Academy Reports

Distributed Arrays of Small Instruments for Research and Solar-Terrestrial Research: Report of a Workshop. The National Academies Press, Washington, D.C., 2006. A. A. Chan contributed to this report as a member of the NRC Space Studies Board Ad Hoc Committee on Distributed Arrays of Small Instruments for Research and Monitoring in Solar-Terrestrial Physics that wrote

the report.

Solar and Space Physics and Its Role in Space Exploration. The National Academies Press, Washington, D.C., 2004. A. A. Chan contributed to this report as a member of the NRC Space Studies Board Committee on the Assessment of the Role of Solar and Space Physics in NASA's Space Exploration Initiative that wrote the report.

Exploration of the Outer Heliosphere and the Local Interstellar Medium: A Workshop Report. The National Academies Press, Washington, D.C., 2004. A. A. Chan contributed to this report as a member of the NRC Space Studies Board Committee on Solar and Space Physics that wrote the report.

Plasma Physics of the Local Cosmos. The National Academies Press, Washington, D.C., 2004. A. A. Chan contributed to this report as a member of the NRC Space Studies Board Committee on Solar and Space Physics that wrote the report.

Refereed Medical Abstracts

Please note: Extended abstracts which are submitted to medical meetings and which are refereed before acceptance are listed by medical researchers as publications. However, since that is not common practice for physicists, these are listed these separately from the main publication list.

P. G. Loubser, J. A. Daribi, and A. A. Chan. Prediction of hemoglobin concentration in sequestered whole blood during acute normovolemic hemodilution. *Anesthesia and Analgesia*, 92:S105, 2001.

A. A. Chan and P. G. Loubser. Acute normovolemic hemodilution: Limits on allowable surgical blood loss and on hemoglobin concentration. *Anesthesia and Analgesia*, 86:S58, 1998. This paper was one of ten papers (from over five hundred presented at the 1998 International Anesthesia Research Society (IARS) Meeting) which was selected by the Editorial Board of the Medical Education Network, an international medical information service, for re-publication in *Scientific Conference and Abstract News*, Spring, 1998.

Current Research Funding

Physics of Particle Injection into the Inner Magnetosphere. PI: F. R. Toffoletto. CoIs: A. A. Chan, T. W. Hill, S. Sazykin, R. W. Spiro, R. A. Wolf. NASA Heliophysics Theory Program.

A New Method for Combined Modeling of Local Acceleration and Radial Transport in the Radiation Belts. PI: A. A. Chan. NASA SR&T (Supporting Research and Technology) Program.

Radiation Belt Modeling and Data Assimilation. PI: A. A. Chan. NASA SR&T (Supporting Research and Technology) Program.

Inner Magnetosphere Module for Integrated Space Weather Model.

PI: F. R. Toffoletto. CoIs: A. A. Chan, T. W. Hill, P. R. Reiff, R. W. Spiro. Subcontract from NSF STC Grant "Center for Integrated Space Weather Modeling (CISM)" (PI: W.J. Hughes, Boston University).

Professional Service

Research Area Coordinator for Inner Magnetosphere and Storms (IMS), Geospace Environment Modeling (GEM) Program, National Science Foundation, since November 2009.

Member of National Academy Committee on Solar and Space Physics (CSSP), June 2003 to June 2006.

Co-author of National Academy reports:

- *Plasma Physics of the Local Cosmos.* Committee on Solar and Space Physics, National Academies Press, 2004.

- *Exploration of the Outer Heliosphere and the Local Interstellar Medium*. Committee on Solar and Space Physics, National Academies Press, 2004.
- *Solar and Space Physics and its Role in Space Exploration*. Committee on the Assessment of the Role of Solar and Space Physics in NASA's Space Exploration Initiative, National Academies Press, 2005.
- *Distributed Arrays of Small Instruments for Research and Solar-Terrestrial Research: Report of a Workshop*. Ad Hoc Committee on Distributed Arrays of Small Instruments for Research and Monitoring in Solar-Terrestrial Physics, National Academies Press, 2006.

Associate Editor of *Geophysical Research Letters*, December 2000 to December 2003.

Lead Convener of the Inner Magnetosphere/Storms Campaign, NSF Geospace Environment Modeling (GEM) Program, 1999 to 2003. (Lead organizer of a workshop each summer and a mini-workshop each winter, on physics of the inner magnetosphere and magnetic storms.)

Member of the GGCM Steering Committee, June 1998 to June 2001. The GGCM (Geospace General Circulation Model) is being developed by the Geospace Environment Modeling program of the NSF as a comprehensive global physical model of the geospace environment.

Member of the AGU Scarf Award Committee, 2000-2001. The Scarf Award is given at most annually for the best PhD thesis in Space Physics, Planetary Physics and Aeronomy. The committee also makes awards for the best student papers presented at the AGU Fall and Spring meetings.

Co-Organiser: *Rarotonga Energetic Particle Workshop (REPW)*, Rarotonga, Cook Islands, August 2007. (Lead Organiser: Dr. Craig Rodger, University of Otago, New Zealand)

Lead Convener: *Wave and Particle Dynamics in the Ring Current and Radiation Belts*. IUGG XXIV 2007, Perugia, Italy, July 2007.

Deputy Organiser: *Meeting of the Panel on Radiation Belt Environment Models* 36th COSPAR Scientific Assembly, Beijing, People's Republic of China, July 2006.

Co-Convener: Special Session *Nonlinear and Kinetic Physics of ULF and VLF Waves*. Fall AGU Meeting, San Francisco, December 2005.

Co-Convener: *Session 3.1: The Magnetospheric Particle Accelerator*. IAGA, Toulouse, France, July 2005.

Co-Convener: *The Radiation Belts*. Asia-Oceania Geophysical Society (AOGS) Annual Meeting, Singapore, July 5-9, 2004.

Co-Convener: Special Session *Relativistic Electron Dynamics: Focus on Losses* at the Western Pacific Geophysics Meeting, Wellington, New Zealand, July 9-12, 2002.

Head of the Scientific Committee and Lead Organizer: *International Space Environment Conference (ISEC): Radiation Belt Science and Technology*, Queenstown, New Zealand, July 2001.

Co-Convener: Symposium 9, *Energetic Particle Dynamics in the Inner Magnetosphere*. S-RAMP: STEP – Results, Applications and Modeling Phase. Sapporo, Japan, October 2000.

Co-Convener: Special Session *New Perspectives in Dynamics and Coupling in Inner Magnetospheric Physics*. AGU Spring Meeting. Boston, Massachusetts, May 1999.

Lead Convener: Symposium 3.07: *Generation and Propagation of ULF Waves*. IAGA Meeting. Uppsala, Sweden, July 1997.

Referee for Journal Articles: *Journal of Geophysical Research*, *Geophysical Research Letters*, *Physics of Plasmas*, *Physics of Fluids*.

Referee and Review Panelist for Research Proposals: NSF, NASA.

Rice University Service and Activities

Faculty Associate and Divisional Advisor for Natural Sciences, at Martel College, Rice University, since 2001.

Award for Outstanding Faculty Associate, Martel College, Rice University: 2005–2006, 2008–2009, 2011–2012.

Award for Distinguished Faculty Associate, Martel College, Rice University: 2003–2004, 2004–2005, 2006–2007, 2007–2008, 2009–2010, 2010–2011.

Faculty Associate at Sid Richardson College, Rice University, 1995–2001.

Fellow of Scientia, 1994–1996, 2002–present. Scientia is an institute of Rice University faculty founded in 1981 to promote scholarly discussion across disciplinary boundaries.

Department Service:

Member, Graduate Admissions Committee, August 2009 to present.

Co-Chair, Graduate Admissions Committee, August 2005 to July 2008.

Search Committee for Condensed Matter Theorist faculty position, 2005.

Search Committee for Condensed Matter Experimenter faculty position, 2004.

Search Committee for Solar Physics faculty position, 2003.

Wilson Prize Committee (Department Ph.D. thesis prize), 2000, 2001.

Search Committee for two High-Energy Astrophysics faculty positions, 2000.

Graduate Admissions Committee, 1996–2000, 2003–2005.

Five-Year Plan Committee, 1998. Research Faculty Search Committee, 1994.

A. J. Dessler Reading Room coordinator and Fondren Library liaison, 1993–1995.

Plasma Physics Curriculum Committee, 1993. Core Course Curriculum Committee, 1993.

Department Representative at Majors Days, Freshman Academic Fairs, and On Campus Days, every year from 1993 to 1999.

Student Advising

Current Ph.D. Student: Liheng Zheng.

Previous Graduate Students:

Xin Tao, Ph.D., May 2009. *Hamiltonian theory and stochastic simulation methods for radiation belt dynamics*. Winner of the William and Elva Gordon Prize, 2008.

Bin Yu, Ph.D., May 2007. *Simulation of Dynamics of Radiation Belt Electrons During Geomagnetic Storms Driven by High Speed Solar Wind Streams*.

Yue Fei. Ph.D., May 2007. *Simulation of Radiation Belt Electron Diffusion*.

Timothy Glover, Ph.D., 2002. *Measurement of Plasma Parameters in the Exhaust of a Magnetoplasma Rocket by Gridded Energy Analyzer and Emissive Langmuir Probe*. Winner of the William and Elva Gordon Prize, 2002.

Hee-Jeong Kim, Ph.D., 1999. *Dynamics of Relativistic Electrons in Earth's Magnetosphere*.

Karsten E. Braaten, M.S., 1997. *A Model of Bounce-Averaged Relativistic Protons with Emphasis on the March 1991 Magnetospheric Compression*.

Karen M. Klamczynski, M.S., 1997. *Bounce-Resonant Ion Interaction with Hydromagnetic Waves*.

Thesis Committees:

Deirdre Wendel, Ph.D., expected 2008. Antoun Daou, Ph.D., 2008. Liang Wu, M.S., 2008. Brooke Olson, Ph.D., 2007. Yining Li, M.S., 2005. Kaan Ozturk, Ph.D., 2005. Shuo Ji, M.S., 2001. Brent Buckalew, M.S., 2000. David Geller, Ph.D., 1999. Seth Orloff, Ph.D., 1998. Shan Xue, Ph.D., 1997. Michikazu Hojo, M.S., 1997. Mauricio Reyes-Ruiz, Ph.D., 1996. Adam Usadi, Ph.D., 1995.

Tracy Totten, Ph.D., 1994. Chuxin Chen, Ph.D., 1994.

Undergraduate Senior Theses:

Aaron Levine, '11. Yoav Kallus, '06. Justin Ruths, '04. Shawn Brooks, '96. Jeff Williams, '96.

Invited Presentations

1. *Radial transport in the radiation belts: Recent results and open questions.* Anthony Chan, Scot Elkington, Josef Koller, Ian Mann, Jonathan Rae, Louis Ozeke, and Jay Albert, GEM Workshop, Snowmass, Colorado, USA, 18-22 June 2012.
2. *Radial Transport of Radiation Belt Electrons in a High-Speed Stream Storm: Comparing Models and Observations.* Anthony Chan, Yen-fei Chen, Scot Elkington, Josef Koller, Ian Mann, Jonathan Rae, and Louis Ozeke, Inner Magnetosphere Coupling II (IMC II) Workshop, Los Angeles, California, USA, 19-22 March 2012.
3. *Simulations of Radiation Belt Electron Dynamics in High-Speed-Stream Storms.* Anthony A. Chan, Yen-fei Chen, and Scot R. Elkington, URSI National Radio Science Meeting, Boulder, Colorado, 4-7 January, 2012.
4. *Development of an MHD-SDE Simulation Method for Radiation Belt Modeling.* A. A. Chan, S. R. Elkington, J. M. Albert. ISSI Workshop 1 on The Earth's Radiation Belts: Physical Processes and Dynamic Modeling, Bern, Switzerland, February 8-11, 2011.
5. *Theory and Simulations of Relativistic Electron Dynamics in Earth's Magnetosphere.* A. A. Chan. CEA Cadarache, Institut de reserche sur la fusion par confinement magnétique (IRFM), Aix-en-Provence, France, June 18, 2009.
6. *Killer Electrons and Phase-Space Lagrangians: Relativistic Electron Dynamics in Earth's Magnetosphere.* A. A. Chan. Laboratoire de Physique des Plasmas, Ecole Polytechnique - CNRS, Observatoire de Saint-Maur, Saint Maur des Fossés, France, June 11, 2009.
7. *Acceleration and Transport of Radiation Belt Electrons by Wave-Particle Interactions: General Theory and Radial Diffusion Calculations.* A. A. Chan, X. Tao, J. M. Albert. COSPAR Scientific Assembly, Montreal, July 13-20, 2008.
8. *Acceleration and Transport of Radiation Belt Electrons by Wave-Particle Interactions: General Theory and Radial Diffusion Calculations.* A. A. Chan, A. J. Brizard, S. R. Elkington, Y. Fei, R. A. Wolf, B. Yu, X. Tao, J. M. Albert. International Symposium on Recent Observations and Simulations of the Sun-Earth System (ISROSES), Varna, Bulgaria, September 17-22, 2006.
9. *Radial Transport of Radiation Belt Electrons.* A. A. Chan, Y. Fei, B. Yu, R. A. Wolf, S. Naehr, F. Toffoletto, S. R. Elkington, and A. J. Brizard. Asia-Oceania Geophysical Society (AOGS) Meeting, Singapore, June 20-24, 2005.
10. *Recent Results on Radial Diffusion Theory and Simulations.* A. A. Chan, Y. Fei, S. R. Elkington, and A. J. Brizard. Workshop on Energetic Electron Radiation Belt Dynamics. Hermanus Magnetic Observatory, Hermanus, South Africa, March 7-11, 2005.
11. *Radial Diffusion of Radiation Belt Electrons.* A. A. Chan, Y. Fei, S. R. Elkington, A. J. Brizard, and J. M. Albert. URSI National Radio Science Meeting, Boulder, Colorado, January 5-8, 2005.

12. *Radial Transport of Radiation Belt Electrons.* A. A. Chan. ORBITALS Science Workshop. Banff, Alberta, Canada, September 22-24, 2004.
13. *Relativistic Electrons in Earth's Magnetosphere: Theoretical Studies of Sources, Transport, and Acceleration.* A. A. Chan. Space Physics Seminar, Department of Physics, University of Alberta. Edmonton, Alberta, Canada, July 28, 2004.
14. *Quasilinear Diffusion of Relativistic Electrons by Electromagnetic Fluctuations.* A. A. Chan and A. J. Brizard. AOGS Annual Meeting, Singapore, July 5-9, 2004.
15. *Radiation Belt Transport Theory using Phase-Space Lagrangian Methods* A. A. Chan and A. J. Brizard, Mini-Conference on Hamiltonian and Lagrangian Methods in Plasma Physics and Fluid Dynamics, 2002 APS Division of Plasma Physics Meeting, Orlando, Florida, November 11-15, 2002.
16. *Radiation Belt Theory and Modeling: A Review of Recent Results.* A. A. Chan. Space Science Applications Laboratory Seminar, Aerospace Corporation, Los Angeles, California, July 26, 2002.
17. *Killer Electrons and Phase-Space Lagrangians: Transport and Acceleration of Relativistic Electrons in Earth's Magnetosphere.* A. A. Chan. Colloquium, Laboratory for Atmospheric and Space Physics, University of Colorado at Boulder, May 17, 2002.
18. *Can Substorms Produce a Seed Population for Relativistic Electrons?* A. A. Chan, H.-J. Kim, R. A. Wolf and J. Birn. GEM Workshop, Snowmass, Colorado, June 18-22, 2001.
19. *Fully-Adiabatic Flux Changes, Substorm Injection and Radial Transport of Relativistic Electrons.* A. A. Chan. First S-RAMP Conference: STEP - Results, Applications and Modeling Phase. Sapporo, Japan, October 2-6, 2000.
20. *Radiation Belt Modules and the GGCM.* A. A. Chan. 2000 GEM Workshop. Snowmass, Colorado. June 19-23, 2000.
21. *Recent Work and Comments on Key Issues.* Relativistic Electron Workshop. A. A. Chan. Maui, Hawaii. January 12-14, 2000.
22. *An Introduction to Space Physics, Space Weather, and the Rest of the Universe.* A. A. Chan. Macleans College, Howick, New Zealand. July 22, 1999.
23. *Trapped Energetic Particles in Earth's Magnetosphere: Killer Electrons and Phase-Space Lagrangians.* A. A. Chan. Colloquium. Department of Physics, University of Auckland, New Zealand. July 14, 1999.
24. *Theory and Modeling of the Radiation Belts.* A. A. Chan. Invited Plenary Tutorial. GEM (Geospace Environment Modeling) Workshop. Snowmass, Colorado. June 21-25, 1999.
25. *Substorm Injection and Drift-Resonant Transport.* A. A. Chan, H.-J. Kim, R. A. Wolf and J. Birn. GEM (Geospace Environment Modeling) Workshop. Snowmass, Colorado. June 21-25, 1999.
26. *Excitation of Large-Scale Electromagnetic Waves in Earth's Magnetosphere.* A. A. Chan. Colloquium, Department of Physics, University of Texas at Arlington. February 24, 1999.
27. *Relative Sizes and Distances in the Universe* A. A. Chan. A presentation to about one hundred fourth- and fifth-grade students at Herod Elementary School, Houston Independent School District, Houston, Texas, January 28, 1999.

28. *Theory and Modeling of Slow (One-Day) Relativistic Electron Flux Variations* A. A. Chan. Relativistic Electron Workshop. Maui, Hawaii, January 18-21, 1999.
29. *Relativistic Electrons in Earth's Magnetosphere*. A. A. Chan. Department Colloquium. Department of Space Physics and Astronomy, Rice University. October 6, 1998.
30. *Approaches to the Teaching of Physics and Astronomy to Non-Majors*. A. A. Chan. A presentation in the CSST (Center for the Study of Science and Technology) Workshop series "Teaching Science". Symonds Gardiner Teaching Laboratory, Rice University. September 21, 1998. Invited by Professor Albert Van Helden.
31. *Theory and Modeling of the Radiation Belts*. A. A. Chan. Western Pacific Geophysics Meeting, Taipei, Taiwan. July 21–24, 1998.
32. *Radiation Belt Modules for the Geospace General Circulation Model (GGCM)*. A. A. Chan. GEM Workshop, Snowmass, Colorado. June 15–19, 1998.
33. *Simulation of Substorm Injection of Relativistic Electrons Using 3D Time-Dependent MHD Fields*. A. A. Chan, H.-J. Kim, R. A. Wolf and J. Birn. GEM (Geospace Environment Modeling) Workshop, Snowmass, Colorado. June 15–19, 1998.
34. *Relativistic Electrons in Earth's Magnetosphere*. A. A. Chan. Plasma Physics Colloquium. Institute of Fusion Studies, University of Texas at Austin. March 2, 1998.
35. *A Variational Principle for Hydromagnetic Wave-Particle Interactions*. A. A. Chan. Geometry and Analysis Seminar. Department of Mathematics, Rice University. October 15, 1997.
36. *Noncanonical Hamiltonian Methods in Guiding Center Theory*. A. A. Chan. NIS-1 Group Seminar. Los Alamos National Laboratory. September 12, 1997.
37. *Dynamics of Relativistic Magnetospheric Electrons*. A. A. Chan. NIS-1 MPA Group Seminar. Los Alamos National Laboratory. September 11, 1997.
38. *Relativistic Electrons: Fully-Adiabatic Response and Delayed Substorm Injection*. A. A. Chan, H.-J. Kim, R. A. Wolf and J. Birn. IAGA 8th Scientific Assembly, Uppsala, Sweden. August 4–14, 1997.
39. *Relativistic Electron Dynamics: Fully-Adiabatic Response and Substorm Injection*. A. A. Chan, H.-J. Kim, R. A. Wolf and J. Birn. Air Force Research Laboratory, Hanscom, Massachusetts. July 21, 1997.
40. *Energetic Electrons: Fully-Adiabatic Response and Substorm Injection*. A. A. Chan, H.-J. Kim, R. A. Wolf and J. Birn. GEM (Geospace Environment Modeling) Workshop, Snowmass, Colorado. June 16–20, 1997.
41. *MHD Waves and Resonant Ions in the Earth's Magnetosphere*. A. A. Chan. Research Seminar. Department of Applied Physics, Columbia University. April 11, 1997.
42. *NSCI 111 Science Today: Physics and Astronomy, The Web Page*. A. A. Chan. Rice University Web Week, Panel on Class Web Pages. March 18, 1997.
43. *Modeling of Storm-Time Relativistic Electron Fluxes: First Results*. A. A. Chan. Space Weather: Research to Operations Workshop, Boulder, Colorado. January 16-17, 1997.
44. *The Fully-Adiabatic Response of Outer-Zone MeV Electrons*. A. A. Chan and H.-J. Kim. GEM (Geospace Environment Modeling) Workshop, Snowmass, Colorado. June 26, 1996.

45. *Kinetic Excitation of MHD Waves*. A. A. Chan. Space Physics Seminar. NIWA (National Institute of Water and Atmospheric Research), Wellington, New Zealand. August 13, 1996.
46. *Plasma Instabilities Driven by Bounce Resonance and Drift-Bounce Resonance*. Research Seminar, Princeton Plasma Physics Laboratory. July 18, 1996.
47. *Magnetohydrodynamic Waves in The Near-Earth Space Environment*. A. A. Chan. Colloquium. Department of Physics, Sam Houston State University, Huntsville, Texas. March 23, 1996.
48. *La Grande Fête des Sous-Tempêtes (A Report on ICS-4, the 4th International Conference on Substorms)*. A. A. Chan. June 4, 1996. Department of Space Physics and Astronomy Seminar, Rice University.
49. *A Review of the Theory of Internally-Generated Magnetospheric Hydromagnetic Waves*. A. A. Chan. XXI IUGG General Assembly, Boulder, Colorado. July 2-14, 1995.
50. *MSFM Results for the November 1993 Magnetic Storm*. A. A. Chan and R. A. Wolf. GEM (Geospace Environment Modeling) Workshop, Snowmass, Colorado. June 28, 1995.
51. *Instructional Computing at Rice University*. A. A. Chan. Workshop on Instructional Computing in Space Physics, UCLA. March 30–31, 1995.
52. *Gyrokinetic Theory of Magnetospheric Drift Alfvén Ballooning Modes*. A. A. Chan. 1995 Cambridge Workshop on Multiscale Phenomena in Space Plasmas, Bermuda. February 20-25, 1995.
53. *Excitation of Ultra-Low-Frequency Electromagnetic Waves in the Earth's Magnetosphere*. A. A. Chan. Colloquium. Department of Physics, University of Houston. October 4, 1994.
54. *Excitation of MHD Waves by Ring Current Ions*. A. A. Chan. Research seminar. Los Alamos National Laboratory. July 21, 1994.
55. *Ultra Low Frequency Wave-Particle Interactions in Earth's Magnetosphere*. A. A. Chan. Taos Workshop on the Earth's Trapped Particle Environment, Taos, New Mexico. August 14–19, 1994.
56. *An Introduction to the Theory of Ballooning Modes*. A. A. Chan. Particles and Fields Seminar, Dept. of Space Physics & Astronomy, Rice University. April 18, 1994.
57. *Hamiltonian Chaos in the Interaction of Ring Current Ions with Magnetospheric Hydromagnetic Waves*. A. A. Chan. 1993 Cambridge Workshop on Chaos, Stochasticity and Strong Turbulence, MIT. July 1993.
58. *Hydromagnetic Wave-Particle Interactions in the Earth's Magnetosphere*. A. A. Chan. Colloquium. Department of Physics, Auckland University, Auckland, New Zealand. June 16, 1993.
59. *Radial Transport of Ring Current Ions due to Magnetospheric Hydromagnetic Waves*. A. A. Chan, M. K. Hudson and X. Li. Third Huntsville Workshop on Magnetospheric Plasma Models: Sources, Distribution, Transport, Energization, and Loss of Magnetospheric Plasmas, Guntersville, Alabama. October 5–8, 1992.
60. *Kinetic Effects on Magnetospheric Hydromagnetic Waves*. A. A. Chan. Department of Space Physics and Astronomy, Rice University, Houston, Texas. September 10, 1992.

61. *Interaction of Ring Current Ions with Magnetospheric Hydromagnetic Waves.* A. A. Chan, M. K. Hudson, R. E. Denton, and X. Li. 1992 Cambridge Workshop on Controversial Issues and New Frontier Research in Geoplasmas, MIT. August 10–14, 1992.
62. *Ring Current Ion Wave-Particle Interactions.* A. A. Chan, R. E. Denton, M. K. Hudson, and X. Li. XX IUGG General Assembly, Vienna, Austria. August 11–24, 1991.
63. *Excitation of Magnetospheric Alfvén Waves by Energetic Ring Current Protons.* A. A. Chan. Colloquium. Space Sciences Laboratory, University of California at Berkeley. February 20, 1990.
64. *Hamiltonian Test Particle Dynamics in a Perturbed Magnetic Dipole Field.* A. A. Chan, A.J. Brizard and Liu Chen. Conference on Research Trends in Nonlinear and Relativistic Effects in Plasmas, Center for Nonlinear Dynamics, La Jolla Institute, La Jolla, California. February 5–8, 1990.
65. *Interaction of Energetic Ring Current Protons with Magnetospheric Alfvén Waves: Excitation Mechanisms.* A. A. Chan. Princeton Plasma Physics Laboratory Theory Seminar, Princeton University. November 30, 1989.
66. *Interaction of Ring Current Protons with Magnetospheric Hydromagnetic Waves: Particle Transport.* A. A. Chan. Colloquium. Dept. of Physics & Astronomy, Dartmouth College. June 19, 1989.
67. *Hamiltonian Guiding Center Drift Motion in a Perturbed Dipole Field.* Colloquium. A. A. Chan. Institute of Geophysics and Planetary Physics, UCLA. December 14 1987.

Membership in Professional Organizations

American Physical Society, 1983 to present.

American Geophysical Union, 1986 to present.

International Association of Geomagnetism and Aeronomy, ULF Working Group, 1990 to present.

International Anesthesia Research Society, 1998-2000.