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Curriculum Vitae

Born	March 28, 1961, Honolulu, Hawaii, U.S.A.
Citizenship	U.S.A., Latvia.
Education	<p>B.S. Physics, University of California, Irvine, June 1984.</p> <p>M.S. Physics (Computational Physics), San Jose State University, California, August 1991. <i>Investigating the Motions and Energies of Ions Confined in a Uniform Magnetic Field.</i></p> <p>Abstract: The research described in this thesis is aimed at understanding the motion and energies of charged particles trapped in a constant magnetic field B. The study entailed writing a computer simulation of the motion of three ions confined in a constant, vertical B-field. While the simulation is general enough to allow n charged particles of any charge and mass, the cases constructed were only for hydrogen ions. Computed quantities for the ions included positions, velocities, kinetic and total energies. The calculated positions and velocities elucidate how a system of three charged particles behave under the classical assumption of the Lorentz force. We were especially interested in the variation with particle density of the kinetic energy exchange (coupling) between the energy related to motion parallel to and orthogonal to the confining magnetic field. It is found that as the density of the three particle system decreases, the coupling decreases.</p> <p>PhD. Physics, University of Heidelberg, July 2001. <i>Io Revealed in the Jovian Dust Streams.</i></p> <p>Short Summary: The Jovian dust streams are high-speed bursts of submicron-sized particles traveling in the same direction from a source in the Jovian system. Since their discovery in 1992, they have been observed by three spacecraft: Ulysses, Galileo and Cassini. The source of the Jovian dust streams is dust from Io's volcanoes. The charged and traveling dust stream particles have particular signatures in frequency space and in real space. The frequency-transformed Galileo dust stream measurements show different signatures, varying orbit-to-orbit during Galileo's first 29 orbits around Jupiter. Time-frequency analysis demonstrates that Io is a localized source of charged dust particles. Aspects of the particles' dynamics can be seen in the December 2000 joint Galileo-Cassini dust stream measurements. To match the travel times, the smallest dust particles could have the following range of parameters: radius: 6 nm, density: 1.35--1.75g/cm³, sulfur charging conditions, which produce dust stream speeds: 220\450 km/s (Galileo\Cassini) and charge potentials: 5.5\6.3V (Galileo\Cassini).</p>
Foreign Language	English (native), Italian, German (First-year college program, writing, reading, and grammar).
Employment	<p>May 2006-Present:</p> <p><i>Associate Researcher (long-distance): Planetary Science Institute, Tucson, Arizona.</i> Examining circum/interplanetary dust charging and dynamics, and the origin of water on Earth.</p> <p>2003-Present:</p> <p><i>Scientific Researcher: Istituto di Fisica dello Spazio Interplanetario, INAF Rome.</i> Mission work for existing and in-the-process-of-being- built infrared spectrometers on space missions: Dawn, Cassini, and Rosetta. Europlanet Small Bodies and Dust Working Group Coordinator.</p> <p>2004-2005:</p> <p><i>Adjunct Assistant Professor Astronomy, American University of Rome, Rome, Italy.</i> Astronomy instructor for the liberal arts university students.</p>

1998 to 2002:

Graduate student/Post-doc: Max-Planck-Institut für Kernphysik and University of Heidelberg. Examined circum/interplanetary dust charging and dynamics, including Io as a the origin of the Jovian dust streams, using in-situ dust data from the Galileo and Cassini spacecraft dust instruments.

(see <http://www.mpi-hd.mpg.de/dustgroup/~graps/>)

1995 to 1999:

Space Sciences Editor: Science and Engineering Network News Newsletter. Wrote column on Internet space science resources. (see: <http://www.amara.com/past/senn.html>)

1995 to 1998:

Scientific Programming: Solar Oscillations Investigations Project, Stanford University, California. Image processing and helioseismic oscillation software, and solar educational materials for the MDI SOHO instrument. (see <http://solar-center.stanford.edu>)

1995 to 1996:

Scientific Programming Consultant: Research Systems, Boulder, Colorado. Wrote wavelet software for the IDL programming language

1995:

- *Scientific Applications Consultant: Advent Systems, Mountain View, California.* Wavelet programming and radar data reduction.
- *HTML Programming Consultant: MacSciTech Users Association.* World Wide Web site work.

1994:

- *Technical Writer: Greenleaf Medical, Palo Alto, California.* Wrote a user manual for a Macintosh medical data acquisition system.
- *Research Scientist: Bay Area Environmental Research Institute, San Francisco, and NASA-Ames Research Center, Moffett Field, California.* Wavelet algorithms and applications.
- *Numerical Analysis Consultant: Alliance Laboratories, Redwood City, California.* Updated and rewrote thermocouple numerical analysis programs.

1986 to 1994:

Software Specialist II: Sterling Software, NASA-Ames Research Center. Infrared data analysis and interpretation for astronomical and atmospheric data from KAO, SpaceLab 2, ER-2, ground-based telescopes, laboratory prototype instruments, and simulated tropospheric data, database development for three ER-2 atmospheric missions, dynamics of chaotic orbital evolution of solar system objects, UV ring occultation data analysis from Voyager 2, detecting circumstellar dust around main sequence stars, beta-testing of Macintosh scientific commercial software, writing/editing technical manuals and conference proceedings, systems operations for eight Macintoshes, Unix systems administration for two Silicon Graphics workstations.

1993:

- *Consultant: NASA-Ames Research Center, Moffett Field, California.* Wrote bimonthly Digital Explorations newsletter for Atmospheric and Space Sciences divisions. *Consultant: Apple Computer, Cupertino, California.* Wrote User and Programmer manuals for the Scientist's Workbench application. *Consultant: Franklin and Marshall College, Pennsylvania.* Created list of infrared-excess star candidates for Infrared Space Observatory observations.

1984 to 1986:

Professional Research Assistant: LASP, University of CO, Boulder, Colorado. Ultraviolet data analysis for planetary ring data from the Voyager 2; and ultraviolet data analysis for Venus atmospheric and Comet Halley data from the Pioneer Venus.

1982 to 1984:

Technical Assistant: Jet Propulsion Laboratory, Pasadena, California. Ultraviolet data analysis for planetary ring data from the Voyager 2 Photopolarimeter Project.

1981 to 1986:

Research Assistant: Jet Propulsion Laboratory, Pasadena, California. Technical assistance for systematic photographic search for asteroids with Palomar Observatory's Schmidt telescopes. Co-discoverer of asteroid 1982 XB.

TALKS

2006 November "Watering the Earth", University of Southern California Physics Colloquium, Los Angeles, California.

2006 October "Watering the Earth", Division of Planetary Sciences of the AAS, Pasadena, California.

2006 September "Watering the Earth", European Planetary Science Congress #1, Berlin, DE.

2006 September "Watering the Earth", VII Convegno di Scienze Planetarie, San Felice Circeo-Rome, IT.

2006 April "Watering the Earth" (J. Lunine), and "Constraints for the Water", Consiglio Nazionale delle Ricerche Colloquium, Rome, IT.

2006 April "Constraints for the Earth's Water from Isotopic Abundances", European Geophysical Union, Vienna, Austria.

2006 April "Constraints for the Earth's Water from Isotopic Abundances", European Geophysical Union, Vienna, AT.

2005 October "From Where did Earth Get its Water?", Consiglio Nazionale delle Ricerche Colloquium, Rome, IT.

2005 October "From Where did Earth Get its Water?", INAF Astrophysics School, Volterra, IT.

2005 September "GEO Dust and Debris Fluxes and Charging Behavior" and "Dust Working Group Strategies: in the EUROPLANET framework", Dust in Planetary Systems, Lihue, Hawaii.

2005 September "GEO Dust and Debris Fluxes and Charging Behavior", Division of Planetary Sciences of the American Astronomical Society, Cambridge, UK.

2005 June "The Jovian Dust Streams", and "Jovian Dusty Plasma", International Space Sciences Institute: 'Dusty Rings Workshop', Bern, CH.

2005 February "Wavelets: A Tool for Science", Consiglio Nazionale delle Ricerche Colloquium, Rome, IT.

2005 January "GEO Dust and Debris Fluxes and Charging Behavior," VI Convegno di Scienze Planetarie, Aosta, IT.

2004 July "GEO Debris and Interplanetary Dust: Fluxes and Charging Behavior", COSPAR, Paris, FR

2004 February "The Jovian Dust Streams: A Window into Cosmic Dust Charging Processes", Osservatorio Astronomico di Capodimonte, Napoli, IT.

2003 November "Cosmic Dust Charging Processes," Universite de Fribourg Suisse Colloquium, Fribourg, CH.

2003 November "Where Did Earth Get its Water?" Universite de Fribourg Suisse Seminar, Fribourg, CH.

2003 November "Cosmic Dust Charging Processes," Consiglio Nazionale delle Ricerche Colloquium, Rome, IT.

2003 November "Io Revealed in the Jovian Dust Streams," Consiglio Nazionale delle Ricerche, Rome, IT.

2003 September "Wavelets for Seismology," Seismic Signals Related to Volcanic Unrest, Pantelleria, IT.

2003 September "Jupiter's Dusty Plasma Manifested," V Convegno di Scienze Planetarie, Gallipoli, IT.

2003 July "Reduction of GORID micrometeoroid and debris particles," Galileo/Ulysses/Cassini/StarDust 2003 Dust Workshop, Noordwijk, NL.

2003 May "Jupiter's Dusty Plasma Manifested," Astrophysics of Dust, Estes Park, Colorado.

2003 April "Jupiter's Dusty Plasma Manifested," European Geophysical Society, Nice, FR.

2002 August "Jovian Dust Streams: Current Results", Galileo/Ulysses/Cassini/StarDust 2002 Dust Workshop, Potsdam, DE.

2002 Jul/Aug "Fathom the Jovian Dust Streams: Recent Modeling Results", Asteroids, Comets and Meteors

2002, Berlin, DE.

2002 June "Fathom the Jovian Dust Streams", EuroJove Conference, Lisboa, PT.

2002 April "Fathom the Jovian Dust Streams", European Geophysical Society, Nice, FR.

2001 Nov/Dec "Io Revealed in the Jovian Dust Streams", Division of Planetary Sciences, New Orleans.

2001 September "Io Revealed in the Jovian Dust Streams", Seismic Phenomena Associated with Volcanic Activity, Tenerife, Canary Islands, ES.

2001 August "Io Revealed in the Jovian Dust Streams", Meteoroids 2001 International Conference, Kiruna, SE.

2001 July "Io Revealed in the Jovian Dust Streams", Galileo/Ulysses/Cassini/StarDust 2001 Dust Workshop, Heidelberg, DE.

2001 June "Io Revealed in the Jovian Dust Streams", Jupiter Symposium, Boulder, Colorado.

2001 June "Io Revealed in the Jovian Dust Streams", NASA-Ames Spaces Sciences Colloquium, Mountain View, California.

2001 May "Charging and Dynamics of Dust in Earth's Magnetosphere", ESA Earth Environment Contracts Presentations, ESTEC, Noordwijk, NL.

2001 May "Io Revealed in the Jovian Dust Streams", Max-Planck-Institut für Kernphysik Colloquium, Heidelberg, DE.

2000 October "Charging Processes for Dust Particles in Saturn's Magnetosphere", Division of Planetary Sciences, Pasadena, California.

2000 April "The Jovian Dust Streams: Io Reveals Itself", European Geophysical Society, Nice, France.

2000 April "Charging Processes for Dust Particles in Saturn's Magnetosphere", IAU Symposium 181: Dust in the Solar System, Canterbury, UK.

1999 November Colloquium: "Introduction to Wavelets," TU-Munich, Institute of Aeronautics, Garching, DE.

1999 October "Frequency Modulation and Evolution of Galileo Dust Detector Data", Division of Planetary Sciences, Padua, IT.

1999 August "Frequency Evolution of Galileo Dust Detector Data", Galileo/Ulysses/Cassini/StarDust 1999 Dust Workshop, Münster, DE.

1999 July "The Jovian Dust Streams: Io Dances with Jupiter's Magnetosphere", Asteroids, Comets, and Meteors 1999, Ithaca, New York.

1999 April "Time Series / Frequency Analysis of Galileo Dust Detector Data", European Geophysical Society, Den Haag, NL.

1998 October "The Origin of the Jovian Dust Streams", Division of Planetary Sciences, Madison, Wisconsin.

1998 August "On the Origin of the Jovian Dust Streams", Meteoroids 1998 International Conference, Tatranska Lomnica, SK.

1998 June Colloquium: "Astronomical Wavelets", Max-Planck-Institut für Kernphysik, Heidelberg, DE.

1998 May "Time-series analysis of Galileo Dust Detector data", Galileo/Ulysses/Cassini 1998 Dust Workshop, Univ of Maryland.

1998 March Seminar: "Wavelet Analysis in Astronomy", Cornell, Ithaca, New York.

1997 October Poster Talk: "South-North and Radial Traverses Through the Interplanetary Dust Cloud" Exozody Workshop, NASA-Ames Research Center, Mountain View, California.

1997 July Conducted 1 Day Workshop: "Wavelets: Introduction, Algorithms & Examples" for Alan Kay, Ted Kaehler, and the rest of the Squeak team, Walt Disney Imagineering, Palo Alto.

1996 March Stanford Helioseismology Seminar, "Introduction to Wavelet Applications."

1995 January Science and Engineering Applications on the Mac Conference "Introduction to Wavelets."

1994 August, 1995 January MacWorld Expo, "The Mac in Science", Boston, San Francisco.

July 1991 At the World Latvian Scientific Congress, Riga, Latvia titled "A Snapshot of the Vigorous Astronomical Research Currently Pursued at the NASA-Ames Research Center."

1993,1988,1987,1984,1983 At the Division of Planetary Sciences Meetings on the topic of Saturn's and Uranus' rings.

PUBLICATIONS

Dust Detection in the Solar System.

- Krüger, H., Graps, A. L., Proceedings of the Dust in Planetary Systems (Workshop, Sept 26-30, 2005, Kauai, Hawaii), SP-643 in press, February 2007. This volume of 55 refereed articles will be available from a public website soon.
- Graps, A. L., Grün, E., Svedhem, H., Krüger, H., Horanyi, M., Heck, A., Lammers, S. (2000), "Io as a Source of the Jovian Dust Streams", *Nature* 405, 48-50 (May 4, 2000)
- A. L. Graps, Green, S.F., McBride, N.M., McDonnell, J.A.M., Bunte, K., Svedhem, H., and Drolshagen, G. (2006), "GEO Debris and Interplanetary Dust: Fluxes and Charging Behavior", in "Dust in Planetary Systems", Krüger, H. and Graps, A. eds., ESA Publications, SP-643 in press February 2007).
- Graps, A.L., "Characterization of Jovian Plasma-Embedded Dust Particles", *Planetary and Space Sciences* (2006), *Planetary and Space Sciences*, Volume 54, Issue 9-10, Physics of Dusty Rings, Pages 911-918.
- Krüger, Harald, Graps, Amara L., Flandes, Alberto, Forsythe, Robert J., Hamilton, Douglas P., Horanyi Mihaly, Grün, Eberhard, "Ulysses jovian latitude scan of electromagnetically interacting dust streams" (2006), *Planetary and Space Sciences*, Volume 54, Issues 9-10, Pages 919-931
- Krüger, Harald; D. Bindschadler; S.F. Dermott; A. L. Graps; E. Grün; B.A. Gustafson; D.P. Hamilton; M.S. Hanner, M. Horányi; J. Kissel; B.A. Lindblad; D. Linkert; G. Linkert; I. Mann; J.A.M. McDonnell; R. Moissl; G.E. Morfill; C. Polanskey; G. Schwehm; R. Srama; H.A. Zook, "Five years of Ulysses dust data: 2000-2004" (2006), *Planetary and Space Sciences*, Volume 54, Issues 9-10, Pages 932-956,
- Krüger, Harald; N. Altobelli; B. Anweiler; S.F. Dermott; V. Dikarev; A. L. Graps; E. Grün; B.A. Gustafson; D.P. Hamilton; M.S. Hanner, M. Horányi; J. Kissel; M. Landgraf; B.A. Lindblad; D. Linkert; G. Linkert; I. Mann; J.A.M. McDonnell; R. Moissl; G.E. Morfill; C. Polanskey; G. Schwehm; R. Srama; H.A. Zook, "Galileo dust data from the jovian system: 1997-1999" (2006), *Planetary and Space Sciences*, Volume 54, Issues 9-10, Pages 879-910,
- Graps, Amara L.; Cerroni, Priscilla; Guest Editors (2005), "The Saturn Universe: A Cassini Workshop October 5-8, 2004", *Earth, Moon and Planets* 96 Nos. 3-4, June 2005.
- Krüger, Harald; Graps, Amara L.; Forsythe, Robert J.; Eberhard (2005), "Electromagnetically Interacting Dust Streams During Ulysses' Second Jupiter Encounter", *New Vistas in Dusty Plasma: Fourth International Conference on the Physics of Dusty Plasmas*, AIP Conference Proceedings, Volume 799, pp. 157-160.
- Harald Krüger, Mihaly Horanyi, Alexander V. Krivov and Amara L. Graps, "Jovian Dust: Streams, Clouds and Rings", in: *Jupiter: The Planet, Satellites & Magnetosphere*, eds. F. Bagenal, W. McKinnon, T. Dowling, Cambridge University Press, 2004.
- E. Grün, Dikarev, V., Krüger, H.; Kempf, S.; Moragas-Klostermeyer, G., Srama, R.; Frisch, P. C.; Graps, A. L., Landgraf, M. (2004), "Dust in interplanetary space and in the local galactic environment", in *Astrophysics of Dust*, editors: Witt, Adolf N., Clayton, Geoffrey C., Draine, Bruce T., ASP Conference Series 309.
- S.F. Green, A.L. Graps, "Gorid Data Analysis", in Summary Report for ESA Contract 6272/02/NL/EC : Processing, Analysis and Interpretation of Dust Data from Impact Detectors, 2004.

- Harald Krüger, Paul Geissler, Mihaly Horanyi, Amara L. Graps, Sascha Kempf, Ralf Srama, Georg Moragas-Klostermeyer, Richard Moissl, Torrence V. Johnson, Eberhard Gruen, "Jovian Dust Streams: A monitor of Io's volcanic plume activity," *Geophysical Research Letters* 30(21):2101, 2003 Nov 7.
- Graps, A. L. and Grün, E. (2000, "Dust in the Earth's Magnetosphere: Properties, Charging, and Dynamics", in Summary Report for ESA Contract 13145/98/NL/WK : Update of Statistical Meteoroid/Debris Models for GEO, 2000.
- Graps, A.L. and Grün, E., (2000) "Charging Processes for Dust Particles in Saturn's Magnetosphere," *Dust in the Solar System and Other Planetary Systems, Proceedings of the IAU colloquium 181 and COSPAR Colloquium 11, University of Kent, April 2000.*
- E. Grün, H. Krüger, A. L. Graps, D. P. Hamilton, A. Heck, G. Linkert, H. A. Zook, S. Dermott, H. Fechtig, B. A. Gustafson, M. S. Hanner, M. Horanyi, J. Kissel, B.A. Lindblad, D. Linkert, I. Mann, J. A. M. McDonnell, G. E. Morfill, C. Polansky, G. Schwehm, R. Srama (1998), "Galileo Observes Electromagnetically Coupled Dust in the Jovian Magnetosphere", *Journal of Geophysical Research* 103, No. E9, Pages 20, 011-20, 022, August 30, 1998.
- E. Grün, H. Krüger, S. Dermott, H. Fechtig, A. L. Graps, B. A. Gustafson, D. P. Hamilton, M. S. Hanner, A. Heck, M. Horanyi, J. Kissel, B. A. Lindblad, D. Linkert, G. Linkert, I. Mann, J. A. M. McDonnell, G. E. Morfill, C. Polansky, G. Schwehm, R. Srama, H. A. Zook (1997), "Dust Measurements in the Jovian Magnetosphere", *Geophysical Research Letters* 24, No. 17, 2171-2174.

Wavelets Introduction.

Graps, A.L.; "An Introduction to Wavelets", *IEEE Computational Sciences and Engineering*, Summer 1995, pp 50-61. This paper has been downloaded at amara.com by approximately 170 000 people since its publication in 1995 and has been referenced in papers, theses and books including: *The Illustrated Wavelet Transform Handbook* by Paul S. Addison (Institute of Physics Publishing, 2002), *The World According to Wavelets* by Barbara Hubbard (2000, AK Peters), and *Discovering Wavelets* by Edward Aboufadel and Steven Schlicker (1999, Wiley), and in hundreds of web sites.

Nonlinear curvefitting and testing self-gravity of Voyager 2 Uranus ring data.

Graps, A. L., M. R. Showalter, J. J. Lissauer, D. M. Kary (1995), "Optical Depth Profiles and Streamlines of the Uranian Epsilon Ring", *Astronomical Journal* 109, 2262-2273

Moon thermal infrared observations.

Sprague, A. L. , F. C. Witteborn, R. W. Kozlowski, D. P. Cruikshank, J. J. Bartholemew, and A. L. Graps (1993), "The Moon: Mid-Infrared (7.5-11.4 microns) Spectroscopy of Selected Regions", *Icarus* 100, 73-84.

Polycyclic aromatic hydrocarbon infrared detection in infrared galactic sources.

F. C. Witteborn, S. A. Sandford, J. D. Bregman, L. J. Allamandola, M. Cohen, D. H. Wooden, and A. L. Graps (1989), "New Emission Features in the 11-13 micron Region and Their Relationship to Polycyclic Aromatic Hydrocarbons", *Astrophysical Journal* 341, 270-277.

SpaceLab 2 infrared particle detection.

J.P. Simpson, F.C. Witteborn, A. Graps, G.G. Fazio, D.G. Koch (1993), "Particle Sightings by the Infrared Telescope on SpaceLab 2", *J of Spacecraft and Rockets* 30, 216-221.

Ultraviolet detection of interplanetary Lyman-alpha.

J.M. Ajello, A.I. Stewart, G.E. Thomas, and A. Graps (1987), "Solar Cycle Study of Interplanetary Lyman-Alpha Variations", *Astrophysical Journal* 317, 964-986.

Ultraviolet observations of Uranus from Voyager 2.

Arthur L. Lane, Charles W. Hord, Robert A. West, Larry W. Esposito, Karen E. Simmons, Robert M. Nelson, Brad D. Wallis, Bonnie J. Buratti, Linda J. Horn, Amara L. Graps (1986); "Photometry from Voyager 2: Initial Results from the Uranian Atmosphere, Satellites, and Rings", *Science* 233, 65-70.

Ultraviolet detection of ring material in Saturn's rings from Voyager 2.

- A. L. Graps, A. L. Lane, L. J. Horn, and K.E. Simmons (1984), "Evidence for Material between Saturn's A and F Rings from the Voyager 2 Photopolarimeter", *Icarus* 60, 409-415.
- A. L. Graps and A. L. Lane (1986), "Voyager 2 Photopolarimeter Experiment: Evidence for Tenuous Outer Ring Material at Saturn", *Icarus* 67, 205-210.
- Arthur L. Lane, Amara L. Graps, and Karen E. Simmons, "The C-Ring of Saturn: A High Resolution View of Some of its Structure", in *Planetary Rings*, ed by A. Brahic, Cepadues-Edition, Toulouse, 1982.

Popular Science.

- *Cosmic Dust* entry and its associated pages in Wikipedia.
- Amara Graps and Antal Juhasz (2001), "Dusty Phenomena in the Solar System", *Sky & Telescope*, January 2001, pp 56-63.
- Graps, Amara (1999), "Parallel Computing Allows Fluid Approach to Astrophysics", *Scientific Computing World*, October/November 1999, pp. 24-25.
- Graps, Amara (1999), "N-body Simulations Push Hardware and Software Limits", *Scientific Computing World*, April 1999, pp 30-32.
- Graps, Amara (1998), "Probability Offers Link Between Theory and Reality", *Scientific Computing World*, October 1998, pp 25-27.
- Graps, Amara (1998), "Wavelets are Stars in Astronomy Problems", *Scientific Computing World*, April 1998, pp 22-25.
- Graps, Amara (1997), "Interpreting the Sun's Vibrations", *Scientific Computing World*, October 1997, pp 18-20