

NAME: Gordon Chin

PRESENT POSITION: NASA/Goddard Space Flight Center, AST, Stellar Studies
Code 693.1 Planetary Systems Branch
Laboratory for Extraterrestrial Physics

RESEARCH AREA: Submillimeter receiver technology, submillimeter optically-pumped laser development, acousto-optic spectrometer development. Planetary and cometary atmosphere radiative transfer and line emission simulations. Development of spectral-line database and management software Observation and excitation calculation of molecular infrared and millimeter transitions in cometary and planetary atmospheres. Experimental control of chaotic systems - computational physics.

EXPERIENCE:

- 2005-Current Lunar Reconnaissance Orbiter (LRO) Project Scientist: LRO comprise of a low altitude Lunar orbiter scheduled for launch Q4 2008 with six competed instruments and one technology demonstration. LRO will assess resources, landing sites, and radiation environment to provide essential data for future Lunar robotics and manned missions as the first step in the Vision for Space Exploration.
- 2002-Current Co-Investigator on Mars Volcanic Emission and Life Scout (MARVEL): Lead investigator for the development and investigation with SIGNAL the submillimeter radiometer and spectrometer to detect and localize volatiles associated with volcanic and geothermal activity. Marvel was selected for Step 2 Concept Study for the 2007 Scout opportunity.
- 1998-Current: Member of the NSF ALMA Management Advisory Committee: Chair 2003-2004. ALMA is the Atacama Large Millimeter Array, a 64-telescope synthetic aperture array sited on the 16,000 ft Chajnator northern Chile plateau, with equal participation between North America, ESO, and Japan.
- 1998-Current Principal Investigator for a proposed Discovery-Class Mission, Vesper,: Vesper orbiter studies the Venus atmosphere from the surface to lower thermosphere. The Vesper Orbiter proposal was selected for Feasibility Study for Discovery 7. Current Vesper mission comprise a Venus orbiter and atmospheric probe.
- 1994: Small Explorer Program Scientist -Detailed to NASA HQ part-time. Responsible for the scientific and technical evaluation of proposals for the second set of Small Explorer missions.
- 1989-Current: Project Scientist for the Submillimeter Wave Astronomy Satellite (SWAS) - SWAS is a Small Explorer mission that will employ cooled Schottky submillimeter heterodyne receivers to observe water, oxygen, ^{13}CO , and neutral carbon (CI) in the interstellar medium. The satellite will survey interstellar cloud complexes at these spectral lines to investigate the process of star formation. The mission plans several years observing duration.

1979-Current: Astrophysicist, GSFC
1977-1979: NAS-NRC Postdoctoral Research Fellow, GSFC

AWARDS: 2004 NASA Group Achievement Award SWAS Team
2004 Goddard Performance Award
1997 Goddard Performance Award
1996 Goddard Special Act Award
1995 Goddard Special Act Group Award, SWAS I&T Team
1995 Goddard Performance Award
1994 NASA Exceptional Achievement Medal
1993 Goddard Performance Award
1989 Goddard Performance Award

EDUCATION: 1995 - Goddard Leadership Educational Series (GLES)
1977 - Ph.D. - Physics, Columbia University
1974 - M. Phil. - Physics, Columbia University
1972 - M.A. - Physics, Columbia University
1970 - B.A. - Physics, Columbia College

Publications

- 1977 "Observations of CO Emission from a Dense Cloud; Associated with the Supernova Remnant IC443, ", R.H. Cornett, G. Chin and G.R. Knapp, *Astron. & Astrophys.*, **54**, p. 889.
- 1977 "The Molecular Complexes in Orion", M. Kutner, K. Tucker, Chin and P. Thaddeus, *Ap. J.*, **215**, p. 521.
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- 1979 "Search for H₂ Emissions at 2.1 μm in Ten Southern Hemisphere Sources", N.S. Scoville, D. Y. Gezari, G. Chin, and R.R. Joyce, *Ast. J.*, **84**, P. 1571
- 1980 "Vibrationally Excited Silicon Monoxide Masers", D. Buhl, G. Chin, D. Glenar, T. Kostiuk, M.J. Mumma and F.J. Lovas, *Proceedings IAU Symposium No. 87 on Interstellar Molecules*.
- 1980 "A 10 Micron Heterodyne Receiver for Ultra-High Resolution Astronomical Spectroscopy", D. Buhl, G. Chin, J. Faris, T. Kostiuk, M.J. Mumma and D. Zipoy, *Proceedings IAU Symposium No. 87 on Interstellar Molecules*, p.633.
- 1980 "Design and Performance of Acousto-Optic Spectrometer for Use with Heterodyne Receivers", G. Chin and D. Buhl, *Proceedings Heterodyne Systems Technology Conference*, Williamsburg, VA.
- 1980 "Direct Observation of the Failure of Local Thermodynamic Equilibrium in the CO₂ (001) State in the Lower Atmosphere of Mars", M.J. Mumma, D. Buhl, G. Chin, D. Deming, F. Espenak, T. Kostiuk, *Proceedings IAU Symposium No. 96*.
- 1980 "Acousto-Optic Spectrometers for Radio Astronomy", G. Chin, D. Buhl and J.M. Florez, *International Optical Computing Conference, SPIE*, **231**.
- 1981 "The Discovery of Natural Gain Amplification in the 10 μm CO₂ Laser Bands on Mars: A Natural Laser", M.J. Mumma, D. Buhl, G. Chin, D. Deming, F. Espenak, T. Kostiuk and D. Zipoy, *Science*, **212**, p. 45.
- 1981 "Bulk and Integrated Acousto-Optic Spectrometers for Radio Astronomy", G. Chin D. Buhl and J.M. Florez, *Optical Information Processing for Aerospace Application*, NASA Conference Reference 2207, p. 85.
- 1981 "433 Micron Laser Heterodyne Observations of Galactic CO from Mauna Kea", D. Buhl, G.A. Koepf, G. Chin, N. McAvoy, H.R. Fetterman, D. D. Peck, B.J. Clifton, P. E. Tannenwald, P.F. Goldsmith and N.R. Erickson, *Infrared Astronomy, SPIE*, **280**.
- 1981 "Infrared Heterodyne Spectroscopy", M.J. Mumma, T. Kostiuk, D. Buhl, G.Chin, *Infrared Astronomy, SPIE*, **280**, p.111.

- 1982 "Infrared Heterodyne Spectroscopy", M.J. Mumma, T. Kostiuk, D. Buhl, G.Chin, *Infrared Astronomy, Optical Engineering*, **21**, p. 313.
- 1982 "CO (J=6→5) Distribution in Orion and Detection in other Galactic Sources", G.A. Koepf, D. Buhl, G. Chin, D.D. Peck, H.R. Fetterman, B.J. Clifton and P.E. Tannenwald, *Ap. J.*, **260**, p. 584.
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- 1984 "Molecular Astronomy using Heterodyne Detection at 691 GHz", D.D. Peck, H.R. Fetterman, D. Buhl, G. Chin and S. Petuchowski, *International Journal of Infrared and Millimeter Waves*, **Vol. 5 No. 3**, p 329.
- 1984 "Vibrational and Rotational Excitation of CO in Comets: Part I. Non-Equilibrium Calculations. Part II. Results of the Calculation for Standard Bright Comet, Comet IRAS-Aracki-Alcock, and Comet Halley", G. Chin and H.A. Weaver, *NASA TM 86122*.
- 1984 "Vibrational and Rotational Excitation of CO in Comets: Non-Equilibrium Calculations", G. Chin and H.A. Weaver, *Ap. J.*, **285**, p. 858.
- 1884 "Radioastronomical Observations of Comets IRAS-Araki-Alcock (1983d), and Sugano-Saigigusa-Fujikawa (1983e)," W. M. Irvine, Z. Abraham, M. A'Hearn, W. Altenhoff, C. H. Anderson, J Bally, W. Batria, A. Baudry, D. Bockelee-Morvan, G. Chin, J. Crovisier, I. DePater, D. Despois, L. Ekelund, E. Gerard, T. Hasegawa, C. Heiles, J. M. Hollis, W.Huchtmeier, N. Kaifu, R. Levreault, C. R. Masson, P. Palmer, M. Perault, L. J. Rickard, A. I. Sargent, E. Scalise, F. P. Schloerb, J. Schmidt, A. A. Stark, M. Stevens, P. Stumpff, E. C. Sutton, D. Swade, M. Skyes, B. turner, C. Wade, M. Walmsley, J. Webber, A. Winnberg, A. Wooten, *Icarus* (ISSN0019-1035), vol. 60, Oct. 1984, p. 215-220. Research supported by the Naturvetenskapliga Forskningsradet, NASA, and NSF.
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- 1984 "Acousto-Optic Spectrometers: Noise Contribution and System Considerations", G. Chin, *NASA X-693-84-9*.
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- 1987 "Optically Pumped Submillimeter Gas Lasers and the Prospects for Constructing Space-Qualifiable LO Systems", G. Chin, *International Journal of Infrared and Millimeter Waves*, **Vol. 8 No. 10**, p. 1219.
- 1987 "High Throughput Bit-Slice Front-End Processor for the New Goddard 10 μ m 58 x 62 Array Camera", G. Chin and D.Y. Gezari, *Infrared Astronomy with Arrays, Proceedings of the Workshop on Ground-based Astronomical Observations with Infrared Array Detector*, ed. Wynn-Williams and E.E. Becklin, University of Hawaii, p. 160.
- 1989 "Real Time Processor for Array Speckle Interferometry", G. Chin, J. Florez, R. Borelli, W. Fong, J. Miko, C. Trujillo, *IEEE Transactions on Nuclear Science*, **vol. 37, No. 1**, p. 958.
- 1990 "Fiber-Coupled High Resolution Infrared Array Spectrometer for the Kuiper Airborne Observatory", D.A. Glenar, D. Reuter, M.J. Mumma, G. Chin, G. Wiedemann, D.E. Jennings, K. Forrest, and H.A. Weaver, "*Astronomical Telescopes & Instrumentation for the 21st Century in Astronomy VII*", edited by D.L. Crawford, **SPIE Proceedings Series, vol. 1235**, Tucson, AZ, February 13-17, 1990, p. 933. Category: Instrumentation and Photography.
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- 1991 "NASA's Small Explorer Program," D.N., Baker, G. Chin, and R.F. Pfaff, Jr., *Physics Today*, December 1991, p. 44.
- 1991 "Report of the Heterodyne Submillimeter-Wave Sensors Panel," Robert Wilson *et al.*, *Workshop Proceedings: Sensor Systems for Space Astrophysics in the 21st Century*, ed. Barbara Wilson, JPL Publication 91-24, Vol. 2. p. 50.
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- 1992 "Optically pumped submillimeter laser heterodyne receivers- Astrophysical observations and recent technical developments," Gordon Chin, *IEEE, Proceedings (ISSN 0018-9219)*, **vol. 80, no. 11**, p. 1788-1799. Category: Lasers and Masers
- 1993 "Radio Observations Spatial and Temporal Variations in the Mesospheric Winds of Venus," David Buhl, Jeffrey J. Goldstein, Gordon Chin, Amer. Astron. Soc. Meeting, 183, #25.05.
- 1994 "Observations of Global Changes in the Wind Dynamics of the Venus Mesosphere: A Doppler Study of the 1.3 mm CO Line," D. Buhl, J.J. Goldstein, and G. Chin, submitted to *Icarus*.
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- 1999 “Implications of SWAS Observations for Water Abundance and Velocity Structure in Molecular Clouds,” M. L. Ashby, E. A. Bergin, R. Plume, J. M. Carpenter, G. J. Melnick, J. R. Stauffer, S. C. Kleiner, B. M. Patten, V. Tolls, Z. Wang, Y. F. Zhang, P. F. Goldsmith, M. Harwit, N. R. Erickson, J. E. Howe, R. L. Snell, D. A. Neufeld, D. G. Schieder, G. Winnewisser, G. Chin, *Amer. Astron. Society Meeting 195, #84.03*.
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- Harwit, N. R. Erickson, J. E. Howe, R. L. Snell, D. A. Neufeld, D. G. Koch, R. Schieder, G. Winnewisser, G. Chin, *Amer. Astron. Soc. Meeting 195, #84.02*
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- 1999 “Implications for Interstellar Chemistry and Star Formation,” E. A. Bergin, G. J. Melnick, J. R. Stauffer, M. L. Ashby, S. C. Kleiner, B. M. Patten, R. Plume, V. Tolls, Z. Wang, Y. F. Zhang, P. F. Goldsmith, M. Harwit, N. R. Erickson, J. E. Howe, R. L. Snell, D. A. Neufeld, D. G. Koch, R. Schieder, G. Winnewisser, *Amer. Astron. Soc. Meeting 195, #63.07*.
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- 1999 “Molecular Oxygen Abundance in Interstellar Clouds,” P. F. Goldsmith, M. L. Ashby, E. A. Bergin, S. C. Kleiner, G. J. Patten, R. Plume, J. R. Stauffer, V. Tolls, Z. Wang, Y. F. Zhang, M. Harwit, N. R. Erickson, J. E. Howe R. L. Snell, D. A. Neufeld, D. G. Koch, R. Schieder, G. Winnewisser, G. Chin, *Amer. Astron. Soc. Meeting 195, #63.04*.
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- 1999 “Water in Molecular Clouds,” R. L. Snell, J. E. Howe, N. R. Erickson, M. L. Ashby, E.A. Bergin, S. C. Kleiner, G. J. Melnick, B. M. Patten, R. Plume, J. R. Stauffer, V. Tolls, Z. Wang, Y. F. Zhang, P. F. Goldsmith, M. Harwit, D .A. Neufeld, D. G. Koch, R. Schieder, G. Winnewisser, G. Chin, *Amer. Astron. Soc. Meeting 195, #63.02*.
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