Curriculum Vitae

Dariusz C. (Darek) Lis

Education

1985 – 1989 University of Massachusetts at Amherst, Department of Physics and Astronomy, Ph. D.
1981 – 1985 University of Warsaw, Department of Physics.

Professional Experience

2019 – Scientist, Jet Propulsion Laboratory, California Institute of Technology.
2014 – 2019 Professor (Professeur des universités 1ère classe), Sorbonne University.
Director, Laboratory for Studies of Radiation and Matter in Astrophysics and Atmospheres (UMR8112 — CNRS, Paris Observatory/PSL University, Sorbonne University, École normale supérieure, University of Cergy-Pontoise).
2009 – 2014 Deputy Director, Caltech Submillimeter Observatory.
1998 – 2015 Senior Research Associate in Physics (now Research Professor), California Institute of Technology.
1992 – 1998 Senior Research Fellow in Physics (now Research Assistant Professor), California Institute of Technology.
1989 – 1992 Research Fellow in Physics, California Institute of Technology.
1985 – 1989 Research Assistant, University of Massachusetts, Five College Radio Astronomy Observatory.

Visiting Appointments

2015 – Visiting Associate in Physics, California Institute of Technology.
2013 Visiting Professor (Professeur des universités 1ère classe invité), École normale supérieure.
2011 Visiting Associate Professor (Maître de conférences invité), University of Bordeaux 1.
2007 Visiting Senior Astronomer (Astronome invité), Paris Observatory.
2003 Visiting Scientist, Max Planck Institut for Radio Astronomy.
1992 – 1994 Lecturer, University of California, Los Angeles.
1989 – 1991 Consultant (Postdoctoral Research Associate), Rensselaer Polytechnic Institute.

Awards

2014 NASA Group Achievement Award, *U.S. Herschel HIFI Instrument Team*.
2010 NASA Group Achievement Award, *Herschel HIFI Hardware Development Team*.
1985 Minister of Science and Higher Learning Fellowship, Poland.

Research

Astrophysics and astrochemistry of the interstellar medium, star formation. Evolution of molecular complexity in astrophysical environments. Volatile composition of comets and the origin of Earth's oceans. Cometary research featured on *National Geographic* and *CBC Quirks & Quarks*.
Astrophysics Data System: 237 refereed publications, 9700+ citations, h-index 56.

Teaching

Undergraduate *Classical Mechanics and Electromagnetism* and *Atomic and Molecular Spectroscopy*, California Institute of Technology; mentored *SURF* students. Undergraduate *Astronomy: The Nature of the Universe,* University of California at Los Angeles.

Research Administration

Responsible for the scientific leadership and all management aspects of the second largest scientific department of Paris Observatory, with a total academic and technical staff of 150, which carries out fundamental research in cosmology and early universe, formation and evolution of stars and galaxies, dynamics of the interstellar medium and stellar plasmas, astrochemistry, laboratory astrophysics, submillimeter instrumentation and Earth's remote sensing (2014 — 2019).

Funding Awards

2016 – 2018 *Modeling Tools for GUSTO*, CNES, APR, PI.
2009 – 2017 *Herschel Open Time Funding*, NASA, PI, NASA PI, Co-I.
2009 – 2014 *HIFI: Heterodyne Instrument for the Far-Infrared*, NASA (Herschel GT Funding), Co-I.

1998 – 1999 *Star Formation in the Galactic Center*, NASA (ISO Block Grant), PI.
1996 – 2013 *Astronomical Studies with the Caltech Submillimeter Observatory,* NSF, Co-PI.
1996 – 1998 *Oxygen in Molecular Clouds*, NASA (ISO Block Grant), Co-I.

Committees, Science Teams, Working Groups

2016 – 2019 NASA, COPAG, Far Infrared Science Interest Group, Leadership Council.
2016 – 2019 NASA, Origins Space Telescope, HERO Science Team; Solar System Working Group.
2015 – 2016 NASA, *Stratospheric Heterodyne Array System for Terahertz Astronomy* (Phase A), Co-I.
2007, 2016 ESA, Cosmic Vision CDF, *Far-Infrared Interferometer* (FIRI), Mission Study Proposal Team; *The Far-Infrared Spectroscopic Explorer* (FIRSPEX), M5 Mission Proposal, Co-I.
2005 International Astronomical Union, Editorial Board.
2003 – 2014 CCAT Feasibility Study, Site Evaluation Working Group; CCAT Science Working Group.
1999 – 2005 California Institute of Technology, Faculty Committee on Foreign Scholars.
1998 – 2015 Herschel/HIFI Instrument Team. Herschel Key Program Science Teams: HEXOS (deputy PI), CHESS (subprogram coordinator), HOP, HSSO, PRISMAS, and WISH.
1998 ESA, *HIFI: Heterodyne Instrument for the Far-Infrared*, Astronomy Co-I.
1996 – 2012 Caltech Submillimeter Observatory, Advisory Committee.

French Science Committees

JUICE, Comité Inter Organisms, CNES; *Euclid*, Comité Inter Organisms, CNES; ANO IRAM/ARC ALMA, Comité de Pilotage; DIM ACAV/DIM-ACAV$^+$, Comité de Pilotage; Paris Astronomical Data Centre, Comité de Pilotage; Labex ESEP, Comité Exécutif; Labex Plas@Par, International Scientific Committee; Observatoire de Paris, Comité Paritaire d'Etablissement.

Conference Organizing Committees

Velocity-Resolved FIR Imaging Spectroscopy of the Future: A Symposium Honoring P.F. Goldsmith, Organizer and SOC Chair (2018); Workshop *Oxygen in Space*, SOC (2018); Symposium *Science with a Large Cooled FIR Space Observatory*, EWASS, Co-Organizer (2017); *The Hydride Toolbox*, LOC (2016); Symposium *Future Prospects for FIR Space Astrophysics*, EWASS, Organizer and SOC Chair (2016); ESA/ESTEC Conference, *Water in the Universe: From Clouds to Oceans,* SOC (2016); IAU General Assembly Focus Meeting, *Search for Water and Life's Building Blocks in the Universe,* SOC (2015); Workshop *High Resolution Spectroscopy of the Interstellar Medium and Star-forming Regions: From Herschel to ALMA and Beyond*. SOC, Co-Chair (2015); *Submillimeter Astrophysics and Technology: A Symposium Honoring T.G. Phillips* OC (2009); Workshop *Submillimeter and Far-Infrared Laboratory Spectroscopy in Support of Herschel, SOFIA, and ALMA*, OC (2006); IAU Symposium 231, *Astrochemistry: Recent Successes and Future Challenges*, LOC (2005).

Time Allocation Committees

Stratospheric Observatory for Infrared Astronomy, US and German TAC (2014 – 2015); Combined Array for Research in Millimeter-Wave Astronomy TAC (2014); ALMA Cycle 0 Proposal Review Committee, ALMA Review Panel, Deputy Chair (2011 – 2012); Institut de Radioastronomie Millimétrique, Program Committee (1997 – 2001).

Review Panels

NSF, Large Scale ISM Panel; NASA, APRA/Laboratory Astrophysics, Interstellar Molecules Panel, Chair; ALMA, Development Study Review Panels; NASA, Astrophysics Theory Program, ISM Panel.

Books Edited

Submillimeter Astrophysics and Technology: A Symposium Honoring Thomas G. Phillips, ASP (2009).
Astrochemistry: Recent Successes and Current Challenges, CUP (2006).

Professional Affiliations

American Astronomical Society (Division of Planetary Sciences); American Chemical Society; International Astronomical Union (Divisions: Facilities, Technologies and Data Science; Planetary Systems and Bioastronomy; Interstellar Matter and Local Universe; Commissions: Radio Astronomy; Laboratory Astrophysics; Astrochemistry); International Scientific Radio Union.

Publications[†]

Dariusz C. (Darek) Lis

1. *The CARMA-NRO Orion Survey: The Filamentary Structure as Seen in $C^{18}O$.* S.T. Suri, Á. Sánchez-Monge, P. Schilke, S.D. Clarke, R.J. Smith, et al., *A&A*, in press (2019; arXiv:1901.0176). [†]
2. *Review: Far-Infrared Instrumentation and Technology Development for the Next Decade.* D. Farrah, K. Smith, D. Ardilla, C.M. Bradford, M. Dipirro, et al., *JATIS*, in press (2018; arXiv:1709.2389). [†]
3. *ALMA Autocorrelation Spectroscopy of Comets: The HCN/$H^{13}CN$ Ratio in Comet C/2012 S1 (ISON).* M.A. Cordiner, M.Y. Palmer, M. De Val-Borro, S.B. Charnley, L. Paganini, et al., *Ap. J.*, **870**, L26 (2019; 10.3847/2041-8213/aafb05). [†]
4. *ALMA Observations of the Young Protostellar System Barnard 1b: Signatures of an Incipient Hot Corino B1b-S.* N. Marcelino, M. Gerin, J. Cernicharo, A. Fuente, H.A. Wootten, et al., *A&A*, **620**, A80 (2018; 10.1051/0004-6361/201731955). [†]
5. *The CARMA—NRO Orion Survey.* S. Kong, H.G. Arce, J.R. Feddersen, J.M. Carpenter, F. Nakamura, et al., *Ap. J. S.,* **236**, 25 (2018; 10.3847/1538-4365/aabafc). [†]
6. *French SKA White Book — The French Community towards the Square Kilometer Array.* F. Acero, J.-T. Acquaviva, R. Adam, N. Aghanim, M. Allen, et al. (2017; arXiv:1712.6950).
7. *The Onset of Energetic Particle Irradiation in Class 0 Protostars.* C. Favre, A. López-Sepulcre, C. Ceccarelli, C. Dominik, P. Caselli, et al., *A&A*, **608**, A82 (2017; 10.1051/0004-6361/201630177). [†]
8. *Evidence for Disks at Early Stage in Class 0 Protostars?* M. Gerin, J. Pety, B. Commerçon, A. Fuente, J. Cernicharo, et al., *A&A*, **606**, L3 (2017; 10.1051/0004-6361/201630187). [†]
9. *Chemical Segregation in the Young Protostars Barnard 1b-N and S. Evidence for Pseudo-Disk Rotation in Barnard 1b-S.* A. Fuente, M. Gerin, J. Pety, B. Commerçon, M. Agúndez, et al., *A&A*, **606**, A35 (2017; 10.1051/0004-6361/201730963). [†]
10. *Deep, Broadband Spectral Line Surveys of Molecule-Rich Interstellar Clouds.* S.L. Widicus Weaver, J.C. Laas, L. Zou, J.A. Kroll, M.L Rad, et al., *Ap. J. Suppl.*, **232**, 3 (2017; 10.3847/1538-4365/aa8098). [†]
11. *The Physical and Chemical Structure of Sagittarius B2: II. Continuum Millimeter Emission of Sgr B2(M) and Sgr B2(N) with ALMA.* Á. Sánchez-Monge, P. Schilke, A. Schmiedeke, A. Ginsburg, R. Cesaroni, D.C. Lis, et al., *A&A*, **604**, A6, (2017; 10.1051/0004-6361/201730426). [†]
12. *New Limits to CO Outgassing in Centaurs.* M. Drahus, B. Yang, D.C. Lis, and D. Jewitt, *MNRAS,* **468**, 2879–2909 (2017; 10.1093/mnras/stw2227). [†]
13. *Survey of Cold Water Lines in Protoplanetary Disks: Indication of Systematic Volatile Depletion.* F. Du, E.A. Bergin, M. Hogerheijde, E. van Dishoeck, G.A. Blake, et al., *Ap. J.*, **842**, 98, (2017; 10.3847/1538-4357/aa70ee). [†]
14. *The Nature of Shocks Revealed by SOFIA OI Observations in the Cepheus E Protostellar Outflow.* A. Gusdorf, S. Anderlecht, B. Lefloch, A. Leurini, H. Wiesmeyer, et al., *A&A*, **602**, A9 (2017; 10.1051/0004-6361/201730454). [†]
15. *ALMA Mapping of Rapid Gas and Dust Variations in Comet C/2012 S1 (ISON): New Insights into the Origin of Cometary HNC.* M.A. Cordiner, J. Boissier, S.B. Charnley, A.J. Remijan, M.J. Mumma, et al., *Ap. J.*, **838**, 147 (2017; 10.3847/1538-4357/aa6590). [†]
16. *Detection of CO and HCN in Pluto's Atmosphere with ALMA.* E. Lellouch, M. Gurwell, B. Butler, T. Fouchet, P. Lavvas, et al. *Icarus*, **286**, 289 (2017; 10.1016/j.icarus.2016.10.013). [†]
17. *Thermal Physics of the Inner Coma: ALMA Studies of the Methanol Distribution and Excitation in Comet C/2012 K1 (PanSTARRS).* M.A. Cordiner, N. Biver, J. Crovisier, D. Bockelée-Morvan, M.J. Mumma, et al., *Ap. J.*, **837**, 177 (2017; 10.3847/1538-4357/aa6211). [†]
18. *CO Spectral Line Energy Distributions in Galactic Sources: Empirical Interpretation of Extragalactic Observations.* N. Indriolo, E.A. Bergin, J.R. Goicoechea, J. Cernicharo, M. Gerin, et al., *Ap. J.*, **836**, 117 (2017; 10.3847/1538-4357/836/1/117). [†]
19. *Narodziny światów. Z prochu powstałeś… czyli chemia kosmosu.* D.C. Lis, A. Karska, and E.F. van Dishoeck, *Urania*, **1/2017 (787)** (2017; Invited popular science cover article).

[†] Publications in refereed journals. ADS: 237 refereed publications, 9742 citations, h-index 56.

20. *Analysis of the Herschel/HEXOS Spectral Survey toward Orion South: A Massive Protostellar Envelope with Strong External Irradiation.* K. Tahani, R. Plume, E.A. Bergin, V. Tolls, T.G. Phillips, et al. *Ap. J.,* **832**, 12 (2016; 10.3847/0004-637X/832/1/12). †
21. *Herschel/HIFI Spectral Mapping of C^+, CH^+, and CH in Orion BN/KL: The Prevailing Role of Ultraviolet Irradiation in CH^+ Formation.* P.W. Morris, H. Gupta, Z. Nagy, J.C. Pearson, V. Ossenkopf, E. Falgarone, D.C. Lis, et al. *Ap. J.,* **829**, 15 (2016; 10.3847/0004-637X/829/1/15). †
22. *Star Formation and Feedback: A Molecular Outflow−Prestellar Core Interaction in L1689N*. D.C. Lis, A. Wootten, M. Gerin, L.Pagani, E. Roueff, F.F.S. van der Tak, C. Vastel, and C.M. Walmsley *Ap. J.*, **827**, 133 (2016; 10.3847/0004-637X/827/2/133). †
23. *The Far Infrared Spectroscopic Explorer (FIRSPEX): Probing the Lifecycle of the ISM in the Universe.* D. Rigopoulou, M. Caldwell, B.N. Ellison, C. Pearson, E. Caux, et al., *Proceedings SPIE Space Telescopes and Instrumentation 2016: Optical, Infrared, and Millimeter Wave,* **9904**, 99042K (2016; 10.1117/12.2233593).
24. *N_2H^+ and $N^{15}NH^+$ towards the Prestellar Core L16293 in L1689N.* F. Daniel, A. Faure, L. Pagani, G. Lique, M. Gerin et al., *A&A*, **592**, A45 (2016; 10.1051/0004-6361/201628192). †
25. *First Detection of Gas-Phase Ammonia in a Planet-Forming Disk: NH_3, N_2H^+, and H_2O in the Disk around TW Hydrae.* V.N. Salinas, M.R. Hogerheijde, E.A. Bergin, L.I. Cleeves, C. Brinch, et al. *A&A*, **591**, A122 (2016; 10.1051/0004-6361/201628172). †
26. *Isotopic Ratios of H, C, N, O, and S in Comets C/2012 F6 (Lemmon) and C/2014 Q2 (Lovejoy).* N. Biver, R. Moreno, D. Bockelée-Morvan, Aa. Sandqvist, P. Colom, J. Crovisier, D.C. Lis, et al. *A&A*, **589**, A78 (2016; 10.1051/0004-6361/201528041). †
27. *Water in Star-forming Regions with Herschel (WISH). VI. Constraints on UV and X-Ray Irradiation from a Survey of Hydrides in Low- to High-Mass Young Stellar Objects.* A.O. Benz, S. Bruderer, E.F. van Dishoeck, M. Melchior, S.F. Wempfler, F. van der Tak, J.R. Goicoechea, N. Indriolo, L.E. Kristensen, D.C. Lis, et al., *A&A*, **590**, A105 (2016; 10.1051/0004-6361/201525835). †
28. *The Physical and Chemical Structure of Sagittarius B2. I. Three-Dimensional Thermal Dust and Free-Free Continuum Modeling on 100 AU to 45 pc Scales.* A. Schmiedeke, P. Schilke, Th. Möller, Á. Sánczez-Monge, E. Bergin, C. Comito, T. Csengeri, D.C. Lis, S. Molinari, S.-L. Qin, and R. Rolffs, *A&A*, **588**, 143 (2016; 10.1051/0004-6361/201527311). †
29. *Collisional Excitation of Doubly and Triply Deuterated Ammonia ND_2H and ND_3 by H_2*. F. Daniel, C. Rist, A. Faure, E. Roueff, M. Gerin, D.C. Lis, P. Hily-Blant, A. Bacmann, and L. Wiesenfeld, *MNRAS*, **457**, 1535–1549 (2016; 10.1093/mnras/stw084). †
30. *Stratified NH and ND Emission in the Prestellar Core 16293E in L1689N*. A. Bacmann, F. Daniel, P. Caselli, C. Ceccarelli, D. Lis, C. Vastel, F. Dumouchel, F. Lique, and E. Caux, *A&A*, **587**, 26 (2016; 10.1051/0004-6361/201526084). †
31. *On the Ortho-to-Para Ratio in NH_2: Herschel/HIFI Observations of Ortho- and Para-NH_2 Rotational Transitions towards W31C, W49N, W51, and G34.3+0.1.* C.M. Person, A.O.H. Olofsson, R. Le Gal, E.S. Wirstrom, G.E. Hassel, et al. *A&A*, **586**, A128 (2016; 10.1051/0004-6361/201526781). †
32. *Herschel HIFI Observations of the Sgr A +50 km s^{-1} Cloud: Deep Searches for O_2 in Emission and Foreground Absorption.* A. Sandqvist, B. Larsson, A. Hjalmarson, P. Encrenaz, M. Gerin, et al. *A&A*, **584**, A118 (2015; 10.1051/0004-6361/201526280). †
33. *Ethyl Alcohol and Sugar in Comet C/2014 Q2 (Lovejoy).* N. Biver, D. Bockelée-Morvan, R. Moreno, J. Crovisier, P. Colom, D.C. Lis, A. Sandqvist, J. Boissier, D. Despois, and S. Milam, *Science Advances,* **1**, e1500863 (2015; 10.1126/sciadv.1500863). †
34. *Detection of Extragalactic Argonium, ArH^+, toward PKS 1830-211.* H. S. P. Müller, S. Muller, P. Schilke, E.A. Bergin, J.H. Black, M. Gerin, D.C. Lis, D.A. Neufeld, and S. Suri, *A&A Letters,* **582**, L4 (2015; 10.1051/0004-6361/201527254). †
35. *Velocity-Resolved [CII] Emission and $L[CII]/L_{FIR}$ Mapping along Orion.* J.R. Goicoechea, D. Teyssier, M. Etxaluze, P.F. Goldsmith, M. Gerin, et al. *Ap. J.*, **812**, 75 (2015; 0.1088/0004-637X/812/1/75). †
36. *The Distribution of Deuterated Formaldehyde within Orion KL.* C. Favre, E.A. Bergin, J.L. Neill, N.R. Crockett, Q. Zhang, and D.C. Lis, *Ap. J.*, **808**, 155 (2015; 10.1088/0004-637X/808/2/155). †
37. *Herschel Observations of Interstellar Chloronium. II. Detections toward G29.96-0.02, W49N, W51, and W3(OH), and Determinations of the Ortho-to-Para and $^{35}Cl/^{37}Cl$ Isotopic Ratios.* D.A. Neufeld,

J.H. Black, J. Cernicharo, M. Gerin, J.R. Goicoechea, et al., *Ap. J.*, **807**, 55 (2015; 10.1088/0004-637X/807/1/54). †

38. *A Herschel/HIFI Legacy Survey of HF and H_2O in the Galaxy: Probing Diffuse Molecular Cloud Chemistry*. P. Sonnentrucker, M. Wolfire, D.A. Neufeld, N. Flagey, M. Gerin, P. Goldsmith, D.C. Lis, and R. Monje, *Ap. J.*, **806**, 49 (2015; 10.1088/0004-637X/806/1/49). †
39. *Depletion of Chlorine into HCl Ice in a Protostellar Core. The CHESS Spectral Survey of OMC-2 FIR 4.* M. Kama, E. Caux, A. López-Sepulcure, V. Wakelam, C. Dominik, C. Ceccarelli, M. Lanza, F. Lique, B.B. Oschendorf, D.C. Lis, R.N. Cabarello, and A.G.G.M. Tielens, A&A, **574**, 107 (2015; 10.1051/0004-6361/201424737). †
40. *Herschel Survey of Galactic OH^+, H_2O^+, and H_3O^+: Probing the Molecular Hydrogen Fraction and Cosmic-Ray Ionization Rate.* N. Indriolo, D.A. Neufeld, M. Gerin, P. Schilke, A.O. Benz, et al., *Ap. J.*, **800,** 40 (2015; 10.1088/0004-637X/800/1/40). †
41. *Herschel/HIFI Line Surveys: Discovery of Interstellar Chloronium (H_2Cl^+)*. D.C. Lis, in Proceedings of the International Conference of Computational Methods in Sciences and Engineering 2010, eds. T.E. Simons and G. Maroulis, (AIP Conf. Proc. Vol. 1642), 346 (2015; 10.1063/1.4906690).
42. *[CII] Absorption and Emission in the Diffuse Interstellar Medium across the Galactic Plane.* M. Gerin, M. Ruaud, J. Goicoechea, B. Godard, M. de Luca, et al. *A&A*, **573**, A30 (2015; 10.1051/0004-6361/201424349). †
43. *Water Deuterium Fractionation in the High-Mass Star-Forming Region G34.26+0.15 based on Herschel/HIFI Data.* A. Coutens, C. Vastel, U. Hincelin, E. Herbst, D.C. Lis, L. Chavarria, M. Gerin, F.F.S van der Tak, C. M. Persson, P.F. Goldsmith, and E. Caux, *MNRAS*, **445**, 1299–1313 (2014; 10.1093/mnras/stu1816). †
44. *ALMA Measurements of the HNC and HC_3N Distributions in Titan's Atmosphere.* M.A. Cordiner, C. A. Nixon, N.A. Teanby, J. Sergiano, C.B. Charnley et al., *Ap. J. Letters*, **795,** L30 (2014; 10.1088/2041-8205/795/2/L30). †
45. *Collisional Excitation of Singly Deuterated Ammonia NH_2D by H_2.* F. Daniel, A. Faure, L. Wiesenfeld, E. Roueff, D.C. Lis, and P. Hily-Blant, *MNRAS*, **444**, 2544–2554 (2014; 10.1093/mnras/stu1670). †
46. *Mapping the Release of Volatiles in the Inner Comae of Comets C/2016 F6 (Lemmon) and C/2012 (ISON) using the Atacama Large Millimeter/Submillimeter Array.* M.A. Cordiner, A.J. Remijan, J. Boissier, S.N. Milam, M.J. Mumma, et al., *Ap. J. Letters,* **792***,* L2 (2014; 10.1088/2041-8205/792/1/L2). †
47. *Herschel HIFI Observations of O_2 toward Orion: Special Conditions for Shock Enhanced Emission.* J.-H. Chen, P.F. Goldsmith, S. Viti, R. Snell, D.C. Lis, et al., *Ap. J.,* **793**, 111 (2014; 10.1088/0004-637X/793/2/111). †
48. *The W43-MM1 Mini-Starburst Ridge, A Test for Star Formation Efficiency Models.* F. Louvet, F. Motte, P. Hennebelle, A. Maury, Q. Nguyen-Luong, I. Bonnell, S. Bontemps, A. Gusdorf, T. Hill, F. Gueth, N. Peretto, A. Duarte-Cabral, G. Stephan, P. Schilke, T. Csengeri, and D.C. Lis, *A&A*, **570**, A15 (2014; 10.1051/0004-6361/201423603). †
49. *Herschel Observations of Extraordinary Sources: Analysis of the Full Herschel/HIFI Molecular Line Survey of Sagittarius B2(N).* J.L. Neill, E.A. Bergin, D.C. Lis, P. Schilke, N.C. Crockett, C. Favre, M. Emprechtinger, C. Comito, S.-L. Qin, D.E. Anderson, et al., *Ap. J.*, **789**, 8 (2014; 10.1088/0004-637X/789/1/8). †
50. *Upper Limits to Interstellar NH^+ and para-NH_2^- Abundances. Herschel-HIFI Observations towards Sgr B2(M) and G10.6-0.4 (W31C).* C.M. Persson, M. Hajigholi, G. Hassel, A.O.H. Olofsson, J.H. Black, E. Herbst, H.S.P. Müller, J. Cernicharo, E.W. Wirström, M. Olberg, Å. Hjalmarson, D. Lis, and H. Cuppen, M. Gerin, K.M. Menten, *A&A*, **567**, A130 (2014; 10.1051/0004-6361/201423748). †
51. *Herschel Observations of Extraordinary Sources: Analysis of the HIFI 1.2 THz Wide Spectral Survey toward Orion KL I. Methods.* N.R. Crockett, E.A. Bergin, J.L. Neill, C. Favre, P. Schilke, D.C. Lis, T.A. Bell, G.A. Blake, J. Cernicharo, M. Emprechtinger, et al., *Ap. J.*, **787**, 112 (2014; 10.1088/0004-637X/787/2/112). †
52. *Complex Organic Molecules in Comets C/2012 F6 (Lemmon) and C/2013 R1 (Lovejoy): Detection of Ethylene Glycol and Formamide* N. Biver, D. Bockelée-Morvan, V. Debout, J. Crovisier, J. Boissier,

D.C. Lis, N. Dello Russo, R. Moreno, F. Colom, G. Paubert, R. Vervack, and H.A. Weaver, *A&A Letters*, **566**, L5 (2014; 10.1051/0004-6361/201423890). †

53. *Ubiquitous Argonium (ArH^+) in the Diffuse Interstellar Medium: A Molecular Tracer of Almost Purely Atomic Gas.* P. Schilke, D.A. Neufeld, H.S.P. Müller, C. Comito, E.A. Bergin, D.C. Lis, M. Gerin, J.H. Black, et al., *A&A*, **566**, A29 (2014; 10.1051/0004-6361/201423727). †
54. *Performance of the Caltech Submillimeter Observatory Dual-Color 180-720 GHz Balanced SIS Receivers.* J.W. Kooi, A. Chamberlin, R. Monje, A. Kovacs, H. Yoshida, B. Force, K. Cooper, D. Miller, M. Gould, D.C. Lis, R. LeDuc, J.A. Stern, and T.G. Phillips, *IEEE Trans. THz Sci. Technol.*, **4**, 149–164 (2014; 10.1109/TTHZ.2013.2293117). †
55. *Widespread Rotationally-Hot Hydronium Ion in the Galactic Interstellar Medium.* D.C. Lis, P. Schilke, E.A. Bergin, M. Gerin, J.H. Black, C. Comito, M. De Luca, B. Godard, R. Higgins, F. Le Petit, T.G. Phillips, J.C. Pearson, and S. Yu, *Ap. J.,* **785***,* 135 (2014; 10.1088/0004-637X/785/2/135). †
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236. *Statistical Properties of Centroid Velocity Increments in the ρ Ophiuchi Molecular Cloud*. D.C. Lis, J. Keene, Y. Li, T.G. Phillips, and J. Pety, *Ap. J.*, **504**, 889–899 (1998). †
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244. *High-Frequency Measurements of the Spectrum of Sgr A**. E. Serabyn, J. Carlstrom, D.C. Lis, T.R. Hunter, J.H. Lacy, and R. Hills, *Ap. J. Letters*, 490, L77–L81 (1997). †
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250. *Characterization of a Submillimeter Hornless Camera Using a Monolith Silicon Bolometer Array for the Caltech Submillimeter Observatory*. N. Wang, T. Hunter, D. Benford, E. Serabyn, D.C. Lis, T.G. Phillips, S.H. Harvey, K. Boyce, A. Szymkowiak, J. Gygax, C. Allen, and B. Mott, *Applied Optics*, 35, 6629–6640 (1996). †
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252. *FTS Atmospheric Transmission Measurements and Observations of Planetary Atmospheres*. E. Serabyn, E.W. Weisstein, and D.C. Lis, in *The Physics and Chemistry of Interstellar Molecular Clouds*, eds. G. Winnewisser and G. Pelz (Springer), 377–379 (1995).
253. *Atomic Carbon and CO Isotope Emission in the Vicinity of the Orion Bar*. J.A. Tauber, D.C. Lis, J. Keene, P. Schilke, and T.H. Bűttgenbach, *A&A*, **297**, 567–573 (1995). †
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259. *Modeling Transient Heating in the Chamaeleon Diffuse Cloud: VSGs, PAHs or HACs?* S.D. Doty, C.M. Leung, and D.C. Lis, in *The First Symposium on the Infrared Cirrus and Diffuse Interstellar Clouds*, eds. R. Cutri and W. Latter (ASP Conference Series, Vol. 58), 408 (1994).
260. *The Morphology of a Bright Rim in NGC 2264: Early Stages of High Mass Star Formation*. J.A. Tauber, D.C. Lis and P.F. Goldsmith, *Ap. J.*, **403**, 202–210 (1993). †
261. *Millimeter-Wavelength Aperture Synthesis Observations of Massive Star-Forming Regions in Sagittarius B2*. D.C. Lis, P.F. Goldsmith, N.Z. Scoville, and J.E. Carlstrom*, Ap. J.*, **402**, 238–248 (1993). †
262. *Morphology of the Dust Emission and High-Mass Star Formation in the Galactic Center*. D.C. Lis and J.E. Carlstrom, in *Sky Surveys: Protostars to Protogalaxies*, ed. B. Soifer (ASP Conference Series), 55–59 (1993).
263. *Remote Observing with the Caltech Submillimeter Observatory*. D.C. Lis and K. Young, in *Observing at a Distance*, eds. D. Emerson and R. Clowes (World Scientific), 15–18 (1993).
264. *Dust Emission in the Galactic Center*. D.C. Lis and J.E. Carlstrom, in *Back to the Galaxy*, eds. S. Holt and F. Verter (AIP Conference Proceedings 278), 52–55 (1993).
265. *High Angular Resolution Far-infrared Observations of Sgr B2*. P.F. Goldsmith, D.C. Lis, D.F. Lester, and P.M. Harvey, *Ap. J.*, **389**, 338–346 (1992). †

266. *Millimeter Continuum Observations of Galactic Center Giant Molecular Cloud Cores*. D.C. Lis, J.E. Carlstrom, and J. Keene, *Ap. J.*, **380**, 429–440 (1991). †
267. *Location of the Thermal Continuum Source Sagittarius D*. D.C. Lis, *Ap. J. Letters*, **379**, L53–L56 (1991). †
268. *Infrared Emission from Isolated Dust Clouds in the Presence of Very Small Dust Grains*. D.C. Lis and C.M. Leung, *Icarus*, 91, 7–13 (1991). †
269. *Size and Density Distribution of Very Small Dust Grains in the Barnard 5 Cloud*. D.C. Lis and C.M. Leung, *Ap. J. Letters*, 372, L107–L111, (1991). †
270. *Protostellar Condensations in the Core of NGC 2024*. D.C. Lis, J.E. Carlstrom, and T.G. Phillips, *Ap. J.*, 370, 583–589 (1991). †
271. *High Density Gas in the Core of the Sagittarius B2 Molecular Cloud*. D.C. Lis and P.F. Goldsmith*, Ap. J.*, 369, 157–168 (1991). †
272. *A Size Upper Limit and Position for the HCN Maser in CIT 6*. J.E. Carlstrom, W.J. Welch, P.F. Goldsmith and D.C. Lis, *A. J.*, 100, 213–215 (1990). †
273. *Modeling of the Continuum and Molecular Line Emission from the Sagittarius B2 Molecular Cloud*. D.C. Lis and P.F. Goldsmith, *Ap .J.*, **356**, 195–210 (1990). †
274. *High Angular Resolution Submillimeter Observations of Sagittarius B2.* P.F. Goldsmith, D.C. Lis, R. Hills, and J. Lasenby, *Ap. J.,* **350**, 186–194 (1990). †
275. *Far Infrared and Submillimeter Continuum Observations of the Sagittarius B2 Molecular Cloud Core.* D.C. Lis, P.F. Goldsmith, R. Hills, and J. Lasenby, in *Submillimetre Astronomy*, eds. G. Watt and A. Webster (Kluwer), 183–184 (1990).
276. *Search for Circular Polarization of HCN Maser Emission in CIT 6.* D.C. Lis, P.F. Goldsmith, and C.R. Predmore, *Ap. J.,* **341**, 823–827 (1989). †
277. *Dust Emission in the Sagittarius B2 Molecular Cloud Core.* D.C. Lis and P.F. Goldsmith, in *Interstellar Dust: Contributed Papers*, eds. A. Tielens and L. Allamandola (NASA CP-3036), 205–209, (1989).
278. *CO Isotope Studies and Mass of the Sagittarius B2 Molecular Cloud.* D.C. Lis and P.F. Goldsmith, *Ap. J.*, **337**, 704–711 (1989). †
279. *The Sagittarius B2 Molecular Cloud: An Extreme Case of a Galactic center Molecular Cloud.* Ph.D. Thesis, University of Massachusetts at Amherst. (1989). †
280. *Summary of some Observations of Peculiar Red Giants with IRAM 30m Radiotelescope.* A. Omont, S. Guilloteau, R. Lucas, J.J. Benayoun, J. Cernicharo, E. Narcessian, M. Morris, P.F. Goldsmith, and D.C. Lis*,* in *Evolution of Peculiar Red Giant Stars,* eds. H. Johnson and B. Zuckerman (Cambridge Univ. Press), 373 (1989).
281. *^{13}CO and C^{18}O Observations of the Sgr B2 Molecular Cloud: Molecular Abundances and Column Densities.* D.C. Lis and P.F. Goldsmith, in *Molecular Clouds in the Milky Way and External Galaxies*, eds. R. Dickman, R. Snell and J. Young (Springer), 191–192 (1988).
282. *Linear Polarization of HCN Maser Emission in CIT 6.* P.F. Goldsmith, D.C. Lis, A. Omont, S. Guilloteau, and R. Lucas, *Ap. J.,* **333**, 873–879 (1988). †
283. *Linear Polarization of Millimeter-Wave Emission Lines in Clouds without Large Velocity Gradients.* D.C. Lis, P.F. Goldsmith, R.L. Dickman, C.R. Predmore, A. Omont and J. Cernicharo, *Ap. J.,* **328**, 304–314 (1988). †
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285. *1300 Micron Continuum Observations of the Sagittarius B2 Molecular Cloud Core.* P.F. Goldsmith, R.L. Snell, and D.C. Lis, *Ap. J. Letters,* **313**, L5–L9 (1987). †

Invited Presentations

Dariusz C. (Darek) Lis

1. *Far-Infrared Spectroscopic Universe.* Colloquium, Shanghai Normal University, Shanghai, China (October 2018).
2. *The Complex Far-Infrared Universe.* Colloquium, NASA Jet propulsion Laboratory, Pasadena, CA (July 2018).
3. *The Complex Molecular and Atomic Universe.* Colloquium, NASA Ames Research Center, Mountain View, CA (May 2018).
4. *The Complex Molecular and Atomic Universe.* Colloquium, Purple Mountain Observatory, Chinese Academy of Sciences, Nanjing, China (May 2018).
5. *Terahertz Space Science of the Future.* The 29th IEEE International Symposium on Space Terahertz Technology, Pasadena, CA (March 2018).
6. *Complex Organic Molecules in Hot Cores and Hot Corinos.* Astronomy Department Seminar, Columbia University, New York, NY (February 2018).
7. *The Complex Molecular Universe.* A symposium honoring Karl M. Menten, *35 Years of Tuning in to the Molecular Universe*. Bonn, Germany (September 2017).
8. *ALMA and Herschel Observations of Hot Cores and Hot Corinos*. Symposium *Molecules in Space: Linking the Interstellar Medium to Exoplanets.* American Chemical Society Fall National Meeting, Washington, DC (August 2017; Invited review talk).
9. *Far-Infrared Spectroscopy: Herschel, SOFIA, ALMA and Beyond.* Astronomy Department Seminar, Columbia University, New York, NY (May 2017).
10. *Solar System Science with the Origins Space Telescope*. OST Heterodyne Instrument Workshop. Paris Observatory, Paris, France (May 2017).
11. *Ortho-to-Para Ratio in Water in the Interstellar Medium.* Workshop *Nuclear Spin Effects in Astrochemistry*, University of Grenoble, Grenoble, France (May 2017).
12. *Solar System Opportunities with SOFIA*. Conference *Spectroscopy with SOFIA: New Results and Future Opportunities*. Schloss Ringberg, Germany (March 2017).
13. *Spectral Line Surveys — From Herschel to ALMA.* Workshop *Complex Organic Molecules in Space*, University of Cergy-Pontoise, France (February 2017).
14. *Building Stars, Planets, and Basic Ingredients of Life in Space.* Symposium *Interstellar Shocks: Models, Observations, and Experiments,* Toruń, Poland (September 2016; Invited public lecture).
15. *Hydrides in Space: From Herschel to ALMA.* Symposium to Honor Prof. Jacek Krełowski, Toruń, Poland (June 2016).
16. *Far-Infrared Astrophysics after Herschel*. Universities Space Research Association, Baltimore, MD (May 2016).
17. *Far-Infrared Spectroscopy and Astrochemistry after Herschel*. Far-Infrared Surveyor Workshop, Pasadena, CA (June 2015).
18. *Les Activités Plasmas au LERMA*. Journée Laboratoire de Physique des Plasmas, Paris Observatory, Meudon, France (March 2015).
19. *Water in the Solar System as Seen by Herschel.* 2014 Gothenburg Lise Meitner Award Symposium to Honor Ewine van Dishoeck, Gothenburg, Sweden (September 2014).
20. *Herschel/HIFI Measurements of the Ortho-to-Para Ratio in Interstellar Water.* Workshop on Nuclear Spin Effects in Astrochemistry, Gothenburg, Sweden (June 2014).
21. *Spectroscopy and Astrochemistry with Herschel.* Southeast Regional Meeting of the American Chemical Society, Atlanta, GA (November 2013).
22. *Spectroscopy and Astrochemistry with Herschel.* NHSC Workshop, Exploiting the Herschel Archive, Pasadena, CA (August 2013).

23. *Recent Astrochemistry Results from Herschel.* École Normale Supérieure, Paris, France (April 2013).
24. *Astrochemistry Lessons from Herschel.* Astrochemistry in the ALMA Era, Copenhagen, Denmark (January 2013; Invited review talk).
25. *Major Spectroscopy Results from HEXOS*. Molecular Spectroscopy in the Era of Far-Infrared Astronomy, Atlanta, GA (October 2012).
26. *Molecular Line Studies with the GLT—A Herschel Perspective.* The Greenland Telescope Project Workshop, Cambridge, MA (September 2012).
27. *Recent Spectroscopy Results from Herschel/HIFI*. Colloquium, Northwestern University, Evanston, IL (March 2012).
28. *Recent Spectroscopy Results from Herschel/HIFI*. SOFIA Colloquium, USRA, NASA Ames Research Center, Mountain View, CA (February 2012).
29. *Hot, Metastable Hydronium Ion in the Galactic Center*. Royal Society Discussion Meeting on *Chemistry, Astronomy, and Physics of* H_3^+, Kavli Royal Society International Centre, United Kingdom (February 2012).
30. *Ocean-Like Water in Comet 103P/Hartley 2*. Herschel-Spitzer-WISE JPL Science Fair, Pasadena, CA (October 2011).
31. *Molecules in Astrophysical Environments*. Federation of Analytical Chemistry and Spectroscopy (FASS) Conference, Reno, NV (October 2011).
32. *Recent Spectroscopic Results from the Herschel Space Observatory*. Séminaire, Laboratoire d'Astrophysique de Bordeaux, Bordeaux, France (June 2011).
33. *Astrochemistry and High-Resolution Spectroscopy with ALMA*. ALMA Community Day, Pasadena, CA (March 2011).
34. *Isotopic Ratios in the Interstellar Medium.* ALMA: Extending the Limits of Astrophysical Spectroscopy. Victoria, British Columbia, Canada (January 2011; Invited review talk).
35. *Star Formation and Interstellar Medium: The Herschel View.* The Submillimeter Universe: The CCAT View, Ithaca, NY (November 2010).
36. *Herschel Observations of Molecules in Starforming Regions.* The Chemical Cosmos, Grenoble, France (October 2010).
37. *Herschel/HIFI Line Surveys: Discovery of Interstellar Chloronium* (H_2Cl^+)*.* Spectroscopy of Molecular Ions in Laboratory and in Space, Kos, Greece (October 2010).
38. *Herschel Early Results in High-Mass Star Formation.* Great Barriers in Star Formation, Townsville, Australia (September 2010; Invited review talk).
39. *Ancillary Data and Tools for Spectral Line Surveys: HEXOS Perspectives*. From Data Cubes to Science: Advanced Tools for ALMA, Cologne, Germany (October 2009).
40. *CCAT Galactic Science*. CCAT Partnership Meeting, Observatoire de Paris, Paris, France (September 2009).
41. *CSO Status, Upgrade Plans, and Galactic Science*. Caltech Long Wavelength Astronomy Retreat, Oxnard, CA (September 2009).
42. *Herschel/HIFI: A Window to the Molecular Universe*. Astronomy Colloquium, Academia Sinica Institute of Astronomy and Astrophysics, Taipei, Taiwan (June 2009).
43. *Novel Imaging and Spectroscopy Instruments for the CSO and CCAT.* Millimeter and Submillimeter Astronomy at High Angular Resolution, Academia Sinica, Taipei, Taiwan (June 2009).
44. *Herschel/HIFI: A Window to the Molecular Universe*. Astronomy Colloquium, National Radio Astronomy Observatory/University of Virginia, Charlottesville, VA (April 2009).
45. *Hydrides in Space (CSO Perspective)*. Submillimeter Astrophysics and Technology: A Symposium Honoring Thomas G. Phillips, California Institute of Technology, Pasadena, CA (February 2009).
46. *Submillimeter Spectroscopy of Hydrides and Deuterides*. Colloquium, NASA Ames Research Center, Mountain View, CA (November 2008).

47. *Submillimeter Absorption Spectroscopy*. Workshop on Absorption Spectra of Transluscent Interstellar Clouds, Special Astrophysical Observatory of the Russian Academy of Sciences, Northern Caucasus, Russia (August 2008).
48. *Hydrogen Isocyanide in Comets and the Interstellar Medium*. Caltech Submillimeter Observatory, Hilo, HI (July 2008).
49. *Astrochemistry with CCAT*. Spectroscopy with CCAT: Science and Instrumentation Workshop. University of Colorado, Boulder, CO (May 2008).
50. *Hydrogen Isocyanide in Comets and the Interstellar Medium*. Laboratoire d'Etudes Spatiales et d'Instrumentation en Astrophysique, Observatoire de Meudon, France (February 2007).
51. *Solar System Science with eSMA*. eSMA Workshop, Leiden Observatory, Leiden, The Netherlands (February 2007).
52. *The Cornell Caltech Atacama Telescope*. Laboratoire d'Etude du Rayonnement et de la Matière en Astrophysique, Observatoire de Paris, France (January 2007).
53. *Deuteration and Depletion in Cold ISM*. Laboratoire d'Étude du Rayonnement et de la Matière en Astrophysique, Observatoire de Paris, France (January 2007).
54. *The Cornell Caltech Atacama Telescope*. Institut d'Astrophysique Spatiale, Université Paris Sud, Orsay, France (January 2007).
55. *Herschel/HIFI Surveys.* CCAT Partnership Meeting, Cornell University, Ithaca, NY (July 2006).
56. *Herschel/HIFI Science.* Herschel Workshop, Jet Propulsion Laboratory, Pasadena, CA (June 2006).
57. *Deuteration and Depletion: Tracing the Physical Conditions in Dense, Cold ISM.* Astrophysics Seminar, Northwestern University, Evanston, IL (May 2006).
58. *Herschel/HIFI Observations of Extraordinary Objects: The Orion and Sgr B2 Starforming Regions.* HIFI Key Program Coordination Workshop, Leiden, The Netherlands (February 2006).
59. *Contemporary Millimeter/FIR Instruments and ALMA: CSO and HIFI.* ALMA Science Workshop, College Park, MD (May 2004).
60. *Dust Distribution in the Milky Way.* IRAM in the ALMA/Herschel/Planck Era, Grenoble, France (December 2003).
61. *Solar System Studies with the Atacama Submillimeter Telescope.* Cornell/Caltech Atacama Submillimeter Telescope Workshop, Pasadena, CA (October 2003).
62. *Deuterium Fractionation in Cold, Dense Interstellar Medium*. Astronomy Colloquium, Max Planck Institute for Radio Astronomy and Bonn University, Bonn, Germany (August 2003).