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Molecular fingerprints of star formation throughout the Universe : a space-based infrared study

Lahuis, F.

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Bibliography

- Aalto, S. 2005, in IAU Symposium, ed. D. C. Lis, G. A. Blake, & E. Herbst, 270
- Alexander, R. D., Clarke, C. J., & Pringle, J. E. 2005, Constraints on the ionizing flux emitted by T Tauri stars, *MNRAS*, 358, 283
- . 2006, Photoevaporation of protoplanetary discs - I. Hydrodynamic models, *MNRAS*, 369, 216
- Allamandola, L. J., Sandford, S. A., Tielens, A. G. G. M., & Herbst, T. M. 1992, Infrared spectroscopy of dense clouds in the C-H stretch region - Methanol and 'diamonds', *ApJ*, 399, 134
- André, P. & Montmerle, T. 1994, From T Tauri stars to protostars: Circumstellar material and young stellar objects in the rho Ophiuchi cloud, *ApJ*, 420, 837
- Armus, L. et al. 2006, Detection of the Buried Active Galactic Nucleus in NGC 6240 with the Infrared Spectrograph on the Spitzer Space Telescope, *ApJ*, 640, 204
- . 2007, Observations of Ultraluminous Infrared Galaxies with the Infrared Spectrograph on the Spitzer Space Telescope. II. The IRAS Bright Galaxy Sample, *ApJ*, 656, 148
- . 2004, Observations of Ultraluminous Infrared Galaxies with the Infrared Spectrograph (IRS) on the Spitzer Space Telescope: Early Results on Markarian 1014, Markarian 463, and UGC 5101, *ApJS*, 154, 178
- Armus, L., Heckman, T. M., & Miley, G. K. 1987, Multicolor optical imaging of powerful far-infrared galaxies - More evidence for a link between galaxy mergers and far-infrared emission, *AJ*, 94, 831
- . 1989, Long-slit optical spectroscopy of powerful far-infrared galaxies - The nature of the nuclear energy source, *ApJ*, 347, 727
- Azcarate, I. N., Cesosimo, J. C., & Colomb, F. R. 1986, Low density ionized gas associated with M 17, G 333.3-0.4 and RCW 74., *Revista Mexicana de Astronomia y Astrofisica*, 13, 15
- Banhidi, Z. & et al. 2007, H₂ Spectral Mapping in Serpens, , in prep
- Baraffe, I. & Chabrier, G. 1996, in ASP Conf. Ser. 98: From Stars to Galaxies: the Impact of Stellar Physics on Galaxy Evolution, ed. C. Leitherer, U. Fritze-von-Alvensleben, & J. Huchra, 209
- Bary, J. S., Weintraub, D. A., & Kastner, J. H. 2003, Detections of Rovibrational H₂ Emission from the Disks of T Tauri Stars, *ApJ*, 586, 1136
- Beltrán, M. T., Cesaroni, R., Neri, R., Codella, C., Furuya, R. S., Testi, L., & Olmi, L. 2005, A detailed study of the rotating toroids in G31.41+0.31 and G24.78+0.08, *A&A*, 435, 901
- Bergin, E. A. & Langer, W. D. 1997, Chemical Evolution in Preprotostellar and Protostellar Cores, *ApJ*, 486, 316
- Bernstein, M. P., Sandford, S. A., Allamandola, L. J., Chang, S., & Scharberg, M. A. 1995, Organic Compounds Produced by Photolysis of Realistic Interstellar and Cometary Ice Analogs Containing Methanol, *ApJ*, 454, 327
- Blake, G. A. & Boogert, A. C. A. 2004, High-Resolution 4.7 Micron Keck/NIRSPEC Spectroscopy of the CO Emission from the Disks Surrounding Herbig Ae Stars, *ApJ*, 606, L73
- Bockelée-Morvan, D. et al. 2000, New molecules found in comet C/1995 O1 (Hale-Bopp). Investigating the link between cometary and interstellar material, *A&A*, 353, 1101
- Bontemps, S. et al. 2001, ISOCAM observations of the rho Ophiuchi cloud: Luminosity and mass functions of the pre-main sequence embedded cluster, *A&A*, 372, 173
- Boogert, A. C. A. et al. 2000, ISO-SWS observations of interstellar solid ¹³CO₂: heated ice and the Galactic ¹²C/¹³C abundance ratio, *A&A*, 353, 349
- Boogert, A. C. A., Helmich, F. P., van Dishoeck, E. F., Schutte, W. A., Tielens, A. G. G. M., & Whittet, D. C. B. 1998, The gas/solid methane abundance ratio toward deeply embedded protostars, *A&A*, 336, 352
- Boonman, A. M. S., van Dishoeck, E. F., Lahuis, F., & Doty, S. D. 2003, Gas-phase CO₂ toward massive protostars, *A&A*, 399, 1063
- Boonman, A. M. S., Wright, C. M., & van Dishoeck, E. F. 1999, in The Physics and Chemistry of the Interstellar Medium, Proceedings of the 3rd Cologne-Zermatt Symposium, held in Zermatt, September 22-25, 1998, Eds.: V. Ossenkopf, J. Stutzki, and G. Winnewisser, GCA-Verlag Herdecke, ISBN 3-928973-95-9, ed. V. Ossenkopf, J. Stutzki, & G. Winnewisser, 275

- Boudin, N., Schutte, W. A., & Greenberg, J. M. 1998, Constraints on the abundances of various molecules in interstellar ice: laboratory studies and astrophysical implications, *A&A*, 331, 749
- Bouwman, J., de Koter, A., Dominik, C., & Waters, L. B. F. M. 2003, The origin of crystalline silicates in the Herbig Be star HD 100546 and in comet Hale-Bopp, *A&A*, 401, 577
- Brittain, S. D., Rettig, T. W., Simon, T., Kulesa, C., DiSanti, M. A., & Dello Russo, N. 2003, CO Emission from Disks around AB Aurigae and HD 141569: Implications for Disk Structure and Planet Formation Timescales, *ApJ*, 588, 535
- Brooke, T. Y. et al. 2007, The Spitzer c2d Survey of Nearby Dense Cores. IV. Revealing the Embedded Cluster in B59, *ApJ*, 655, 364
- Brooke, T. Y., Tokunaga, A. T., Weaver, H. A., Crovisier, J., Bockelee-Morvan, D., & Crisp, D. 1996, Detection of acetylene in the infrared spectrum of Comet Hyakutake, *Nature*, 383, 606
- Brown, J. M. & et al. 2007, Cold Disks: Spitzer Spectroscopy of Disks around Young Stars with Large Gaps, *ApJ*, in prep
- Bushouse, H. A. et al. 2002, Ultraluminous Infrared Galaxies: Atlas of Near-Infrared Images, *ApJS*, 138, 1
- Calvet, N., D'Alessio, P., Hartmann, L., Wilner, D., Walsh, A., & Sitko, M. 2002, Evidence for a Developing Gap in a 10 Myr Old Protoplanetary Disk, *ApJ*, 568, 1008
- Carr, J. S., Evans, II, N. J., Lacy, J. H., & Zhou, S. 1995, Observation of Infrared and Radio Lines of Molecules toward GL 2591 and Comparison to Physical and Chemical Models, *ApJ*, 450, 667
- Carr, J. S., Tokunaga, A. T., & Najita, J. 2004, Hot H₂O Emission and Evidence for Turbulence in the Disk of a Young Star, *ApJ*, 603, 213
- Cesaroni, R. 2005a, in IAU Symposium, ed. R. Cesaroni, M. Felli, E. Churchwell, & M. Walmsley, 59
- Cesaroni, R. 2005b, Outflow, Infall, and Rotation in High-Mass Star Forming Regions, *Ap&SS*, 295, 5
- Cesaroni, R., Neri, R., Olmi, L., Testi, L., Walmsley, C. M., & Hofner, P. 2005, A study of the Keplerian accretion disk and precessing outflow in the massive protostar IRAS 20126+4104, *A&A*, 434, 1039
- Charnley, S. B. 1997, Sulfuretted Molecules in Hot Cores, *ApJ*, 481, 396
- Charnley, S. B., Tielens, A. G. G. M., & Millar, T. J. 1992, On the molecular complexity of the hot cores in Orion A - Grain surface chemistry as 'The last refuge of the scoundrel', *ApJ*, 399, L71
- Choe, J. I., Kwak, D. K., & Kukolich, S. G. 1987, Fourier Transform Spectra of the 2100 cm⁻¹ Bands of HCN, *Journal of Molecular Spectroscopy*, 121, 75
- Choe, J. I., Tipton, T., & Kukolich, S. G. 1986, Fourier Transform Spectra of the 3300 per Centimeter Bands of HCN, *Journal of Molecular Spectroscopy*, 117, 292
- Cieza, L. A. & et al. 2007, The Spitzer c2d Survey of Weak-line T Tauri Stars II: New Constraints on the Timescale for Planet Building, *ApJ*, in prep
- Clarke, C. 2006, The formation of high mass stars, *Journal of Physics Conference Series*, 54, 190
- Clarke, C. J., Gendrin, A., & Sotomayor, M. 2001, The dispersal of circumstellar discs: the role of the ultraviolet switch, *MNRAS*, 328, 485
- Cunha, K., Hubeny, I., & Lanz, T. 2006, Neon Abundances in B Stars of the Orion Association: Solving the Solar Model Problem?, *ApJ*, 647, L143
- D'Alessio, P., Calvet, N., Hartmann, L., Franco-Hernández, R., & Servín, H. 2006, Effects of Dust Growth and Settling in T Tauri Disks, *ApJ*, 638, 314
- D'Alessio, P., Calvet, N., Hartmann, L., Lizano, S., & Cantó, J. 1999, Accretion Disks around Young Objects. II. Tests of Well-mixed Models with ISM Dust, *ApJ*, 527, 893
- Darling, J. & Giovanelli, R. 2002, A Search for OH Megamasers at $z > 0.1$. III. The Complete Survey, *AJ*, 124, 100
- Dartois, E., D'Hendecourt, L., Boulanger, F., Jourdain de Muizon, M., Breitfellner, M., Puget, J.-L., & Habing, H. J. 1998, Molecular gas phase counterparts to solid state grain mantles features: implication for gas/grain chemistry, *A&A*, 331, 651
- Dartois, E., Dutrey, A., & Guilloteau, S. 2003, Structure of the DM Tau Outer Disk: Probing the vertical kinetic temperature gradient, *A&A*, 399, 773
- de Geus, E. J., de Zeeuw, P. T., & Lub, J. 1989, Physical parameters of stars in the Scorpio-Centaurus OB association, *A&A*, 216, 44
- de Graauw, T. et al. 1996, Observing with the ISO Short-Wavelength Spectrometer., *A&A*, 315, L49
- de Zeeuw, P. T., Hoogerwerf, R., de Bruijne, J. H. J., Brown, A. G. A., & Blaauw, A. 1999, A HIPPARCOS Census of the Nearby OB Associations, *AJ*, 117, 354
- Decin, L., Morris, P. W., Appleton, P. N., Charmandaris, V., Armus, L., & Houck, J. R. 2004, MARCS: Model Stellar Atmospheres and Their Application to the Photometric Calibration of the Spitzer Space Telescope Infrared Spectrograph (IRS), *ApJS*, 154, 408
- Dent, W. R. F., Greaves, J. S., & Coulson, I. M. 2005, CO emission from discs around isolated HAeBe and Vega-excess stars, *MNRAS*, 359, 663

- Doppmann, G. W., Greene, T. P., Covey, K. R., & Lada, C. J. 2005, The Physical Natures of Class I and Flat-Spectrum Protostellar Photospheres: A Near-Infrared Spectroscopic Study, *AJ*, 130, 1145
- Doty, S. D., van Dishoeck, E. F., van der Tak, F. F. S., & Boonman, A. M. S. 2002, Chemistry as a probe of the structures and evolution of massive star-forming regions, *A&A*, 389, 446
- Downes, D. & Solomon, P. M. 1998, Rotating Nuclear Rings and Extreme Starbursts in Ultraluminous Galaxies, *ApJ*, 507, 615
- Draine, B. T. 2003, Interstellar Dust Grains, *ARA&A*, 41, 241
- Drake, J. J., Testa, P., & Hartmann, L. 2005, X-Ray Diagnostics of Grain Depletion in Matter Accreting onto T Tauri Stars, *ApJ*, 627, L149
- Dullemond, C. P. & Dominik, C. 2004, Flaring vs. self-shadowed disks: The SEDs of Herbig Ae/Be stars, *A&A*, 417, 159
- Dullemond, C. P., Hollenbach, D., Kamp, I., & D'Alessio, P. 2007, in *Protostars and Planets V*, ed. B. Reipurth, D. Jewitt, & K. Keil, 555
- Dutrey, A., Guilloteau, S., & Guelin, M. 1997, Chemistry of protosolar-like nebulae: The molecular content of the DM Tau and GG Tau disks., *A&A*, 317, L55
- Dutrey, A., Guilloteau, S., & Simon, M. 2003, The BP Tau disk: A missing link between Class II and III objects?, *A&A*, 402, 1003
- Duvert, G., Guilloteau, S., Ménard, F., Simon, M., & Dutrey, A. 2000, A search for extended disks around weak-lined T Tauri stars, *A&A*, 355, 165
- Duxbury, G. & Gang, Y. 1989, Fourier transform spectroscopy of HCN in the 14 μ m region, *Journal of Molecular Spectroscopy*, 138, 541
- Ehrenfreund, P., Boogert, A. C. A., Gerakines, P. A., Tielens, A. G. G. M., & van Dishoeck, E. F. 1997, Infrared spectroscopy of interstellar apolar ice analogs, *A&A*, 328, 649
- Ehrenfreund, P. & Charnley, S. B. 2000, Organic Molecules in the Interstellar Medium, Comets, and Meteorites: A Voyage from Dark Clouds to the Early Earth, *ARA&A*, 38, 427
- Eisloffel, J., Mundt, R., Ray, T. P., & Rodriguez, L. F. 2000, in *Protostars and Planets IV*, ed. V. Mannings, A. P. Boss, & S. S. Russell, 815
- Enoch, M. L. et al. 2006, Bolocam Survey for 1.1 mm Dust Continuum Emission in the c2d Legacy Clouds. I. Perseus, *ApJ*, 638, 293
- Evans, II, N. J. et al. 2003, From Molecular Cores to Planet-forming Disks: An SIRTIF Legacy Program, *PASP*, 115, 965
- Evans, II, N. J., Lacy, J. H., & Carr, J. S. 1991, Infrared molecular spectroscopy toward the Orion IRC2 and IRC7 sources - A new probe of physical conditions and abundances in molecular clouds, *ApJ*, 383, 674
- Feigelson, E. D. & Lawson, W. A. 2004, An X-Ray Census of Young Stars in the Chamaeleon I North Cloud, *ApJ*, 614, 267
- Feuchtgruber, H. et al. 2003, in *ESA SP-481: The Calibration Legacy of the ISO Mission*, ed. L. Metcalfe, A. Salama, S. B. Peschke, & M. F. Kessler, 67
- Forrest, W. J. et al. 2004, Mid-infrared Spectroscopy of Disks around Classical T Tauri Stars, *ApJS*, 154, 443
- Gail, H.-P. 2002, Radial mixing in protoplanetary accretion disks. III. Carbon dust oxidation and abundance of hydrocarbons in comets, *A&A*, 390, 253
- Gao, Y. & Solomon, P. M. 2004, The Star Formation Rate and Dense Molecular Gas in Galaxies, *ApJ*, 606, 271
- Geballe, T. R., Goto, M., Usuda, T., Oka, T., & McCall, B. J. 2006, The Interstellar Medium of IRAS 08572+3915 NW: H₃⁺ and Warm High-Velocity CO, *ApJ*, 644, 907
- Geers, V. C. et al. 2006, C2D Spitzer-IRS spectra of disks around T Tauri stars. II. PAH emission features, *A&A*, 459, 545
- Genzel, R. & Cesarsky, C. J. 2000, Extragalactic Results from the Infrared Space Observatory, *ARA&A*, 38, 761
- Genzel, R. et al. 1998, What Powers Ultraluminous IRAS Galaxies?, *ApJ*, 498, 579
- Gerakines, P. A. et al. 1999, Observations of Solid Carbon Dioxide in Molecular Clouds with the Infrared Space Observatory, *ApJ*, 522, 357
- Gibb, E. L. et al. 2000, An Inventory of Interstellar Ices toward the Embedded Protostar W33A, *ApJ*, 536, 347
- Glassgold, A. E. & Langer, W. D. 1973, Cosmic-Ray Heating and Molecular Cooling of Dense Clouds, *ApJ*, 179, L147
- Glassgold, A. E., Najita, J., & Igea, J. 2004, Heating Protoplanetary Disk Atmospheres, *ApJ*, 615, 972
- Glassgold, A. E., Najita, J. R., & Igea, J. 2007, Neon Fine-Structure Line Emission by X-Ray Irradiated Protoplanetary Disks, *ApJ*, 656, 515
- Gorti, U. & Hollenbach, D. 2004, Models of Chemistry, Thermal Balance, and Infrared Spectra from Intermediate-Aged Disks around G and K Stars, *ApJ*, 613, 424
- Gray, R. O. & Corbally, C. J. 1994, The calibration of MK spectral classes using spectral synthesis. 1: The

- effective temperature calibration of dwarf stars, *AJ*, 107, 742
- Greaves, J. S. 2005, Disks Around Stars and the Growth of Planetary Systems, *Science*, 307, 68
- Habart, E., Natta, A., Testi, L., & Carillet, M. 2006, Spatially resolved PAH emission in the inner disks of Herbig Ae/Be stars, *A&A*, 449, 1067
- Haisch, Jr., K. E., Lada, E. A., & Lada, C. J. 2001, Disk Frequencies and Lifetimes in Young Clusters, *ApJ*, 553, L153
- Hartmann, L., Megeath, S. T., Allen, L., Luhman, K., Calvet, N., D'Alessio, P., Franco-Hernandez, R., & Fazio, G. 2005, IRAC Observations of Taurus Pre-Main-Sequence Stars, *ApJ*, 629, 881
- Hartmann, L. & Raymond, J. C. 1989, Wind-disk shocks around T Tauri stars, *ApJ*, 337, 903
- Harvey, P. M. et al. 2006, The Spitzer c2d Survey of Large, Nearby, Interstellar Clouds. II. Serpens Observed with IRAC, *ApJ*, 644, 307
- Helmich, F. P. 1996, PhD thesis, Leiden University
- Helmich, F. P. & van Dishoeck, E. F. 1997, Physical and chemical variations within the W3 star-forming region. II. The 345 GHz spectral line survey, *A&AS*, 124, 205
- Henning, T., Pfau, W., & Altenhoff, W. J. 1990, Infrared and radio emission from very young and massive stellar objects, *A&A*, 227, 542
- Herbst, E. 1995, Chemistry in the Interstellar Medium, *Annu. Rev. Phys. Chem.*, 46, 27
- Higdon, S. J. U. et al. 2004, The SMART Data Analysis Package for the Infrared Spectrograph on the Spitzer Space Telescope, *PASP*, 116, 975
- Hollenbach, D. 1997, in *IAU Symp. 182: Herbig-Haro Flows and the Birth of Stars*, ed. B. Reipurth & C. Bertout, 181
- Hollenbach, D. et al. 2005, Formation and Evolution of Planetary Systems: Upper Limits to the Gas Mass in HD 105, *ApJ*, 631, 1180
- Hollenbach, D. & McKee, C. F. 1989, Molecule formation and infrared emission in fast interstellar shocks. III - Results for J shocks in molecular clouds, *ApJ*, 342, 306
- Hollenbach, D. J., Takahashi, T., & Tielens, A. G. G. M. 1991, Low-density photodissociation regions, *ApJ*, 377, 192
- Hollenbach, D. J. & Tielens, A. G. G. M. 1999, Photodissociation regions in the interstellar medium of galaxies, *Reviews of Modern Physics*, 71, 173
- Hollenbach, D. J., Yorke, H. W., & Johnstone, D. 2000, in *Protostars and Planets IV*, 401
- Houck, J. R. et al. 2004, The Infrared Spectrograph (IRS) on the Spitzer Space Telescope, *ApJS*, 154, 18
- Ilgner, M., Henning, T., Markwick, A. J., & Millar, T. J. 2004, Transport processes and chemical evolution in steady accretion disk flows, *A&A*, 415, 643
- Imanishi, K., Koyama, K., & Tsuboi, Y. 2001, Chandra Observation of the ρ Ophiuchi Cloud, *ApJ*, 557, 747
- Imanishi, M., Nakanishi, K., & Kohno, K. 2006, Millimeter Interferometric Investigations of the Energy Sources of Three Ultraluminous Infrared Galaxies, UGC 5101, Markarian 273, and IRAS 17208-0014, Based on HCN-to-HCO⁺ Ratios, *AJ*, 131, 2888
- Irvine, W. M. & Bergin, E. A. 2000, in *Astrochemistry: From Molecular Clouds to Planetary*, ed. Y. C. Minh & E. F. van Dishoeck, 447
- Jonkheid, B., Dullemond, C. P., Hogerheijde, M. R., & van Dishoeck, E. F. 2007, Chemistry and line emission from evolving Herbig Ae disks, *A&A*, 463, 203
- Jonkheid, B., Faas, F. G. A., van Zadelhoff, G.-J., & van Dishoeck, E. F. 2004, The gas temperature in flaring disks around pre-main sequence stars, *A&A*, 428, 511
- Jonkheid, B., Kamp, I., Augereau, J.-C., & van Dishoeck, E. F. 2006, Modeling the gas-phase chemistry of the transitional disk around HD 141569A, *A&A*, 453, 163
- Jørgensen, J. K. et al. 2006, The Spitzer c2d Survey of Large, Nearby, Interstellar Clouds. III. Perseus Observed with IRAC, *ApJ*, 645, 1246
- Jørgensen, J. K., Schöier, F. L., & van Dishoeck, E. F. 2002, Physical structure and CO abundance of low-mass protostellar envelopes, *A&A*, 389, 908
- Kamp, I. & Dullemond, C. P. 2004, The Gas Temperature in the Surface Layers of Protoplanetary Disks, *ApJ*, 615, 991
- Kastner, J. H., Zuckerman, B., Weintraub, D. A., & Forveille, T. 1997, X-ray and molecular emission from the nearest region of recent star formation., *Science*, 277, 67
- Kaufman, M. J. 1995, PhD thesis, The Johns Hopkins University
- Kaufman, M. J., Wolfire, M. G., & Hollenbach, D. J. 2006, [Si II], [Fe II], [C II], and H₂ Emission from Massive Star-forming Regions, *ApJ*, 644, 283
- Kaufman, M. J., Wolfire, M. G., Hollenbach, D. J., & Luhman, M. L. 1999, Far-Infrared and Submillimeter Emission from Galactic and Extragalactic Photodissociation Regions, *ApJ*, 527, 795
- Kenyon, S. J., Dobrzycka, D., & Hartmann, L. 1994, A new optical extinction law and distance estimate for

- the Taurus-Auriga molecular cloud, *AJ*, 108, 1872
- Kenyon, S. J. & Hartmann, L. 1995, Pre-Main-Sequence Evolution in the Taurus-Auriga Molecular Cloud, *ApJS*, 101, 117
- Kessler-Silacci, J. et al. 2006, c2d Spitzer IRS Spectra of Disks around T Tauri Stars. I. Silicate Emission and Grain Growth, *ApJ*, 639, 275
- Kester, D. J. M. 2003, in *ESA SP-481: The Calibration Legacy of the ISO Mission*, ed. L. Metcalfe, A. Salama, S. B. Peschke, & M. F. Kessler, 243
- Kim, D.-C. & Sanders, D. B. 1998, The IRAS 1 Jy Survey of Ultraluminous Infrared Galaxies. I. The Sample and Luminosity Function, *ApJS*, 119, 41
- Koerner, D. W. & Sargent, A. I. 1995, Imaging the Small-Scale Circumstellar Gas Around T Tauri Stars, *AJ*, 109, 2138
- Kohnno, K. 2005, in *AIP Conf. Proc. 783: The Evolution of Starbursts*, ed. S. Hüttmeister, E. Manthey, D. Bomans, & K. Weis, 203
- Kratter, K. M. & Matzner, C. D. 2006, Fragmentation of massive protostellar discs, *MNRAS*, 373, 1563
- Lacy, J. H., Carr, J. S., Evans, II, N. J., Baas, F., Achtermann, J. M., & Arens, J. F. 1991, Discovery of interstellar methane - Observations of gaseous and solid CH₄ absorption toward young stars in molecular clouds, *ApJ*, 376, 556
- Lacy, J. H., Evans, II, N. J., Achtermann, J. M., Bruce, D. E., Arens, J. F., & Carr, J. S. 1989, Discovery of interstellar acetylene, *ApJ*, 342, L43
- Lacy, J. H., Richter, M. J., Greathouse, T. K., Jaffe, D. T., & Zhu, Q. 2002, TEXES: A Sensitive High-Resolution Grating Spectrograph for the Mid-Infrared, *PASP*, 114, 153
- Lada, C. J. 1987, in *IAU Symp. 115: Star Forming Regions*, ed. M. Peimbert & J. Jugaku, 1
- Lahuis, F. & Boogert, A. 2003, in *SFChem 2002: Chemistry as a Diagnostic of Star Formation*, proceedings of a conference held August 21-23, 2002 at University of Waterloo, Waterloo, Ontario, Canada N2L 3G1. Edited by Charles L. Curry and Michel Fich. NRC Press, Ottawa, Canada, 2003, p. 335., ed. C. L. Curry & M. Fich, 335
- Lahuis, F. et al. 2006a, c2d Spectroscopy Explanatory Supplement, Tech. rep., Cores to Disks, *Spitzer* legacy team, Pasadena: *Spitzer* Science Center
- Lahuis, F. & van Dishoeck, E. F. 1997, in *ESA SP-419: The first ISO workshop on Analytical Spectroscopy*, ed. A. M. Heras, K. Leech, N. R. Trams, & M. Perry, 275
- Lahuis, F. & van Dishoeck, E. F. 2000, ISO-SWS spectroscopy of gas-phase C₂H₂ and HCN toward massive young stellar objects, *A&A*, 355, 699
- Lahuis, F., van Dishoeck, E. F., Blake, G. A., II, E. N. J., Kessler-Silacci, J. E., & Pontoppidan, K. M. 2007, c2d *Spitzer* IRS Spectra of Disks around T Tauri Stars. III. [Ne II] and H₂ gas-phase lines, *ApJ*, submitted
- Lahuis, F. et al. 2006b, Hot Organic Molecules toward a Young Low-Mass Star: A Look at Inner Disk Chemistry, *ApJ*, 636, L145
- Lahuis, F. et al. 1998, in *ASP Conf. Ser. 145: Astronomical Data Analysis Software and Systems VII*, ed. R. Albrecht, R. N. Hook, & H. A. Bushouse, 224
- Langer, W. D., van Dishoeck, E. F., Bergin, E. A., Blake, G. A., Tielens, A. G. G. M., Velusamy, T., & Whittet, D. C. B. 2000, in *Protostars and Planets IV*, ed. V. Mannings, A. P. Boss, & S. S. Russell, 29
- Lee, H.-H., Bettens, R. P. A., & Herbst, E. 1996, Fractional abundances of molecules in dense interstellar clouds: A compendium of recent model results., *A&AS*, 119, 111
- Lepp, S. & Dalgarno, A. 1996, X-ray-induced chemistry of interstellar clouds., *A&A*, 306, L21
- Li, W., Evans, II, N. J., Jaffe, D. T., van Dishoeck, E. F., & Thi, W.-F. 2002, Photon-dominated Regions in Low-Ultraviolet Fields: A Study of the Peripheral Region of L1204/S140, *ApJ*, 568, 242
- Lorente, R. 1998, Spectral Resolution of SWS AOT 1, Tech. rep., Vilspa: ISO Data Centre
- Low, F. J., Cutri, R. M., Huchra, J. P., & Kleinmann, S. G. 1988, Infrared color-selected quasars and Seyfert 1 galaxies, *ApJ*, 327, L41
- Lutz, D., Veilleux, S., & Genzel, R. 1999, Mid-Infrared and Optical Spectroscopy of Ultraluminous Infrared Galaxies: A Comparison, *ApJ*, 517, L13
- Maloney, P. R., Hollenbach, D. J., & Tielens, A. G. G. M. 1996, X-Ray-irradiated Molecular Gas. I. Physical Processes and General Results, *ApJ*, 466, 561
- Markwick, A. J. & Charnley, S. B. 2004, Chemistry of Protoplanetary Disks (*ASSL Vol. 305: Astrobiology: Future Perspectives*), 33
- Markwick, A. J., Ilgner, M., Millar, T. J., & Henning, T. 2002, Molecular distributions in the inner regions of protostellar disks, *A&A*, 385, 632
- Meijerink, R. & Spaans, M. 2005, Diagnostics of irradiated gas in galaxy nuclei. I. A far-ultraviolet and X-ray dominated region code, *A&A*, 436, 397
- Meyer, M. R. et al. 2002, in *The Origin of Stars and Planets: The VLT View*, ed. J. F. Alves & M. J. McCaugh-

- rean, 463
- Mihos, J. C. & Hernquist, L. 1996, Gasdynamics and Starbursts in Major Mergers, *ApJ*, 464, 641
- Millar, T. J., Bennett, A., Rawlings, J. M. C., Brown, P. D., & Charnley, S. B. 1991, Gas phase reactions and rate coefficients for use in astrochemistry - The UMIST ratefile, *A&AS*, 87, 585
- Millar, T. J., Farquhar, P. R. A., & Willacy, K. 1997, The UMIST Database for Astrochemistry 1995, *A&AS*, 121, 139
- Mitchell, G. F., Maillard, J.-P., Allen, M., Beer, R., & Belcourt, K. 1990, Hot and cold gas toward young stellar objects, *ApJ*, 363, 554
- Murphy, Jr., T. W., Armus, L., Matthews, K., Soifer, B. T., Mazzarella, J. M., Shupe, D. L., Strauss, M. A., & Neugebauer, G. 1996, Visual and Near-Infrared Imaging of Ultraluminous Infrared Galaxies: The IRAS 2 Jy Sample, *AJ*, 111, 1025
- Najita, J., Carr, J. S., & Mathieu, R. D. 2003, Gas in the Terrestrial Planet Region of Disks: CO Fundamental Emission from T Tauri Stars, *ApJ*, 589, 931
- Neufeld, D. A. & Kaufman, M. J. 1993, Radiative Cooling of Warm Molecular Gas, *ApJ*, 418, 263
- Nomura, H., Aikawa, Y., Tsujimoto, M., Nakagawa, Y., & Millar, T. J. 2007, Molecular Hydrogen Emission from Protoplanetary Disks II. Effects of X-ray Irradiation and Dust Evolution, *ArXiv Astrophysics e-prints*
- Nomura, H. & Millar, T. J. 2005, Molecular hydrogen emission from protoplanetary disks, *A&A*, 438, 923
- Parenago, P. P. 1954, Catalogue of stars in the area of the Orion Nebula., *Trudy Gosudarstvennogo Astronomicheskogo Instituta*, 25, 1
- Pascucci, I. et al. 2006, Formation and Evolution of Planetary Systems: Upper Limits to the Gas Mass in Disks around Sun-like Stars, *ApJ*, 651, 1177
- Persi, P., Ferrari-Toniolo, M., & Spinoglio, L. 1987, in *IAU Symp. 122: Circumstellar Matter*, ed. I. Appenzeller & C. Jordan, 93
- Piétu, V., Dutrey, A., & Guilloteau, S. 2007, Probing the structure of protoplanetary disks: a comparative study of DM Tau, LkCa 15 and MWC 480, *ArXiv Astrophysics e-prints*
- Pontoppidan, K. M. & Dullemond, C. P. 2005, Projection of circumstellar disks on their environments, *A&A*, 435, 595
- Pontoppidan, K. M., Dullemond, C. P., van Dishoeck, E. F., Blake, G. A., Boogert, A. C. A., Evans, II, N. J., Kessler-Silacci, J. E., & Lahuis, F. 2005, Ices in the Edge-on Disk CRBR 2422.8-3423: Spitzer Spectroscopy and Monte Carlo Radiative Transfer Modeling, *ApJ*, 622, 463
- Pontoppidan, K. M. et al. 2003, A 3-5 μ m VLT spectroscopic survey of embedded young low mass stars I. Structure of the CO ice, *A&A*, 408, 981
- Pontoppidan, K. M., Stapelfeldt, K. R., Blake, G. A., van Dishoeck, E. F., & Dullemond, C. P. 2007, Deep Spitzer spectroscopy of the 'Flying Saucer' edge-on disk: Large grains beyond 50 AU, *ArXiv Astrophysics e-prints*
- Porras, A. et al. 2007, The Spitzer c2d Survey of Large, Nearby, Interstellar Clouds. V. Chamaeleon II Observed with IRAC, *ApJ*, 656, 493
- Preibisch, T. et al. 2005, The Origin of T Tauri X-Ray Emission: New Insights from the Chandra Orion Ultra-deep Project, *ApJS*, 160, 401
- Prinn, R. G. 1993, in *Protostars and Planets III*, ed. E. H. Levy & J. I. Lunine, 1005
- Qi, C., Kessler, J. E., Koerner, D. W., Sargent, A. I., & Blake, G. A. 2003, Continuum and CO/HCO⁺ Emission from the Disk Around the T Tauri Star LkCa 15, *ApJ*, 597, 986
- Qi, C., Wilner, D. J., Calvet, N., Bourke, T. L., Blake, G. A., Hogerheijde, M. R., Ho, P. T. P., & Bergin, E. 2006, CO J = 6-5 Observations of TW Hydrae with the Submillimeter Array, *ApJ*, 636, L157
- Rebull, L. M. et al. 2007, The Spitzer c2d Survey of Large, Nearby, Interstellar Clouds: VI. Perseus Observed with MIPS, *ArXiv Astrophysics e-prints*
- Richter, M. J., Jaffe, D. T., Blake, G. A., & Lacy, J. H. 2002, Looking for Pure Rotational H₂ Emission from Protoplanetary Disks, *ApJ*, 572, L161
- Ridge, N. A. et al. 2006, The COMPLETE Survey of Star-Forming Regions: Phase I Data, *AJ*, 131, 2921
- Roche, P. F. & Aitken, D. K. 1984, An investigation of the interstellar extinction. I - Towards dusty WC Wolf-Rayet stars, *MNRAS*, 208, 481
- . 1985, An investigation of the interstellar extinction. II - Towards the mid-infrared sources in the Galactic centre, *MNRAS*, 215, 425
- Rodgers, S. D. & Charnley, S. B. 2003, Chemical Evolution in Protostellar Envelopes: Cocoon Chemistry, *ApJ*, 585, 355
- Roelfsema, P. R., Kester, D. J. M., Wesselius, P. R., Sym, N., Leech, K., & Wieprecht, E. 1993, in *ASP Conf. Ser. 52: Astronomical Data Analysis Software and Systems II*, ed. R. J. Hanisch, R. J. V. Brissenden, & J. Barnes, 254
- Roelfsema, P. R. et al. 2003, in *ESA SP-481: The Calibration Legacy of the ISO Mission*, ed. L. Metcalfe,

- A. Salama, S. B. Peschke, & M. F. Kessler, 31
- Roellig, M. et al. 2007, A PDR-Code Comparison Study, ArXiv Astrophysics e-prints
- Rothman, L. S. et al. 1992, The HITRAN molecular data base - Editions of 1991 and 1992, *Journal of Quantitative Spectroscopy and Radiative Transfer*, 48, 469
- Sako, S., Yamashita, T., Kataza, H., Miyata, T., Okamoto, Y. K., Honda, M., Fujiyoshi, T., & Onaka, T. 2005, Search for 17 μm H₂ Pure Rotational Emission from Circumstellar Disks, *ApJ*, 620, 347
- Sanders, D. B., Soifer, B. T., Elias, J. H., Madore, B. F., Matthews, K., Neugebauer, G., & Scoville, N. Z. 1988a, Ultraluminous infrared galaxies and the origin of quasars, *ApJ*, 325, 74
- Sanders, D. B., Soifer, B. T., Elias, J. H., Neugebauer, G., & Matthews, K. 1988b, Warm ultraluminous galaxies in the IRAS survey - The transition from galaxy to quasar?, *ApJ*, 328, L35
- Schutte, W. A. et al. 1999, Weak ice absorption features at 7.24 and 7.41 μm in the spectrum of the obscured young stellar object W 33A, *A&A*, 343, 966
- Sheret, I., Ramsay Howat, S. K., & Dent, W. R. F. 2003, A search for H₂ around pre-main-sequence stars, *MNRAS*, 343, L65
- Shipman, R. F. et al. 2003, in *ESA SP-481: The Calibration Legacy of the ISO Mission*, ed. L. Metcalfe, A. Salama, S. B. Peschke, & M. F. Kessler, 107
- Shu, F. H., Adams, F. C., & Lizano, S. 1987, Star formation in molecular clouds - Observation and theory, *ARA&A*, 25, 23
- Solomon, P. M., Downes, D., Radford, S. J. E., & Barrett, J. W. 1997, The Molecular Interstellar Medium in Ultraluminous Infrared Galaxies, *ApJ*, 478, 144
- Spoon, H. W. W. et al. 2004, Fire and Ice: Spitzer Infrared Spectrograph (IRS) Mid-Infrared Spectroscopy of IRAS F00183-7111, *ApJS*, 154, 184
- Spoon, H. W. W., Keane, J. V., Cami, J., Lahuis, F., Tielens, A. G. G. M., Armus, L., & Charmandaris, V. 2005, in *IAU Symposium*, ed. D. C. Lis, G. A. Blake, & E. Herbst, 281
- Spoon, H. W. W., Marshall, J. A., Houck, J. R., Elitzur, M., Hao, L., Armus, L., Brandl, B. R., & Charmandaris, V. 2007, Mid-Infrared Galaxy Classification Based on Silicate Obscuration and PAH Equivalent Width, *ApJ*, 654, L49
- Spoon, H. W. W. et al. 2006, The Detection of Crystalline Silicates in Ultraluminous Infrared Galaxies, *ApJ*, 638, 759
- Stanford, S. A., Stern, D., van Breugel, W., & De Breuck, C. 2000, The FIRST Sample of Ultraluminous Infrared Galaxies at High Redshift. I. Sample and Near-Infrared Morphologies, *ApJS*, 131, 185
- Stauber, P., Benz, A. O., Jorgensen, J. K., van Dishoeck, E. F., Doty, S. D., & van der Tak, F. F. S. 2006, Tracing high energy radiation with molecular lines near deeply embedded protostars, ArXiv Astrophysics e-prints
- Stäuber, P., Doty, S. D., van Dishoeck, E. F., & Benz, A. O. 2005, X-ray chemistry in the envelopes around young stellar objects, *A&A*, 440, 949
- Sternberg, A. & Neufeld, D. A. 1999, The Ratio of Ortho- to Para-H₂ in Photodissociation Regions, *ApJ*, 516, 371
- Straizys, V., Cernis, K., & Bartasiute, S. 1996, Interstellar extinction in the area of the Serpens cauda molecular cloud., *Baltic Astronomy*, 5, 125
- Strauss, M. A., Huchra, J. P., Davis, M., Yahil, A., Fisher, K. B., & Tonry, J. 1992, A redshift survey of IRAS galaxies. VII - The infrared and redshift data for the 1.936 Jansky sample, *ApJS*, 83, 29
- Takeuchi, T., Clarke, C. J., & Lin, D. N. C. 2005, The Differential Lifetimes of Protostellar Gas and Dust Disks, *ApJ*, 627, 286
- Telleschi, A., Guedel, M., Briggs, K. R., Audard, M., & Palla, F. 2006, X-ray Emission from T Tauri Stars and the Role of Accretion: Inferences from the XMM-Newton Extended Survey of the Taurus Molecular Cloud, ArXiv Astrophysics e-prints
- Thi, W. F. et al. 2001, H₂ and CO Emission from Disks around T Tauri and Herbig Ae Pre-Main-Sequence Stars and from Debris Disks around Young Stars: Warm and Cold Circumstellar Gas, *ApJ*, 561, 1074
- Thi, W.-F., van Zadelhoff, G.-J., & van Dishoeck, E. F. 2004, Organic molecules in protoplanetary disks around T Tauri and Herbig Ae stars, *A&A*, 425, 955
- van Boekel, R., Min, M., Waters, L. B. F. M., de Koter, A., Dominik, C., van den Ancker, M. E., & Bouwman, J. 2005, A 10 μm spectroscopic survey of Herbig Ae star disks: Grain growth and crystallization, *A&A*, 437, 189
- van Boekel, R., Waters, L. B. F. M., Dominik, C., Bouwman, J., de Koter, A., Dullemond, C. P., & Paresce, F. 2003, Grain growth in the inner regions of Herbig Ae/Be star disks, *A&A*, 400, L21
- van den Ancker, M. 1999, PhD thesis, University of Amsterdam
- van den Ancker, M. E., de Winter, D., & Tjin A Djie, H. R. E. 1998, HIPPARCOS photometry of Herbig Ae/Be stars, *A&A*, 330, 145
- van der Tak, F. F. S., van Dishoeck, E. F., Evans, II, N. J., Bakker, E. J., & Blake, G. A. 1999, The Impact of the

- Massive Young Star GL 2591 on Its Circumstellar Material: Temperature, Density, and Velocity Structure, *ApJ*, 522, 991
- van der Tak, F. F. S., van Dishoeck, E. F., Evans, II, N. J., & Blake, G. A. 2000, Structure and Evolution of the Envelopes of Deeply Embedded Massive Young Stars, *ApJ*, 537, 283
- van Dishoeck, E. F. 1998, in Chemistry and Physics of Molecules and Grains in Space. Faraday Discussions No. 109, 31
- van Dishoeck, E. F. & Blake, G. A. 1998, Chemical Evolution of Star-Forming Regions, *ARA&A*, 36, 317
- van Dishoeck, E. F. & Helmich, F. P. 1996, Infrared absorption of H₂O toward massive young stars., *A&A*, 315, L177
- van Dishoeck, E. F. et al. 1996, A search for interstellar gas-phase CO₂. Gas: solid state abundance ratios., *A&A*, 315, L349
- van Dishoeck, E. F. & Hogerheijde, M. R. 1999, in NATO ASIC Proc. 540: The Origin of Stars and Planetary Systems, ed. C. J. Lada & N. D. Kylafis, 97
- van Dishoeck, E. F. & Tielens, A. G. G. M. 2001, Space-borne observations of the lifecycle of interstellar gas and dust (Dordrecht: Kluwer: The Century of Space Science), 607
- van Zadelhoff, G.-J., van Dishoeck, E. F., Thi, W.-F., & Blake, G. A. 2001, Submillimeter lines from circumstellar disks around pre-main sequence stars, *A&A*, 377, 566
- Vandenbussche, B. et al. 2003, in ESA SP-481: The Calibration Legacy of the ISO Mission, ed. L. Metcalfe, A. Salama, S. B. Peschke, & M. F. Kessler, 455
- Veilleux, S., Goodrich, R. W., & Hill, G. J. 1997, Infrared Spectroscopy of Seyfert 2 Galaxies: A Look through the Obscuring Torus? II., *ApJ*, 477, 631
- Veilleux, S., Kim, D.-C., Sanders, D. B., Mazzarella, J. M., & Soifer, B. T. 1995, Optical Spectroscopy of Luminous Infrared Galaxies. II. Analysis of the Nuclear and Long-Slit Data, *ApJS*, 98, 171
- Viti, S. & Williams, D. A. 1999, Time-dependent evaporation of icy mantles in hot cores, *MNRAS*, 305, 755
- Walmsley, C. M. & Schilke, P. 1993, Observations of Hot Molecular Cores (Dust and Chemistry in Astronomy), 37
- Walmsley, M., Des Forêts, G. P., & Flower, D. 2005, in IAU Symposium, ed. D. C. Lis, G. A. Blake, & E. Herbst, 135
- Werner, M. W. et al. 2004, The Spitzer Space Telescope Mission, *ApJS*, 154, 1
- Whittet, D. C. B., Prusti, T., Franco, G. A. P., Gerakines, P. A., Kilkenny, D., Larson, K. A., & Wesselius, P. R. 1997, On the distance to the Chamaeleon I and II associations, *A&A*, 327, 1194
- Whittet, D. C. B. et al. 1996, An ISO SWS view of interstellar ices: first results., *A&A*, 315, L357
- Wieprecht, E. et al. 1998, in ASP Conf. Ser. 145: Astronomical Data Analysis Software and Systems VII, ed. R. Albrecht, R. N. Hook, & H. A. Bushouse, 279
- Wieprecht, E. et al. 2003, in ESA SP-481: The Calibration Legacy of the ISO Mission, ed. L. Metcalfe, A. Salama, S. B. Peschke, & M. F. Kessler, 285
- Wieprecht, E., Wiezorrek, E., & Haser, L. 2000, SWS-Detector Glitch Effect Correction, *Experimental Astronomy*, 10, 199
- Willner, S. P. et al. 1982, Infrared spectra of protostars - Composition of the dust shells, *ApJ*, 253, 174
- Wolk, S. J., Harnden, Jr., F. R., Flaccomio, E., Micela, G., Favata, F., Shang, H., & Feigelson, E. D. 2005, Stellar Activity on the Young Suns of Orion: COUP Observations of K5-7 Pre-Main-Sequence Stars, *ApJS*, 160, 423
- Young, C. H. et al. 2004, A "Starless" Core that Isn't: Detection of a Source in the L1014 Dense Core with the Spitzer Space Telescope, *ApJS*, 154, 396