

## Jason Melbourne, Ph.D.

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### Education

**Doctor of Philosophy**, Astrophysics, UC Santa Cruz (2006)

Thesis: *The Optical and Infrared Evolution of Galaxies*. (Advisors, C. Max, D.C. Koo)

**Master of Arts**, Astronomy, Wesleyan University (2001)

Thesis: *Metal Abundances in KISS Galaxies*. (Advisor, J.J. Salzer).

**Bachelor of Arts**, Physics and Astronomy double major, UC Berkeley (1995)

### Appointments

**Postdoctoral Fellow**, California Institute of Technology (2007-present)

**Postdoctoral Fellow**, Center for Adaptive Optics, UC Santa Cruz (2006-2007)

### Grants

*Dissecting the Mid-Infrared Flux of M31 and M33*. NASA Astrophysics Data Analysis Program. **P.I.** \$323,336 over 3 years (in review)

*Panchromatic Hubble Andromeda Treasury*, HST Multi-Cycle Treasury Program, 828 Orbits, HST-GO-12055.21 **Co.I. and Caltech P.I.** of the sub-award of \$28,718 for the current fiscal year, with anticipated renewal for another 2 years (2010).

*The Sites and Triggers of Star Formation in Large Disk Galaxies Since  $z=1$* , HST Archival Grant, AR-10965. **P.I.** \$53,000 over 1 year (2006)

### Selected Successful Proposals

*The Local Group Infrared Cluster Survey*, Keck adaptive optics imaging of clusters in M31 and M33 to constrain stellar evolution models. **P.I.** (2010)

*Rest-frame Optical Spectroscopy of  $z=2$  Dust Obscured Galaxies*, Palomar Near-IR Spectroscopy with TripleSpec, **P.I.** (2009)

*Resolved Stellar Populations of Dwarf Galaxies with Keck Adaptive Optics*, Keck Laser Guide Star Adaptive Optics Imaging. **P.I.** (2008)

*A Calibration Database for Stellar Models of Asymptotic Giant Branch Stars*, HST Near-IR Imaging with WFC3, SNAP-11719, **Co. I.** (2008)

*The Spatial Distribution of Warm Dust and PAH in Luminous Infrared Galaxies*, Gemini Mid-IR Imaging with TReCS, **P.I.** (2008-09)

*The Morphologies of  $z=2$  Dust Obscured Galaxies*, Keck Adaptive Optics Near-IR Imaging with NIRC2, **Co.I.** (2007)

*Rest-frame Optical Morphologies of Galaxies in GOODS*. Keck Laser Guide Star, Adaptive Optics Near-IR Imaging with NIRC2, **Co. I.** (2005-06)

## Selected Recent Talks

*The Contribution of Asymptotic Giant Branch Stars to the Infrared Luminosities of Galaxies: Implications for Measuring Stellar Masses of Galaxies*

**Conference**, Vienna, Austria (September 2010)

*Dust Obscured Galaxies at  $z=2$*

**Colloquium**, University of Hawaii (September 2010)

*The Local Group Infrared Cluster Survey*

**Colloquium**, UC Santa Cruz (April 2010)

*Asymptotic Giant Branch Stars as Probes of Star Formation History*

**Conference**, SAO, Russia (September 2009)

*Rest-Frame Optical Spectral Diagnostics of  $z=2$  Dust Obscured Galaxies*

**Conference**, Charlottesville VA (September 2009)

*Resolving Populations of Evolved Stars in Nearby Galaxies*

**AAS Meeting**, Adaptive Optics Special Session, Pasadena CA (June 2009)

*Morphologies of  $z=2$  Dust Obscured Galaxies*

**Keck Science Meeting**, University of California, Santa Cruz (September, 2008)

*Probing the Decline of Star Formation Since  $z=1$ , with AO, Spitzer, and HST*

**Colloquium**, University of Wisconsin, Madison (August 2008)

*Exploring the Optical and Infrared Evolution of Galaxies*

**Colloquium**, Institute for Astronomy, University of Hawaii, Manoa (October 2006)

*The Center for Adaptive Optics Treasury Survey: Combining Adaptive Optics and Hubble Space Telescope Images to Study Distant Galaxies*

**Colloquium**, Lawrence Berkeley National Laboratory (June 2006)

## Teaching Experience

**Adjunct Professor**, *General Physics Laboratory*, Pomona College, Claremont, California (2010 -2011)

Introductory undergraduate physics lab. In addition to instruction, I developed two of the labs, (1) RC Circuits and Vision Biophysics, and (2) Introduction to Ray Optics and Optical Design.

**Director and Lead Instructor**, *Think Like an Astronomer*, Glendale Community College, Glendale, California (2010)

In an effort to promote science literacy, I have developed a 5-session astronomy short course for the general public. This course introduces major themes in astronomy through inquiry-based activities, and exquisite astronomical images.

**Adjunct Professor**, *Introduction to Astronomy Lecture and Lab Courses*, Mt San Antonio Community College, Pomona, California (2009)

I developed and taught the curriculum, for this lecture and lab course, including a semester long Sun tracking lab, and a galaxy morphology inquiry activity.

**Director and Lead Instructor**, *The Keck Adaptive Optics Workshop*,  
University of California Santa Cruz, Santa Cruz, California (2008)

I organized instructors and funding for a workshop on Keck adaptive optics instrumentation and observational techniques for the Caltech and UC Community.

**Lead Instructor**, *The Center for Adaptive Optics (CfAO) Mainland Short Course*  
University of California Santa Cruz, Santa Cruz, California (2005)

A one-week course on astronomy, light, and optics to prepare undergraduates for summer research positions in the CfAO.

**Teaching Assistant**, University of California Santa Cruz (2001-2002)

### Selected Students Advised

John Forbes, Caltech Summer Undergraduate Research Fellow (2009-2010)  
*Spatially Resolved Stellar Populations of  $z=1$  Luminous Infrared Galaxies.*

Steven Dabic, Caltech Summer Undergraduate Research Fellow (2008)  
*Inside-out Disk Growth in Intermediate Redshift Galaxies.*

Abhiram Chivikula, Caltech Summer Undergraduate Research Fellow (2008)  
*Spectral Energy Distributions of High Redshift Dust-Obscured Galaxies.*

### Selected Professional Service

**Referee**, *The Astronomical Journal*, *The Astrophysical Journal*, *Publications of the Astronomical Society of the Pacific* (2005-2010)

**Science Organizing Committee**, *Massive Galaxies 3*, Tucson, Arizona (2010)

**NSF Panel Member**, *Astronomy and Astrophysics Grants*, Arlington, Virginia (2007-2008)

**Director and Lead Instructor**, *The Keck Adaptive Optics Workshop*, University of California Santa Cruz, (2008)

**Science Advisor**, *The California Math and Science Project*, Watsonville, California (2005)

### First-Author Refereed Publications

Melbourne, J., Peng, Chien Y, Soifer, B.T., Desai, V., Armus, L., Busmann, R.S., Dey A., Matthews, K. 2011. “**The Black Hole Masses and Star Formation Rates of  $z > 1$  Dust Obscured Galaxies (DOGs): Results from Keck OSIRIS Integral Field Spectroscopy.**” *The Astronomical Journal*, Volume 141, Issue 4, pp. 141-152.

Melbourne, J., Williams, B., Dalcanton, J., Ammons, S.M., Max, C., Koo, D.C., Girardi, L., Dolphin, A. 2010. “**The Asymptotic Giant Branch and the Tip of the Red Giant Branch as Probes of Star Formation History: The Nearby Dwarf Irregular Galaxy KKH 98**”. *The Astrophysical Journal*, Volume 712, Issue 1, pp. 469-483.

Melbourne, J., Bussman, S., Brand, K., Desai, V., Armus, L., Dey, A., Jannuzi, B. T., Houck, J. R., Soifer, B. T., Matthews, K. 2008. **“High Redshift Dust Obscured Galaxies, a Morphology-SED Connection Revealed by Keck Adaptive Optics”**. *The Astronomical Journal*, Volume 137, Issue 6, pp. 4854-4866

Melbourne, J., Desai, V., Armus, Lee, Dey, Arjun, Brand, K., Thompson, D., Soifer, B. T., Matthews, K., Jannuzi, B. T., Houck, J. R., 2008. **“Morphologies of High-Redshift Dust-Obscured Galaxies from Keck Laser Guide Star Adaptive Optics”**. *The Astronomical Journal*, Volume 136, Issue 3, pp. 1110-1117

Melbourne, J., Ammons, M., Wright, S. A., Metevier, A., Steinbring, E., Max, C., Koo, D. C., Larkin, J. E., Barczys, M., 2008. **“Triggered or Self-Regulated Star Formation Within Intermediate Redshift Luminous Infrared Galaxies. I. Morphologies and Spectral Energy Distributions”**. *The Astronomical Journal*, Volume 135, Issue 4, pp. 1207-1224

Melbourne, J., Dawson K., Koo D. C., Max C., Larkin J. Wright S., Steinbring E., Barczys, M., Aldering, G., Barbary, K., Doi, M., Fadeyev, V., Goldhaber, G., Hattori, T., Ihara Y., Kashikawa N., Konishi K., Kowalski M., Kuznetsova, N., Lidman, C., Morokuma, T., Perlmutter, S., Rubin D., Schlegel D., Spadafora, A. L., Takanashi, N., Yasuda, N. 2007. **“Rest-Frame R-band Lightcurve of a  $z \sim 1.3$  Supernova Obtained with Keck Laser Adaptive Optics”**. *The Astronomical Journal*. Volume 133, Issue 6, pp. 2709-2715

Melbourne, J., Phillips, A., Harker, J., Novak, G., Koo, D. C., Faber, S. M., 2007. **“Radius Dependent Luminosity Evolution of Blue Galaxies in GOODS-N”**. *The Astrophysical Journal*. Volume 660, Issue 1, pp. 81-96

Melbourne, J., Koo, D. C., Le Floch, E., 2005. **“Optical Morphology Evolution of Infrared Luminous Galaxies in GOODS-N”**. *The Astrophysical Journal*. Volume 632, Issue 2, pp. L65—L68

Melbourne, J., Wright, S. A., Barczys, M., Bouchez, A. H., Chin, J., van Dam, M. A., Hartman, S., Johansson, E., Koo, D. C., Lafon, R., Larkin, J., Le Mignant, D., Lotz, J., Max, C. E., Pennington, D. M., Stomski, P. J., Summers, D., Wizinowich, P. L., 2005. **“Merging Galaxies in GOODS-S: First Extragalactic Results from Keck Laser Adaptive Optics”**. *The Astrophysical Journal*. Volume 625, Issue 1, pp. L27-L30

Melbourne, J., Guhathakurta, P., 2004. **“Measuring the Slope of the Dust Extinction Law and the Power Spectrum of Dust Clouds Using Differentially Reddened Globular Clusters”**. *The Astronomical Journal*. Volume 128, Issue 1, pp. 271-286

Melbourne, Jason, Phillips, Andrew, Salzer, John J., Gronwall, Caryl, Sarajedini, Vicki L., 2004. **“Metal Abundances of KISS Galaxies. II. Nebular Abundances of 12 Low-Luminosity Emission-Line Galaxies”**. *The Astronomical Journal*. Volume 127, Issue 2, pp. 686-703

Melbourne, Jason, Salzer, John J., 2002 “**Metal Abundances of KISS Galaxies. I. Coarse Metal Abundances and the Metallicity-Luminosity Relation**”. *The Astronomical Journal*. Volume 123, Issue 5, pp. 2302-2311

Melbourne, Jason, Sarajedini, Ata, Layden, Andrew, Martins, Donald H., 2000 “**CCD Photometry of the Globular Cluster NGC 4833 and Extinction Near the Galactic Plane**”. *The Astronomical Journal*. Volume 120, Issue 6, pp. 3127-3138

### Additional Refereed Publications

Cluver, M. E.; Jarrett, T. H.; Kraan-Korteweg, R. C.; Koribalski, B. S.; Appleton, P. N.; Melbourne, J.; Emonts, B.; Woudt, P. A. 2010. “*Active Disk Building in a Local H I-massive LIRG: The Synergy Between Gas, Dust, and Star Formation*”. **The Astrophysical Journal**, Volume 725, Issue 2, pp. 1550-1562

Girardi, Léo; Williams, Benjamin F.; Gilbert, Karoline M.; Rosenfield, Philip; Dalcanton, Julianne J.; Marigo, Paola; Boyer, Martha L.; Dolphin, Andrew; Weisz, Daniel R.; Melbourne, Jason; Olsen, Knut A. G.; Seth, Anil C.; Skillman, Evan. 2010. “*The ACS Nearby Galaxy Survey Treasury. IX. Constraining Asymptotic Giant Branch Evolution with Old Metal-poor Galaxies*”. **The Astrophysical Journal**, Volume 724, Issue 2, pp. 1030-1043

Inami, H.; Armus, L.; Surace, J. A.; Mazzarella, J. M.; Evans, A. S.; Sanders, D. B.; Howell, J. H.; Petric, A.; Vavilkin, T.; Iwasawa, K.; Haan, S.; Murphy, E. J.; Stierwalt, S.; Appleton, P. N.; Barnes, J. E.; Bothun, G.; Bridge, C. R.; Chan, B.; Charmandaris, V.; Frayer, D. T.; Kewley, L. J.; Kim, D. C.; Lord, S.; Madore, B. F.; Marshall, J. A.; Matsuhara, H.; Melbourne, J. E.; Rich, J.; Schulz, B.; Spoon, H. W. W.; Sturm, E.; U, V.; Veilleux, S.; Xu, K. 2010. “*The Buried Starburst in the Interacting Galaxy II Zw 096 as Revealed by the Spitzer Space Telescope*”. **The Astronomical Journal**, Volume 140, Issue 1, pp. 63-74

Howell, Justin H.; Armus, Lee; Mazzarella, Joseph M.; Evans, Aaron S.; Surace, Jason A.; Sanders, David B.; Petric, Andreea; Appleton, Phil; Bothun, Greg; Bridge, Carrie; Chan, Ben H. P.; Charmandaris, Vassilis; Frayer, David T.; Haan, Sebastian; Inami, Hanae; Kim, Dong-Chan; Lord, Steven; Madore, Barry F.; Melbourne, Jason; Schulz, Bernhard; U, Vivian; Vavilkin, Tatjana; Veilleux, Sylvain; Xu, Kevin. 2010. “*The Great Observatories All-sky LIRG Survey: Comparison of Ultraviolet and Far-infrared Properties*”. **The Astrophysical Journal**, Volume 715, Issue 1, pp. 572-588

Bussmann, R. S.; Dey, Arjun; Borys, C.; Desai, V.; Jannuzi, B. T.; Le Floch, E.; Melbourne, J.; Sheth, K.; Soifer, B. T. 2009. “*Infrared Luminosities and Dust Properties of  $z \approx 2$  Dust-obscured Galaxies*”. **The Astrophysical Journal**, Volume 705, Issue 1, pp. 184-198

Desai, Vandana; Soifer, B. T.; Dey, Arjun; LeFloc'h, Emeric; Armus, Lee; Brand, Kate; Brown, Michael J. I.; Brodwin, Mark; Jannuzi, Buell T.; Houck, James R.; Weedman, Daniel W.; Ashby, Matthew L. N.; Gonzalez, Anthony; Huang, Jiasheng; Smith, Howard A.; Teplitz, Harry; Willner, Steve P.; Melbourne, Jason. 2009. **“Strong Polycyclic Aromatic Hydrocarbon Emission from  $z \approx 2$  ULIRGs”**. *The Astrophysical Journal*, Volume 700, Issue 2, pp. 1190-1204

Armus, L.; Mazzarella, J. M.; Evans, A. S.; Surace, J. A.; Sanders, D. B.; Iwasawa, K.; Frayer, D. T.; Howell, J. H.; Chan, B.; Petric, A.; Vavilkin, T.; Kim, D. C.; Haan, S.; Inami, H.; Murphy, E. J.; Appleton, P. N.; Barnes, J. E.; Bothun, G.; Bridge, C. R.; Charmandaris, V.; Jensen, J. B.; Kewley, L. J.; Lord, S.; Madore, B. F.; Marshall, J. A.; Melbourne, J. E.; Rich, J.; Satyapal, S.; Schulz, B.; Spoon, H. W. W.; Sturm, E.; U, V.; Veilleux, S.; Xu, K. 2009. **“GOALS: The Great Observatories All-Sky LIRG Survey”**. *Publications of the Astronomical Society of the Pacific*, Volume 121, issue 880, pp.559-576

Bussmann, R. S.; Dey, Arjun; Lotz, J.; Armus, L.; Brand, K.; Brown, M. J. I.; Desai, V.; Eisenhardt, P.; Higdon, J.; Higdon, S.; Jannuzi, B. T.; LeFloc'h, E.; Melbourne, J.; Soifer, B. T.; Weedman, D. **“Hubble Space Telescope Morphologies of  $z \sim 2$  Dust Obscured Galaxies. I. Power-Law Sources”**. *The Astrophysical Journal*, Volume 693, Issue 1, pp. 750-770

Brand, Kate; Moustakas, John; Armus, Lee; Assef, Roberto J.; Brown, Michael J. I.; Cool, Richard R.; Desai, Vandana; Dey, Arjun; LeFloc'h, Emeric; Jannuzi, Buell T.; Kochanek, Christopher S.; Melbourne, Jason; Papovich, Casey J.; Soifer, B. T. 2009. **“The Origin of the 24  $\mu$ m Excess in Red Galaxies”**. *The Astrophysical Journal*, Volume 693, Issue 1, pp. 340-346

Ammons, M., Melbourne, J., Max, C., Koo, D., Rosario, D., 2009. **“Spatially Resolved Stellar Populations of Eight GOODS-South AGN at  $z \sim 1$ ”**. *The Astronomical Journal*. Volume 137, Issue 1, pp. 470-497

Steinbring, E., Melbourne, J., Metevier, A. J., Koo, D. C., Chun, M. R., Simard, L., Larkin, J. E., Max, C. E., 2008. **“Cats: Optical to Near-Infrared Colors of the Bulge and Disk of Two  $z = 0.7$  Galaxies Using Hubble Space Telescope and Keck Laser Adaptive Optics Imaging”**. *The Astronomical Journal*, Volume 136, Issue 4, pp. 1523-1532

Marshall, Philip J., Treu, Tommaso, Melbourne, Jason, Gavazzi, Raphaël, Bundy, Kevin, Ammons, S. Mark, Bolton, Adam S., Burles, Scott, Larkin, James E., Le Mignant, David, Koo, David C., Koopmans, Léon V. E., Max, Claire E., Moustakas, Leonidas A., Steinbring, Eric, Wright, Shelley A., 2007. **“Superresolving Distant Galaxies with Gravitational Telescopes: Keck Laser Guide Star Adaptive Optics and Hubble Space Telescope Imaging of the Lens System SDSS J0737+3216”**. *The Astrophysical Journal*, Volume 671, Issue 2, pp. 1196-1211

Weiner, Benjamin J., Willmer, Christopher N. A., Faber, S. M., Harker, Justin, Kassin, Susan A., Phillips, Andrew C., Melbourne, Jason, Metevier, A. J., Vogt, N. P., Koo, D. C., 2006. **“A Survey of Galaxy Kinematics to  $z \sim 1$  in the TKRS/GOODS-N Field. II. Evolution in the Tully-Fisher Relation”**. *The Astrophysical Journal*, Volume 653, Issue 2, pp. 1049-1069

Weiner, Benjamin J., Willmer, Christopher N. A., Faber, S. M., Melbourne, Jason, Kassin, Susan A., Phillips, Andrew C., Harker, Justin, Metevier, A. J., Vogt, N. P., Koo, D. C., 2006. **“A Survey of Galaxy Kinematics to  $z \sim 1$  in the TKRS/GOODS-N Field. I. Rotation and Dispersion Properties”**. *The Astrophysical Journal*, Volume 653, Issue 2, pp. 1027-1048

Noeske, K. G., Koo, D. C., Phillips, A. C., Willmer, C. N. A., Melbourne, J., Gil de Paz, A., Papaderos, P., 2006. **“Luminous Compact Blue Galaxies up to  $z \sim 1$  in the Hubble Space Telescope Ultra Deep Field. I. Small Galaxies or Blue Centers of Massive Disks?”** *The Astrophysical Journal*. Volume 640, Issue 2, pp. L143-L146

Salzer, John J., Lee, Janice C., Melbourne, Jason, Hinz, Joannah L., Alonso-Herrero, Almudena, Jangren, Anna., 2005. **“Metal Abundances of KISS Galaxies. IV. Galaxian Luminosity-Metallicity Relations in the Optical and Near-Infrared”**. *The Astrophysical Journal*. Volume 624, Issue 2, pp. 661-679

Lee, Janice C., Salzer, John J., Melbourne, Jason., 2004. **“Metal Abundances of KISS Galaxies. III. Nebular Abundances for Fourteen Galaxies and the Luminosity-Metallicity Relationship for H II Galaxies”**. *The Astrophysical Journal*. Volume 616, Issue 2, pp. 752-767

Prochaska, Jason X., Bloom, Joshua S., Chen, Hsiao-Wen, Hurley, Kevin C., Melbourne, Jason, Dressler, Alan, Graham, James R., Osip, David J., Vacca, W. D., 2004. **“The Host Galaxy of GRB 031203: Implications of Its Low Metallicity, Low Redshift, and Starburst Nature”**. *The Astrophysical Journal*. Volume 611, Issue 1, pp. 200-207

Wegner, Gary, Salzer, John J., Jangren, Anna, Gronwall, Caryl, Melbourne, Jason., 2003. **“Spectroscopy of KISS Emission-Line Galaxy Candidates. I. MDM Observations”**. *The Astronomical Journal*. Volume 125, Issue 5, pp. 2373-2392