

Curriculum Vitae Matthew Manning Knight

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* As of May 2011, I am currently a Long-term Visitor at Johns Hopkins University Applied Physics Laboratory. However, Lowell Observatory remains my employer and primary mailing address.

Education

2008 Ph.D. Astronomy, University of Maryland
 Advisor: Prof. Michael F. A'Hearn
 Thesis title: "Studies of SOHO Comets"
2003 M.S. Astronomy, University of Maryland
2000 B.S. Physics with Distinction, University of Virginia

Research Experience

2008–present *Postdoctoral Research Associate, Lowell Observatory, Flagstaff, AZ.* Broadband and narrowband studies of comet nuclei and coma morphology in optical wavelengths. Supervisor: Dr. David G. Schleicher
2002–2008 *Graduate Research Assistant, Department of Astronomy, University of Maryland.* Studies of sungrazing comets including lightcurve analysis and dynamical modeling; optical and IR imaging of comets. Supervisor: Prof. Michael F. A'Hearn
1999 *REU, Department of Physics & Astronomy, University of New Mexico.* Atmospheric monitoring and detector calibration for fluorescence experiments with the High Resolution Fly's Eye experiment in Utah. Supervisor: Prof. John M. Matthews
1998 *Undergraduate Research Assistant, Department of Physics, University of Virginia.* Synthesis and investigation of amorphous metals with large strength to density ratios. Supervisor: Prof. Joseph Poon

Refereed Publications

1. **Knight, M. M.** and Schleicher, D.G. The Highly Unusual Outgassing of Comet 103P/Hartley 2 from Narrowband Photometry and Imaging of the Coma. Submitted to *Icarus*.
2. Lisse, C.M., Christian, D.J., Wolk, S., Bodewits, D., Dennerl, K., Combi, M., Lepri, S., Zurbuchen, T., Dello Russo, N., **Knight, M.M.** Chandra ACIS-S Imaging Spectroscopy of Rotationally Modulated X-ray Emission From Comet 103P/Hartley 2 During the EPOXI Encounter. Submitted to *Icarus*.
3. Hsieh, H.H. and 38 colleagues (including **Knight, M.M.**). 2011. Observational and Dynamical Characterization of Main-Belt Comet P/2010 R2 (La Sagra). *The Astronomical Journal*, 143:104 (16pp). arXiv:1109.6350.
4. **Knight, M. M.** and Schleicher, D. G. 2011. CN Morphology Studies of Comet 103P/Hartley 2. *The Astronomical Journal* 141:183 (14pp). arXiv:1103.5466v1. [June 2011 AJ cover]
5. Meech, K.J. and 191 colleagues (including **Knight, M.M.**). 2011. EPOXI: Observations from a Worldwide Earth-Based Campaign. *The Astrophysical Journal Letters*, 734, L1.
6. **Knight, M. M.**, Farnham, T. L., Schleicher, D. G., Schwieterman, E. W. 2011. The Increasing Rotation Period of Comet 10P/Tempel 2. *The Astronomical Journal*, 141:2 (14pp). arXiv:1009.3019v1.
7. **Knight, M. M.**, A'Hearn, M. F., Biesecker, D. A., Faury, G., Hamilton, D. P., Lamy, P., Llebaria, A. 2010. Photometric Study of the Kreutz Comets Observed by SOHO from 1996–2005. *The Astronomical Journal* **139**, 926–949.

8. Farnham, T. L., Samarasinha, N. H., Mueller, B. E. A., **Knight, M. M.** 2007. Cyanogen Jets and the Rotation State of Comet Machholz (C/2004 Q2). *The Astronomical Journal* **133**, 2001–2007.
9. **Knight, M. M.**, Walsh, K. J., A’Hearn, M. A., Swaters, R. A., Zauderer, B. A., Samarasinha, N., Vasquez, R., Reitsema, H. 2007. Ground Based Optical and Near-IR Observations of the Deep Impact Encounter. *Icarus* **187**, 199–207.
10. Meech, K. J. and 207 colleagues (including **Knight, M.M.**) 2005. Deep Impact: Observations from a Worldwide Earth-Based Campaign. *Science* **310**, 265–269.

Papers in Preparation

1. **Knight, M. M.**, Schleicher, D.G., Farnham, T.L., Schwieterman, E.W., Christensen, S. Two Decades of Observations of 10P/Tempel 2 at Lowell Observatory. *AJ* (in prep, for submission Spring 2012)
2. **Knight, M.M.**, Weaver, H.A., Fernandez, Y.R., Chesley, S.R., Kelley, M.S., McNaught, R., Bodewits, D., Lisse, C.M., Osip, D.J., Dello Russo, N. Battams, K. A Multiwavelength Investigation of the Remains of Sungrazing Comet Lovejoy (C/2011 W3). *AJ* (in prep, for submission Summer 2012)

IAU Circulars & Central Bureau Electronic Telegrams

1. **Knight, M.**, Schleicher, D. 2010. Comet 103P/Hartley 2 (morphology and pole solution). *IAU Circ.* 9175
2. **Knight, M.**, Schleicher, D. 2010. Comet 103P/Hartley 2 (morphology and pole solution). *IAU CBET* 2512
3. **Knight, M.**, Schwieterman, E., Schleicher, D. 2010. Comet 103P/Hartley (morphology and rotation period). *IAU Circ.* 9163 (also *IAU CBET* 2418)
4. **Knight, M.** 2010. Comet C/2010 H3 (SOHO) (photometry). *IAU Circ.* 9138 (also *IAU CBET* 2256)
5. **Knight, M.** and Schleicher, D. 2009. Comet C/2007 N3 (Lulin) (morphology, pole solution, and rotation period). *IAU Circ.* 9025
6. **Knight, M.** 2007. P/2007 R5 = 1999 R1 = 2003 R5 (SOHO) (photometry and morphology). *IAU Circ.* 8872

Refereed Archived Datasets

1. **Knight, M.M.** 2010. SOHO LASCO Comet Photometry V1.0, NASA Planetary Data System, SOHO-C-LASCO-5-KREUTZPHOTOM-V1.0
2. **Knight, M.M.** 2010. SOHO LASCO Comet Images V1.0, NASA Planetary Data System, SOHO-C-LASCO-4-COMETIMAGES-V1.0
3. **Knight, M.M.** 2010. Near-infrared Images of Comet 9P/Tempel 1 V1.0, NASA Planetary Data System, DI/EAR-C-SQIID-3-9PNIRIMAGES-V1.0

Published Abstracts and Conference Proceedings

1. **Knight, M.M.**, Weaver, H.A., Fernandez, Y.R., Chesley, S.R., Kelley, M.S., McNaught, R., Bodewits, D., Lisse, C.M., Osip, D.J., Dello Russo, N. Battams, K. 2012.. A Multiwavelength Investigation of the Remains of Sungrazing Comet Lovejoy (C/2011 W3). *AAS* **220**, #128.03.
2. **Knight, M.M.**, Weaver, H.A., Fernandez, Y.R., Chesley, S.R., Kelley, M.S., McNaught, R., Bodewits, D., Lisse, C.M., Osip, D.J., Dello Russo, N. Battams, K. 2012. A Multiwavelength Investigation of the Remains of Sungrazing Comet Lovejoy (C/2011 W3). *ACM* **2012**, #6409.
3. **Knight, M.M.**, Schleicher, D.G., Farnham, T.L., Schwieterman, E.W., Christensen, S.R. 2012. Production Rates, Jet Modeling, and the Continued Spin-Down of Comet 10P/Tempel 2. *ACM* **2012**, #6410.
4. Fuentes, C.I., **Knight, M.M.**, Trilling, D.E. 2012. The STEREO search for IEOs. *ACM* **2012**, #6472.
5. Lisse, C.M., Christian, D.J., Wolk, S.J., Dennerl K., Bodewits D., Li, J.-Y., Combi, M.R., Lepri, S.T., Zurbuchen, T.H., Dello-Russo, N., **Knight, M. M.** 2012. Chandra ACIS-S X-Ray Imaging Spectroscopy of EPOXI Target Comet 103P/Hartley 2. *ACM* **2012**, #6252..

6. **Knight, M.M.**, Schleicher, D.G. 2011. Photometry and Imaging of Comet 103P/Hartley 2 from Lowell Observatory. *EPSC-DPS* **2011**, 655.
7. Fuentes, C., Trilling, D., **Knight, M.** 2011. The Most Dangerous IEOs in STEREO. *EPSC-DPS* **2011**, 682.
8. **Knight, M.M.**, Schleicher, D.G. 2011. CN Morphology of Comet 103P/Hartley 2. *LPSC* **42**, 2634.
9. **Knight, M.M.**, Schleicher, D.G. 2010. Dust and Gas Morphology of Comets 81P/Wild 2, 10P/Tempel 2, and 103P/Hartley 2. *Bull. Am. Astr. Soc.* **42**, 965.
10. Schwieterman, E.W., Schleicher, D.G., **Knight, M.M.**, Farnham, D.G. 2010. Analysis of 10P/Tempel 2's Morphological Features and Pole Orientation. *Bull. Am. Astr. Soc.* **42**, 965.
11. Schwieterman, E.W., Farnham, T.L., **Knight, M.M.**, Schleicher, D.G. 2010. Rotational Period Investigation of Comet P/Tempel 2 During the 1999 Apparition and Other Results. *Bull. Am. Astr. Soc.* **42**, 454.
12. **Knight, M.M.**, Schleicher, D.G. 2009. Narrowband Observations of Comet Lulin (2007 N3). *Bull. Am. Astr. Soc.* **41**, 1036.
13. Schleicher, D.G., Farnham, T.L., Schwieterman, E.W., Knight, M.M. 2009. Nucleus and Coma Properties of Comet 10P/Tempel 2 During Its 1999 Apparition. *Bull. Am. Astr. Soc.* **41**, 1028.
14. **Knight, M. M.**, A'Hearn, M. F., Biesecker, D. A., Faury, G., Hamilton, D. P., Lamy, P., Llebaria, A. 2008. Photometry of the Kreutz Comets 1996–2005. *Bull. Am. Astr. Soc.* **40**, 411.
15. **Knight, M. M.**, A'Hearn, M. F., Biesecker, D. A., Faury, G., Hamilton, D. P., Lamy, P., Llebaria, A. 2008. Phase Angle Effects on Sungrazing Comets Observed by SOHO. *Asteroids, Comets, and Meteors*, abstract # 8143
16. **Knight, M. M.**, A'Hearn, M. F., Biesecker, D. A., Faury, G., Hamilton, D. P., Lamy, P., Llebaria, A. 2007. Recent Evolution of the Kracht Group of Comets. *Bull. Am. Astr. Soc.* **39**, 877.
17. **Knight, M. M.**, A'Hearn, M. F., Biesecker, D. A., Faury, G., Hamilton, D. P., Lamy, P., Llebaria, A. 2007. Recent Evolution of the Kracht Group of Comets. *Bull. Am. Astr. Soc.* **39**, 534.
18. Storm, S., Samarasinha, N., Mueller, B., Farnham, T., Fernandez, Y., Kidder, A., Snowden, D., A'Hearn, M., Harris, W., **Knight, M.**, Morgenthaler, J., Lisse, C., Roesler, F. 2007. Constraining the Rotational Period for Component C of the Periodic Comet 73P/Schwassmann-Wachmann 3. *Bull. Am. Astr. Soc.* **38**, 935.
19. **Knight, M. M.**, A'Hearn, M. F., Biesecker, D. A., Faury, G., Hamilton, D. P., Lamy, P., Llebaria, A. 2006. Understanding the Kreutz Sungrazing Comets. *Bull. Am. Astr. Soc.* **38**, 516.
20. Storm, S. P., Samarasinha, N., Mueller, B., Farnham, T., Fernandez, Y., Kidder, A., Snowden, D., A'Hearn, M., Harris, W., **Knight, M.**, Morgenthaler, J., Lisse, C., Roesler, F. 2006. Time Variability of Component C of the Fragmented Comet 73P/Schwassmann-Wachmann 3. *Bull. Am. Astr. Soc.* **38**, 504.
21. Harris, W. M., Solontoi, M., Snowden, D., Morgenthaler, J. P., Mueller, B. E., Samarasinha, N., Mierkiewicz, E. J., Oliverson, R. J., Kokorowski, M., Kidder, A., Schnackenberg, T., Christensen, C., Farnham, T. L., Fernandez, Y. R., Lisse, C., **Knight, M.**, A'Hearn, M. F., Roesler, F. L. 2006. Integrated Field Spectroscopy of the B and C Fragments of Comet 73p/Schwassmann-Wachmann 3. *Bull. Am. Astr. Soc.* **38**, 502.
22. **Knight, M. M.**, A'Hearn, M. F., Biesecker, D. A., Faury, G., Hamilton, D. P., Lamy, P., Llebaria, A. 2006. Understanding the Kreutz Sungrazing Comets. *36th COSPAR Scientific Assembly*, p. 2697
23. Samarsinha, N. H., Farnham, T., Mueller, B. E. A., **Knight, M. M.**, Belton, M. J. S., A'Hearn, M. F., Lisse, C. M. 2006. Dust Environment of the Deep Impact Mission Target Comet 9P/Tempel 1 Prior to the Impact: A Contextual Investigation. *3rd Asia Oceania Geosci. Soc. Meeting*, abstract #59-PS-A0338
24. **Knight, M. M.**, Swaters, R. A., A'Hearn, M. F., Samarasinha, N. H. 2006. Near-IR Observations of the Deep Impact Encounter with Comet 9P/Tempel 1. *Bull. Am. Astr. Soc.* **37**, 1156.
25. **Knight, M. M.**, A'Hearn, M. F., Biesecker D. A., Faury, G., Hamilton, D. P., Lamy, P., Llebaria. 2005. Light Curves of Kreutz Comet. *IAU Symposium 229, Asteroids Comets and Meteors*, abstract #P5.9

26. **Knight, M. M.**, A'Hearn, M. F., Biesecker, D. A., Faury, G., Hamilton, D. P., Lamy, P., Llebaria, A. 2005. Light Curves of Kreutz Comets. *Bull. Am. Astr. Soc.* **37**, 632.
27. Farnham, T. L., Mueller, B. E. A., **Knight, M. M.**, Samarasinha, N. H. 2005. Narrowband Observations of Comet Tempel 1 in Support of the Deep Impact Mission. *Bull. Am. Astr. Soc.* **37**, 711.
28. **Knight, M. M.**, A'Hearn, M. F. 2004. Kreutz Sungrazing Comets Discovered with SOHO/LASCO. *Bull. Am. Astr. Soc.* **36**, 1150.
29. **Knight, M. M.**, A'Hearn, M. F. 2002. How Well Do We Understand the Cometary Hazard? *NASA Workshop on Scientific Requirements for Mitigation of Hazardous Comets and Asteroids Conference*. Edited by E. Asphaug and N. Samarasinha. p. 58.

Successful Funding Proposals

1. "Quantitative Analyses of Gas and Dust Coma Morphologies in Comets". PI: D.G. Schleicher. Role: Postdoc. Commitment: 6.6 mo/yr for 3 years. Funded by Planetary Astronomy Program, 2010. Total amount: \$290K.
2. "Study of Sungrazing Comets Observed by SOHO and STEREO". PI: **M.M. Knight**. Role: PI. Commitment: 4 mo/yr for 3 years. Funded by Planetary Mission and Data Analysis Program, 2009. Total amount: \$145K.
3. "Groundbased Cometary Studies". PI: D.G. Schleicher. Role: Postdoc. Commitment: 1.4 mo/yr for 3 years. Funded by Planetary Astronomy Program, 2008. Total amount: \$535K.
4. "Studies of SOHO Comets". PI: M.F. A'Hearn. Role: Graduate Student. Commitment: 12 mo/yr for 3 years. Funded by Planetary Atmospheres Program, 2005. Total amount: \$195K.

Successful Telescope Proposals

1. "Is There Any Water Left in Sungrazing Comet C/2011 W3 Lovejoy?" PI: M. Knight. Instrument: *Swift*. Time awarded: 2 orbits. January 2012.
2. "The First Detailed IR Observations of a Sungrazing Comet: C/2011 W3 Lovejoy". PI: M. Knight. Instrument: *Spitzer*. Time awarded: 4 hours. Cycle 8 DDT.
3. "High Spatial Resolution Photometric Imaging of the Area Around the Nucleus of C/2011 W3 Lovejoy". PI: M. Knight. Instrument: *Hubble*. Time awarded: 1 orbit. Cycle 19 DDT.
4. "Submillimetre spectroscopy of sungrazing/Kreutz comets". PI: M. Drahus. Role: Co-I. Instrument: JCMT. Time: 20 hr. Semester: 2011B, 2012A.
5. "A Pilot Study of the Sungrazing Kreutz Comets". PI: M. Drahus. Role: Co-I. Instrument: IRAM 30-m. Time: 11.5 hr. Semester: 2011B, 2012A.

Observing Experience

1. *Hubble Space Telescope*: 1 orbit imaging comets in optical wavelengths
2. *Spitzer Space Telescope*: 4.0 hr imaging comets in thermal-IR wavelengths
3. *Swift*: 2 orbits imaging comets in UV and optical wavelengths
4. Lowell 42-in: 100+ nights imaging comets in broadband and narrowband optical wavelengths
5. Lowell 72-in: 2 night imaging comets in broadband and narrowband optical wavelengths
6. KPNO 4-m: 9 nights imaging comets in optical wavelengths
7. KPNO 2.1-m: 26 nights imaging comets in optical and near-IR wavelengths.
8. NSO McMath-Pierce Solar Telescope: 9 days obtaining spectra of Mercury in optical wavelengths

Professional Experience

1. Since 2008, I have refereed nine manuscripts for seven journals. These include: *The Astronomical Journal*, *The Astrophysical Journal*, *The Astrophysical Journal Letters*, *Icarus*, *Monthly Notices of the Royal Astronomical Society*, *Planetary and Space Science*, and *Science*.
2. Review panelist for NASA Discovery Mission, NASA Planetary Atmospheres, PDS Small Bodies Node

3. External reviewer for NASA Planetary Atmospheres, NASA Outer Planets Research, NASA Planetary Mission Data Analysis Program, and European Northern Observatory CCI International Time Programmes, CFHT CanTAC
4. Scientific Organizing Committee for “Comet Lovejoy Workshop”, Boulder, CO, March 21-22, 2012
5. Co-organized “103P/Hartley 2 Rotation Workshop” held at NOAO, Tucson, AZ in April 2011
6. Session chair for AAS Division of Planetary Sciences, Lunar and Planetary Science Conference
7. Maintenance of “Named Comets” website for the Committee on Small Body Nomenclature, IAU Division III, 2002–2008

Departmental Leadership Activities

1. Colloquium co-organizer, Lowell Observatory, 2010–2011
2. Website working group, Lowell Observatory, 2009
3. Graduate student “Grand Poobah”, UMD Department of Astronomy, 2000–2008
4. Student representative, UMD Astronomy Department Graduate Curriculum Review Committee, 2003
5. Student representative, UMD Astronomy Department Chair Search Committee, 2002

Honors

1. Prize Winner, Spotlight on Graduate Research, University of Maryland (2007)
2. Travel Grant, 35th SAAS-Fee Advanced Course (2005)
3. Center for Teaching Excellence Distinguished Teaching Assistant (2001, 2002)
4. Department of Astronomy Outstanding Teaching Assistant (2001, 2002)

Invited Talks

1. Carnegie Institute of Washington (Department of Terrestrial Magnetism)
2. Lowell Observatory
3. NASA Challenger Center, Alexandria, VA

Public Talks

1. “Death Defying Comet Lovejoy,” Observatory Open House Lecture, University of Maryland (3 additional talks 2004–2012)
2. “An Introduction to Sungrazing Comets,” NAU Outer Solar System Lunch, Flagstaff, AZ (January 2012)
3. “Lowell Observations of 103P/Hartley 2 and 10P/Tempel 2,” Planetary Astronomy Lunchtime Seminar, University of Maryland (12 additional talks 2002–2011)
4. “Chasing Comet Lulin,” Lowell Observatory Advisory Board Meeting, Flagstaff, AZ (June 2009)
5. “Studies of SOHO Comets,” Astronomy Unjournal Club, University of Maryland (4 additional talks 2002–2008)
6. “Recent Evolution of the Kracht Group of Comets,” Spotlight on Graduate Research, University of Maryland (December 2007)
7. “How Well Do We Understand the Cometary Hazard?” Graduate Research Interaction Day, University of Maryland (April 2003)
8. “Comets Observed with SOHO/LASCO,” Intel/Hayden Planetarium student visit to the University of Maryland (March 2003)

Teaching and Outreach

1. Visiting teacher, Baltimore ProjectASTRO (2011–2012)
2. Public program volunteer, Lowell Observatory (2010–2011)
3. Visiting teacher, Lowell Observatory Navajo-Hopi outreach program (2009–2010)
4. Mentor, Northern Arizona REU program (2009)
5. Lowell guide, UMD College Park Scholars astronomy/geology spring break trip (2009, 2011)
6. Graduate Assistant, University of Maryland Observatory (2000–2008)
7. Maryland Day Volunteer, University of Maryland (2001–2007)
8. Math/science substitute teacher, Henrico County, Virginia (2001)
9. Teaching Assistant, ASTR 100 “Introduction to Astronomy,” U. Maryland (4 semesters: Fall 2000–Spring 2002)

Advising Experience

1. Samantha Christensen, Lowell Observatory research assistant (2011–current)
Supervised image processing and analysis of comets 10P/Tempel 2 and 103P/Hartley 2
2. Edward Schwieterman, current U. of Washington graduate student, former Florida Institute of Technology undergraduate (Summer 2009, 2010)
Supervised photometric reductions, image processing, and analysis of comet 10P/Tempel 2; trained in optical ground-based observing
3. Jason Begun, U. of Maryland undergraduate student (2009–current)
Supervised photometric reductions of sungrazing comets

Technical Skills

1. Astronomical techniques: Planning and executing observations (optical/near-IR), Data reduction and analysis (optical/near-IR), Image enhancement, Data mining (SOHO, STEREO), Dynamical modeling (HNBody), Numerical modeling (DataDesk)
2. Astronomical software: IRAF (optical/IR), DS9
3. Programming languages: IDL, C, HTML, Awk, Unix shell scripts
4. Other software: plotting (Supermongo), Spreadsheets (Microsoft Excel, OpenOffice), Word Processing (Microsoft Word, LaTeX), Operating systems (Mac OS X, Windows, Linux/Unix)

Additional Training

1. Cometary Radio Astronomy Workshop (2010)
2. 35th SAAS-Fee Advanced Course on Trans-Neptunian Objects and Comets (2005)
3. Kitt Peak Summer School, University of Maryland (2004)
4. BIMA Summer School (2001)

Memberships

1. American Astronomical Society
2. Division of Planetary Sciences of American Astronomical Society
3. Historical Astronomy Division of American Astronomical Society

Popular Articles

1. “The Survival of Comet Lovejoy (C/2011 W3), A Once in a Generation Event,” *Lowell Observatory Blog*, December 2011
2. “Comet Lulin Zooms By” *Lowell Observer*, December 2009
3. “Sungrazing Comets” *Zenit* (The Netherlands), February 2006, p. 56–61.
4. My work has been mentioned in numerous popular news stories both in print and online. These publications include *Tahdet ja Avaruus* (a Finnish magazine similar to Sky and Telescope), *Space.com*, *NASA Science News*, *Discovery Channel*, *Scientific American*, and *National Geographic*.

References

Dr. David G. Schleicher
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