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EDUCATION:

B.S. 1986, Geology, University of California at Berkeley, Berkeley, CA.

Field Geology: Exotic Terrains of Northern California, with Dr. D. Jones
Certificate, Summer 1991, International Space University, Toulouse, France.

Project: International Mars Mission

Ph.D. 1993, Geophysics, University of Hawai'i at Manoa, Honolulu, HI.

Dissertation: Spectral Effects in the Search for Links Between Meteorites and Asteroids.

PROFESSIONAL

POSITIONS:

Professor, Department of Physics, *Ithaca College, 2015—present*

Chair, Department of Physics, *Ithaca College, 2009—2012, 2016—present*

Associate Professor, Department of Physics, *Ithaca College, 2007—2015*

Visiting Astronomer, Observatory of Paris, *Meudon, France, 2009*

Assistant Professor, Department of Physics, *Ithaca College, 2001—2007*

Visiting Assistant Professor, Department of Astronomy, *Cornell University, 2001—2008*

Research Associate, Astronomy Department, *Cornell University, 1996—2001*

National Science Foundation Visiting Professor, *University of Arizona, 1995—1996*

H. J. Smith Postdoctoral Fellow, McDonald Observatory, *University of Texas, 1993—1995*

SPACECRAFT MISSION

EXPERIENCE:

2011—present

OSIRIS-REx Mission Asteroid Scientist, NASA

2009—2010

MARCO POLO Envoy from NASA - Observing Mission Devel., ESA

2000—2008

HAYABUSA Science Team Member on Near-IR Spectrometer, JAXA

1997—2001

NEAR Science Team Associate on Imaging and Spectroscopy, NASA

1996—1998

GALILEO Science Team Associate on Multispectral Imaging, NASA

PROFESSIONAL

ACTIVITIES AND

SERVICE:

Member, Astronomy Review Panel, National Science Foundation, ~2020

Member, Telescope Time Allocation Committee, National Optical Astronomy
Observatories, ~2018

Advisor, Master's Thesis student Ms. Alice Praet, University of Paris, Paris France,
2017.

Member, Scientific Organizing Committee, *Asteroids IV*, University of Arizona Press,
publication date: Fall 2015.

Member, Prize Committee for the American Astronomical Society Division of Planetary
Sciences, 2013—2014.

Associate Editor, *Meteoritics and Planetary Science*, 1999—2012.

Advisor, Master's Thesis student Ms. Celine Lantz, University of Paris, Paris France,
2012.

Member, Dissertation defense committee for Dr. Francesca DeMeo, Observatory of Paris,
Paris France, 2010.

Member, Dissertation defense committee for Dr. Stéphane Erard, Observatory of Paris, Paris France, 2009.

Co-Chair, Scientific Organizing Committee, 2008 Division of Planetary Sciences Conference, American Astronomical Society, held at Cornell University.

Member, PhD Review Committee for Dr. Philip Bidstrup, University of Copenhagen, Copenhagen, Denmark, 2008.

Chair, NASA Cassini Data Analysis Review Panel, 2006.

Member, Arecibo Observatory Telescope Time Application Review Panel, 2004–2007.

Member, NASA Planetary Science Management Operations Working Group, 1995–2004. A scientific advisory committee convened by the Director of Planetary Science.

Chair, Scientific Organizing Committee, 7th International “*Asteroids, Comets, Meteors*” Conference, Cornell University, 1999.

Member, Review Panels, 1994–present:

- NSF Astronomy
- NSF Career Grant Astronomy
- NASA Planetary Astronomy
- NASA Mars Program
- NASA NEAR Data Analysis
- NASA Cassini Data Analysis
- NASA Planetary Instrument Definition and Development Program
- NASA Near-Earth Object Program
- NASA Planetary Data System Small Bodies Node
- NASA Mission Concepts
- Research Corporation
- Hubble Space Telescope Planetary Astronomy
- NASA Office of Space Science Educational Products

External Reviewer, 1994–present:

- ESA Cosmic Vision Opportunity
- NASA Discovery Mission Opportunity
- NSF Astronomy
- NASA Planetary Astronomy
- NASA Mars Program

Science Advisor, *Earth & Sky*, Austin Texas, 1995–2010.

BOOK CHAPTERS:

Clark, B.E., Hapke B., Pieters C., and Britt D., (2002) Asteroid Space Weathering and Regolith Evolution. In *Asteroids III*, Univ of Arizona Press, pp.585-599.

Muinonen, K, J. Piironen, Y. Shkuratov, A. Ovcharenko, and **B.E. Clark** (2002) Asteroid Photometric and Polarimetric Phase Effects. In *Asteroids III*, (B. Bottke et al. Eds.) Univ of Arizona Press, 123-138.

Li, J.Y., Helfenstein P., Buratti B., Takir D. and **B.E. Clark** (2015) Asteroid Photometry. In *Asteroids IV*, Univ of Arizona Press, pp. 129-150.

Clark, B.E., Barucci M.A., X.D. Zou, M. Fulchignoni, A.S. Rivkin, C. Raymond, M. Yoshikawa, L. Elkins-Tanton, and H. Levison (2017). A Brief History of Spacecraft Missions to Asteroids and Protoplanets, submitted to Elsevier volume “Primitive Meteorites and Asteroids: Physical, Chemical and Spectroscopic Observations Paving the Way for Exploration”, Neyda Abreu, Editor. In press, Elsevier.

SELECTED

PUBLICATIONS:

- * indicates paper with student co-author
- *Melikyan, R., **B.E. Clark**, C. Hergenrother, S. Chesley, M. Nolan, Quanzhi Ye, D. Lauretta. Bennu's Natural Sample Delivery Mechanism: Estimating The Flux Of Bennu Particle Meteors At Earth. Submitted to *JGR Planets*.
- *Sen, Antara, **B.E. Clark**, E.A. Cloutis, A.R. Hendrix, D.N. DellaGiustina, D.M. Applin, S. Connell, A. Parkinson, *S. Ferrone 2020. Color Effects of Textural Variations on Bennu through Analog Laboratory Mixtures: Comparison with MapCam and OVIRS Color Trends. Submitted to *Meteoritics and Planetary Science*.
- *Ferrone, S.M. **B.E. Clark**, H.H. Kaplan, J.-L. Rizos, X.-D. Zou, J.-Y. Li, M.A. Barucci, A. Simon, D. Reuter, P. Hasselman, J.D.P. Deshapriya, G. Poggiali, J.R. Brucato, S. Cambioni, V. Hamilton, and D.S. Lauretta 2020. Visible–Near-Infrared Observations of Organics and Carbonates on (101955) Bennu: Classification Method and Search for Surface Context. Submitted to *Icarus*.
- *Praet, A. M. A. Barucci, **B.E. Clark**, H. H. Kaplan, A. A. Simon, V. E. Hamilton, J. P. Emery, E. S. Howell, L. F. Lim, X.-D. Zou, J.-Y. Li, D.C. Reuter, F. Merlin, J. D. P. Deshapriya, S. Fornasier, P. H. Hasselmann, G. Poggiali, *S. Ferrone, J. R. Brucato, D. Takir, E. Cloutis, H. C. Connolly Jr, M. Fulchignoni, D. S. Lauretta 2020. Hydrogen Abundance Estimation and Distribution on (101955) Bennu. Submitted to *Icarus*.
- *Barucci, M.A., Hasselmann, P.H., *Praet, A., Fulchignoni, M., Deshapriya, J.D.P., Fornasier, S., Merlin, F., **Clark, B.E.**, Simon, A.A., Hamilton, V.E. and Emery, J.P., 2020. OSIRIS-REx spectral analysis of (101955) Bennu by multivariate statistics. *Astronomy & Astrophysics*, 637, p.L4.
- *Kaplan, H.H., D.S. Lauretta, A.A. Simon, V.E. Hamilton, D.N. DellaGiustina, D.R. Golish, D.C. Reuter, C.A. Bennett, K.N. Burke, H. Campins, H.C. Connolly, Jr., J.P. Dworkin, J.P. Emery, D.P. Glavin, T.D. Glotch, R. Hanna, K. Ishimaru, E.R. Jawin, T.J. McCoy, N. Porter, S.A. Sandford, *S.M. Ferrone, **B.E. Clark**, X.-D. Zou, M.G. Daly, O.S. Barnouin, J.A. Seabrook, H.L. Enos (2020). Bright carbonate veins on asteroid (101955) Bennu: Implications for aqueous alteration history. *Science* 370, 6517. doi:10.1126/science.abc3557.
- *DellaGiustina, D.N., K.N. Burke, K.J. Walsh, D.R. Golish, P.H. Smith, E.B. Bierhaus, T. Becker, H. Campins, E. Tatsumi, K. Yumoto, S. Sugita, J.D. Prasanna Deshapriya, E. Cloutis, **B.E. Clark**, A. Hendrix, *A. Sen, M. Al Asad, M.G. Daly, C. Avdellidou, R.-L. Ballouz, M.A. Barruci, K. Becker, C.A. Bennett, W.F. Bottke, H.C. Connolly Jr., M. Delbo, J. de Leon, C.Y. Drouet d'Aubigny, K.E. Edmundson, S. Fornasier, V.E. Hamilton, P. Hasselman, C.W. Hergenrother, E.S. Howell, E.R. Jawin, H.H. Kaplan, L. Le Corre, L. Lim, J.Y. Li, P. Michel, J.L. Molaro, M.C. Nolan, J. Nola, M. Pajola, M. Popescu, N.A. Porter, B. Rizk, J.L. Rizos, A. J. Ryan, B. Rozitis, A.A. Simon, D. Trang, R.A. VanAuken, C.W.V. Wolner, and D.S. Lauretta (2020). Variations in color and reflectance on the surface of asteroid (101955) Bennu. *Science* 370, 6517. doi:10.1126/science.abc3660
- *Deshapriya, J.D.P, M. A. Barucci, E. B. Bierhaus, S. Fornasier, P. H. Hasselmann, F. Merlin, **B.E. Clark**, *A. Praet, M. Fulchignoni, A. A. Simon, V. E. Hamilton, E. A. Cloutis, C. Lantz, X. D. Zou, J.-Y. Li, D. C. Reuter, J. R. Brucato, G. Poggiali, R. T. Daly, D. Trang, *S. Ferrone, D. N. DellaGiustina, D. S. Lauretta (2021). Spectral Analysis of Craters on (101955) Bennu. *Icarus* 357, 114252.
- Simon, A.A., Kaplan, H.H., Cloutis, E., Hamilton, V.E., Lantz, C., Reuter, D.C., Trang, D., Fornasier, S., **B.E. Clark**, and Lauretta, D.S., 2020. Weak spectral features on (101955) Bennu from the OSIRIS-REx Visible and InfraRed Spectrometer. *Astronomy and Astrophysics* 644, A148, doi.org/10.1051/0004-6361/202039688.

- Hamilton, V.E., Kaplan, H.H., Christensen, P.R., Haberle, C.W., Rogers, A.D., Glotch, T.D., Breitenfeld, L.B., Goodrich, C.A., Schrader, D.L., Hanna, R.D., **B.E. Clark**, and Lauretta, D.S., in preparation. Evidence for limited compositional and particle size variation on asteroid (101955) Bennu from thermal infrared spectroscopy. Submitted to *Astronomy and Astrophysics*.
- *Hergenrother, C.W., C. Maleszewski, J.-Y. Li, M. Pajola, S. R. Chesley, A. S. French, A. B. Davis, J. Y. Pelgrift, J. M. Leonard, F. Shelly, A. J. Liounis, K. Becker, S. S. Balram-Knutson, R. Garcia, T. R. Kareta, C. Adam, K. Alkiek, B. J. Bos, M. Brozović, K. N. Burke, E. Christensen, **B.E. Clark**, D. N. DellaGiustina, C. Drouet d'Aubigny, D. Farnocchia, E. S. Howell, R. A. Jacobson, J. N. Kidd, E. J. Lessac-Chenen, *R. Melikyan, M. C. Nolan, R. S. Park, S. Selznick, B. Rizk, D. S. Lauretta (2020) Photometry of particles ejected from active asteroid (101955) Bennu. *JGR Planets*, V125 No9. doi.org/10.1029/2020JE00638.
- Rozitis, B. A. J. Ryan, J. P. Emery, P. R. Christensen, V. E. Hamilton, A. A. Simon, D. C. Reuter, M. Al Asad, R.-L. Ballouz, J. L. Bandfield, O. S. Barnouin, C. A. Bennett, M. Bernacki, K. N. Burke, S. Cambioni, **B.E. Clark**, M. G. Daly, M. Delbo, D. N. DellaGiustina, C. M. Elder, R. D. Hanna, C. W. Haberle, E. S. Howell, D. R. Golish, E. R. Jawin, H. H. Kaplan, L. F. Lim, J. L. Molaro, D. Pino Munoz, M. C. Nolan, B. Rizk, M. A. Siegler, H. C. M. Susorney, K. J. Walsh, and D. S. Lauretta (2020) Asteroid (101955) Bennu's Weak Boulders and Thermally Anomalous Equator. *Science Advances* doi:10.1126/sciadv.abc3699.
- *Kaplan, H.H., V. E. Hamilton, E.S. Howell, S.F. Anderson, M.A. Barucci, J. Brucato, T.H. Burbine, **B.E. Clark**, E.A. Cloutis, H.C. Connolly Jr., E. Dotto, J.P. Emery, S. Fornasier, C. Lantz, L. Lim, F. Merlin, *A. Praet, D.C. Reuter, S.A. Sandford, A.A. Simon, D. Takir, D.S. Lauretta (2020) Visible–Near Infrared Spectral Indices for Mapping Mineralogy and Chemistry with OSIRIS-REx. Accepted for Publication in *Meteoritics and Planetary Science*, 1-22. doi: 10.1111/maps.13461
- *Zou, X.D., Li, J.Y., **B.E. Clark**, D.R. Golish, *S.M. Ferrone, A.A. Simon, D.C. Reuter, D.L. Domingue, H.H. Kaplan, M.A. Barucci, S. Fornasier, *A. Praet, P.H. Hasselmann, C. Bennett, E.A. Cloutis, E. Tatsumi, D.N. DellaGiustina and D.S. Lauretta (2020) Photometry of asteroid (101955) Bennu with OVIRS on OSIRIS-REx. *Icarus*, 114183.
- DellaGiustina, D.N., H. H. Kaplan, A.A. Simon, W.F. Bottke, C. Avdellidou, M. Delbo, D.R. Golish, R.-L. Ballouz, M. Popescu, H. Campins, M. A. Barucci, G. Poggiali, R.T. Daly, L. Le Corre, V. E. Hamilton, K. J. Walsh, N. Porter, E. R. Jawin, T. J. McCoy, H.C. Connolly Jr., J.L. Rizos Garcia, E. Tatsumi, J. de Leon, J. Licandro, S. Fornasier, M.G. Daly, M.M. Al Asad, L. Philpott, J. Seabrook, O. S. Barnouin, **B.E. Clark**, M. C. Nolan, E. S. Howell, R. P. Binzel, B. Rizk, D. C. Reuter, and D.S. Lauretta. Exogenic basalt on asteroid (101955) Bennu. *Nat Astron* (2020). https://doi.org/10.1038/s41550-020-1195-z.
- Golish, D. R., D. N. DellaGiustina, J.-Y. Li, **B.E. Clark**, X.-D. Zou, P. H. Smith, J. L. Rizos, P. H. Hasselmann, C. A. Bennett, S. Fornasier, R.-L. Ballouz, C. D. d'Aubigny, B. Rizk, M. G. Daly, O. S. Barnouin, L. Philpott, M. M. Al Asad, J. A. Seabrook, C. L. Johnson, D. S. Lauretta, Disk-resolved photometric modeling and properties of asteroid (101955) Bennu. *Icarus*, 113724 (2020).
- Bennett, C., Daniella DellaGiustina, Kris Becker, Tammy Becker, Kenneth Edmundson, Dathon Golish, Rory Bennett, Keara Burke, Nicole Cue, **Beth Ellen Clark**, Jacob Contreras, J. D. P. Deshapriya, Christian Drouet d'Aubigny, Erica Jawin, Tristan Nolan, Nicholas Porter, Megan Riehl, Heather Roper, Bashar Rizk, Y Tang, Zoe Zeszut, Robert Gaskell, Eric Palmer, John Weirich, Manar Al Asad, Lydia Philpott, Michael Daly, Olivier Barnouin, Heather Enos, Dante

- Lauretta (2020) A High-Resolution Global Basemap of (101955) Bennu. *Icarus* 113690.
- Hergenrother, C., C.K. Maleszewski, M.C. Nolan, J.-Y. Li, C.D. Drouet Aubigny, F.C. Shelly, E.S. Howell, T.R. Kareta, M.R.M. Izawa, M.A. Barucci, E.B. Bierhaus, H. Campins, S.R. Chesley, **B.E. Clark**, E.J. Christensen, D.N. DellaGiustina, S. Fornasier, D.R. Golish, C.M. Hartzell, B. Rizk, D.J. Scheeres, P.H. Smith, X.-D. Zou, D.S. Lauretta, and the OSIRIS-REx Team (April 2019) Photometric Properties, Rotational Acceleration, and Operational Environment of Asteroid (101955) Bennu from OSIRIS-REx Observations. *Nature Communications* (2019) 10:1291 doi.org/10.1038/s41467-019-09213-x.
- DellaGiustina, D.N., J.P. Emery, D.R. Golish, B. Rozitis, C.A. Bennett, K.N. Burke, R.-L. Ballouz, K.J. Becker, P.R. Christensen, C.Y. Drouet d'Aubigny, V. Hamilton, D.C. Reuter, B. Rizk, A.A. Simon, E. Asphaug, J.L. Bandfield, O.S. Barnouin, M.A. Barucci, E.B. Bierhaus, R.P. Binzel, W.F. Bottke, N.E. Bowles, H. Campins, B.C. Clark, **B.E. Clark**, H.C. Connolly Jr., M.G. Daly, J. deLeon, M. Delbo, J.D.P. Deshapriya, C.M. Elder, S. Fornasier, C.W. Hergenrother, E.S. Howell, E.R. Jawin, H.H. Kaplan, T.R. Kareta, L. LeCorre, J.-Y. Li, J. Licandro, L.F. Lim, P. Michel, J. Molaro, M.C. Nolan, M. Pajola, M. Popescu, J.L. Rizos Garcia, A. Ryan, S.R. Schwartz, N. Schultz, M.A. Siegler, P.H. Smith, E. Tatsumi, C.A. Thomas, K.J. Walsh, C.W.V. Wolner, X.-D. Zou, Lauretta, D.S., and the OSIRIS-REx Team (April 2019) Properties of Rubble-Pile Asteroid (101955) Bennu from OSIRIS-REx Imaging and Thermal Analysis. *Nature Astronomy* Vol3, 341-351.
- Lauretta, D.S., D. N. DellaGiustina, C. A. Bennett, D.R. Golish, K. Becker, S. S. Balram-Knutson, O. S. Barnouin, T. L. Becker, W. F. Bottke, W. V. Boynton, H. Campins, **B.E. Clark**, H. C. Connolly Jr., C. Drouet d'Aubigny, J. P. Dworkin, J. P. Emery, H. L. Enos, V. E. Hamilton, C. W. Hergenrother, E. S. Howell, M. C. Nolan, B. Rizk, H. L. Roper, D. J. Scheeres, P. H. Smith, K. J. Walsh, C. W. V. Wolner, and the OSIRIS-REx Team (April 2019). The Unexpected Surface of Asteroid (101955) Bennu and Challenges for the OSIRIS-REx Sample Return Mission. *Nature* 568, 55-58.
- Hamilton, V., A.A. Simon, P.R. Christensen, D.C. Reuter, **B.E. Clark**, M.A. Barucci, N.E. Bowles, W.V. Boynton, J.R. Brucato, E.A. Cloutis, H.C. Connolly Jr., K.L. Donaldson Hanna, J.P. Emery, H.L. Enos, S. Fornasier, C.W. Haberle, R.D. Hanna, E.S. Howell, H.H. Kaplan, L.P. Keller, C. Lantz, J.-Y. Li, L.F. Lim, T.J. McCoy, F. Merlin, M.C. Nolan, A. Praet, B. Rozitis, S.A. Sandford, D.L. Schrader, C.A. Thomas, X.-D. Zou, D.S. Lauretta and the OSIRIS-REx Team (2019). Evidence for hydrated minerals on asteroid (101955) Bennu. *Nature Astronomy* Vol 3, 332-340.
- Donaldson Hanna, K.L., D. L. Schrader, E. A. Cloutis, G. D. Cody, A. J. King, T. J. McCoy, D. M. Applin, N. E. Bowles, J. P. Mann, H. C. Connolly Jr., L. P. Keller, L. F. Lim, **B.E. Clark**, V. E. Hamilton, D. S. Lauretta, S. S. Russell, and P. F. Schofield (2019). Spectral Characterization of Analog Samples in Anticipation of OSIRIS-REx's Arrival at Bennu: A Blind Test Study. *Icarus* 319, 701-723.
- Lauretta, D.S. et al. (**B.E. Clark**) (2017) OSIRIS-REx: Sample Return from Asteroid (101955) Bennu. *Space Science Reviews* 212, 924-985. DOI 10.1007/s11214-017-0405-1.
- *Takir, D., **B.E. Clark**, C. d'Aubigny, C.W. Hergenrother, J.Y. Li, D.S. Lauretta, R.P. Binzel (2015) Photometric Models of disk-integrated observations of the OSIRIS-REx Target Asteroid (101955) Bennu. *Icarus* 252, 393-399.
- Lauretta, D.S. et al. (**B.E. Clark**) (2014) The OSIRIS-REx Target Asteroid (101955) Bennu: Constraints on its Physical, Geological, and Dynamical Nature from Astronomical Observations. *Meteoritics & Planetary Science* 50, 834-849.

- *Neeley, J., **B.E. Clark**, M.E. Ockert-Bell, M.K. Shepard, J. Conklin, E.A. Cloutis, S. Fornasier, and S.J. Bus (2014) The composition of M-type asteroids II: Synthesis of spectroscopic and radar observations. *Icarus* 238, 37-50.
- *Lantz, C., **B.E. Clark**, A. Barucci, D.S. Lauretta (2013) Evidence for the effects of space weathering spectral signatures on low albedo asteroids. *Astronomy and Astrophysics*, 554, A138 DOI: 10.1051/0004-6361/201321593.
- Hergenrother, Carl W., Michael C. Nolan, Richard P. Binzel, Edward A. Cloutis, Maria Antonietta Barucci, Patrick Michel, Daniel J. Scheeres, Christian Drouet d'Aubigny, Daniela Lazzaro, Noemi Pinilla-Alonso, Humberto Campins, Javier Licandro, **Beth E. Clark**, Bashar Rizk, Edward C. Beshore, Dante S. Lauretta (2013) Lightcurve, Color and Phase Function Photometry of the OSIRIS-REx Target Asteroid (101955) Bennu. *Icarus* 226, 663-670.
- Clark, B.E.** (2012) Evidence for Space Weathering on Asteroid 4 Vesta from NASA's Dawn Mission. *Nature* 491, 45-46.
- Rivkin, A.S., **B.E. Clark**, M. Ockert-Bell, E. Volquardsen, E. S. Howell, S.J. Bus, C.A. Thomas, and M. Shepard. (2011) Asteroid 21 Lutetia at 3 μ m: Observations with IRTF SpeX. *Icarus* 216, 62-68.
- Clark, B.E.**, R.P. Binzel, E. Howell, E.A. Cloutis, M.E. Ockert-Bell, P. Christensen, M.A. Barucci, F. DeMeo, D. Lauretta, H. Connolly Jr., A. Soderberg, C. Hergenrother, and L. Lim, (2011) Asteroid (101955) 1999 RQ36: Spectroscopy from 0.4 to 2.5 μ m and Meteorite Analogs, *Icarus* 216, 462-475.
- Barucci, M.A., I.N. Belskaya, S. Fornasier, M. Fulchignoni, **B.E. Clark**, A. Coradini, F. Capaccioni, E. Dotto, M. Birlan, C. Leyrat, H. Sierks, N. Thomas, and J.B. Vincent. (2012) Overview of Lutetia's Surface Composition. *Planetary and Space Sciences* 66, 23-30.
- Shepard, M., A.W. Harris, P.A. Taylor, **B.E. Clark**, M.E. Ockert-Bell, M.C. Nolan, E.S. Howell, C. Magri, J.D. Giorgini, and L.A.M. Benner. (2011) Radar Observations of Asteroids 64 Angelina and 69 Hesperia. *Icarus* 215, 547-551.
- Fornasier, S., **B.E. Clark** and E. Dotto (2011) Spectroscopic Survey of X-type asteroids. *Icarus* 214, 131-146.
- Ziffer, J., H. Campins, J. Licandro, M. Walker, Y. Fernandez, **B.E. Clark**, T. Mothé-Diniz, E.S. Howell, and R. Deshpande (2011) Near-Infrared Spectroscopy of Primitive Asteroid Families. *Icarus* 213, 538-546.
- *Ockert-Bell, M., **B.E. Clark**, M. Shepard, *R. Isaacs, E.A. Cloutis, S. Fornasier, and S.J. Bus (2010) The Composition of M-Type Asteroids: Synthesis of Spectroscopic and Radar Observations. *Icarus* 210, 674-692.
- Fornasier, S., **B.E. Clark**, E. Dotto, A. Migliorini, M. Ockert-Bell, and M.A. Barucci, (2010) Spectroscopic Survey of M-Type Asteroids. *Icarus* 210, 655-673.
- Clark, B.E.**, J. Ziffer, D. Nesvorny, H. Campins, A. S. Rivkin, T. Hiroi, M.A. Barucci, M. Fulchignoni, R. P. Binzel, S. Fornasier, F. DeMeo, M. E. Ockert-Bell, J. Licandro, T. Mothé-Diniz (2009) Spectroscopy of B-Type Asteroids: Subgroups and Meteorite Analogs. *Journal of Geophysical Research* 115, E06005.
- Shepard, M., **B.E. Clark**, and 18 colleagues (2010). A Radar Survey of M- and X-class Asteroids II: Summary and Synthesis. *Icarus* 208, 221-237
- Clark, B.E.** M. Ockert- Bell, E. Cloutis, D. Nesvorny (2009) Spectroscopy of K-type Asteroids. *Icarus* 202, 119-133.
- Shepard, M., **B.E. Clark**, M. Nolan, L. Benner, S. Ostro, J. Giorgini, F. Vilas, K. Jarvis, S. Lederer, L. Lim, T. McConnochie, J. Bell, J.L. Margot, A. Rivkin, P. Pravec. (2008) Multi-wavelength Observations of Asteroid 2100 Ra Shalom. *Icarus* 193, 20-38.
- *Kitazato, K., **B.E. Clark**, M. Abe, S. Abe, Y. Takagi, and T. Hiroi. (2008) Near-Infrared Photometry of Asteroid 25143 Itokawa by the NIRS Onboard Hayabusa, *Icarus* 194, 137-145.

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SELECTED ABSTRACTS AND CONFERENCE PRESENTATIONS:

- Clark, B.E.**, "NASA's OSIRIS-REx Asteroid Sample Return", presented to a 6th grade class in Saudi Arabia, June 2020; 6th grade class in Trumansburg, New York, October 2020.
- Clark, B.E.**, "NASA's OSIRIS-REx Asteroid Sample Return", presented to an 8th grade class in Ithaca NY, Elizabeth Anne Clune Montessori, April 2020.
- Clark, B.E.**, "Overview of the Search for Space Weathering Signals on Bennu: One Rock Type or Two?", presented at the NASA OSIRIS-REx and JAXA Hayabusa 2 Symposium "Asteroid Science in the age of OREX & H2", Tucson, AZ November 2019.
- Clark, B.E.**, "The Search for Space Weathering Signals on Bennu", presented at the Joint American Astronomical Society Division for Planetary Science and European Planetary Science Congress in Geneva, Switzerland, September 2019.
- Clark, B.E.**, "First Science Results of the OSIRIS-REx Asteroid Sample Return Mission", invited talk at the University of Florence, Italy, September 2019.
- Clark, B.E.**, "Spectral Mapping and the OSIRIS-REx Mission", Keynote Talk at the European Planetary Science Congress, Riga Latvia. September, 2017.
- Clark, B.E.**, V.E. Hamilton, J. Emery, L. Hawley, E. Howell, D. S. Lauretta, A. Simon, P. Christensen, D. Reuter, *S. Ferrone, *F. Efremenko, and *S. Tsangari,

- “Spectral Mapping at Asteroid 101955 Bennu”, American Astronomical Society Division for Planetary Sciences meeting in Provo, Utah. October, 2017.
- Takir, D. and **Clark, B.E.**, “Bidirectional Distribution Functions for Asteroid 101955 Bennu” American Astronomical Society Division for Planetary Sciences meeting in Tucson, Arizona. October, 2014.
- Cloutis, E., P. Hudon, T. Hiroi, M.J. Gaffey, P. Mann, C.M.O’D Alexander, J.F. Bell III, **B.E. Clark**, “Possible Causes of Blue Slopes (~0.5-2.5 μ m) in Carbonaceous Chondrite Spectra”, Lunar and Planetary Science Conference, March 2013.
- Clark, B.E.**, C. Lantz, and M.A. Barucci, “Evidence for the Nature of Space Weathering Spectral Signatures on Low Albedo Asteroids”, American Astronomical Society Division for Planetary Sciences meeting in Reno, Nevada. October, 2012.
- Lantz, C. and **B.E. Clark**, “Space Weathering on Low-Albedo Asteroids”. European Planetary Science Congress meeting in Madrid, Spain, September 2012.
- Neeley, J., **B.E. Clark**, M. Ockert-Bell, M Shepard, E. Cloutis, S. Fornasier, S.J. Bus, and J. Conklin. “Follow up to: The Composition of M-type Asteroids: Synthesis of Spectroscopic and Radar Observations” American Astronomical Society Division for Planetary Sciences meeting in Nantes, France, August, 2011.
- Ockert-Bell, M., **Beth Ellen Clark**, M. K. Shepard, R. Isaacs, E.A. Cloutis, S. Fornasier, and S.J. Bus, “The Composition of M-type Asteroids: Synthesis of Spectroscopic and Radar Observations” American Astronomical Society Division for Planetary Sciences meeting in Pasadena, California, October, 2010.
- Clark, B.E.**, R.P. Binzel, E.S. Howell, E.A. Cloutis, M.Ockert-Bell, P.Christensen, A.Barucci, F.DeMeo, D.Lauretta, H.Connolly Jr., Alicia Soderberg, C.Hergenrother, and L.Lim “Asteroid (101955) 1999 RQ36: Spectroscopy from 0.4 to 2.5 μ m and Meteorite Analogs” American Astronomical Society Division for Planetary Sciences meeting in Pasadena, California, October, 2010.

COURSES

TAUGHT:

- Principles of Physics II: Electricity and Magnetism (PHYS 118)
 Introductory Physics Lab (PHYS 101, PHYS 102)
 Intro to Experimental Physics (PHYS 114)
 Physics Freshman Lab (PHYS 120)
 Power: Energy Options for a Global Society (PHYS 143)
 Planet Earth: Evolution of a Habitable World (PHYS 171)
 Stars, Galaxies, and the Universe (with and without lab) (PHYS 175, PHYS 176)
 Principles of Physics III: Thermodynamics, Waves, Optics (PHYS 217)
 Mathematical Methods for Physicists (PHYS 301)
 Analytical Mechanics (PHYS 311)
 Climate Action Research Team (IISP 350 & PHYS 350)

ENERGY PROFESSIONAL

ACTIVITIES:

- Member, Director of Sustainability and Energy Management Search Committee, Ithaca College, Fall 2013 – Spring 2014.
- Member, Presidents Climate Commitment Committee, Ithaca College, 2007 – present.
One of 15 members, occasional meeting organizer, regular presenter on energy options, (costs, benefits, and carbon reduction potentials). Calculated two extreme end-member models for carbon neutrality for Ithaca College (IC). Represented IC at the National Council on Science and the Environment conference on “Global Warming: Science and Solutions.” Worked with Cornell to select external engineering firms to perform analyses of campus carbon neutrality options. Co-author of the Ithaca College Climate Action Plan.
- Chair, Tompkins Renewable Energy Education Alliance (TREEA), 2005 – 2008.

Organized meetings, facilitated discussions, arranged seminars, wrote grant proposals to EPA, organized field trips to renewable installations, developed first TREEA website, researched wind power and community energy options.

Chair, Organizing Committee, 2006—2007

TREEA “Community Energy Forum”, held at Ithaca College, November 2007 (200 people).

Author, Proposal for Wind Power Turbine for Ithaca College, 2004—present.

Researched the feasibility of and co-wrote (with John Confer) a proposal to erect a utility-grade 1-2 MW wind turbine facility on the campus summit on South Hill. The proposal was accepted by the college for further study, we received a NYSEERDA grant of \$25K, and we received Town of Ithaca approval to erect a temporary meteorological tower. We measured the wind for 6 months. The data indicate favorable conditions for wind power at IC.

Co-Instructor, “Wind Power Workshop”, 2006.

I worked with J. Armstrong to offer and co-teach a course on how to build a wind turbine. The course was taught in the evening, and we attracted 12 members of the Ithaca community.

Member, Energy Committee, Ithaca College, 2003—2004.

Served with representatives from the Department of Facilities on a committee to evaluate proposals and select a company to perform a NYSEERDA-sponsored energy audit.

PROJECTS WITH STUDENTS:

Levi, Sanya	(2004) Ground-Source Heat Pumps for Center for Natural Sciences
Krasnow, Allison	(2004—2006) Wind Power for Ithaca College
Figgatt, Stephen	(2005) A Greenhouse for Ithaca College Using Heat from Compost
Rajan, Nitin	(2005) Real-Time Display of Ithaca College PV Array Energy on the Web
Stelljes, Lia	(2006—2007) Energy Efficiency at the Center for Natural Sciences
Rajan, Nitin	(2006) Fume Hood Energy Waste at the Center for Natural Sciences
Howard, Colin	(2007) Construction and Testing of a 1kW Wind Turbine
Araldi, Sarah	(2007) Community Energy Forum: Biofuels
Figgatt, Stephen	(2007) Community Energy Forum: Solar Power
Gwinn, Elizabeth	(2007) Community Energy Forum: Wind Power
Isaacs, Romaine	(2008) Solar Photovoltaic Power for Ithaca College’s Top 10 Roofs
O’Keefe, Chris	(2008) Renewable Energy Purchasing Options for Ithaca College
Figgatt, Stephen	(2008) An Emissions Reduction Planning Strategy for Ithaca College
Ahearn, Caitlin	(2008) Comparative Case Study of Ground-Source Heat Pump Installations
Burleson, Sarah	(2009) A Solar Thermal Hot Water Demonstration Project for IC
Byrne, Casey	(2010) An Independent Analysis of the Ithaca College Wind Speed Data
Borcyk, Taylor	(2010) A Solar Photovoltaic Demonstration Project for IC
Neeley, Jill	(2009—2011) Statistical Analysis of M-Type Asteroid Meteorite Analogs
Garay, Alejandro	(2011) Summer project: Reduction of March 2011 SPeX Observations
Byrne, Casey	(2011) Analysis of the PRWC Ground-Source Heat Pump System
Cele, Delani	(2011) Analysis of the Wanagel Ground-Source Heat Pump System
Garay, Alejandro	(2011) Analysis of the Jacobson Ground-Source Heat Pump System
Fieger, Nathan	(2012) OSIRIS-REx TAGable areas on Eros and Itokawa
Kenovin, Kat	(2012) Photometry of OSIRIS-REx Target Asteroid RQ36
Jaquith, Jeff	(2012) OSIRIS-REx Yarkovsky Measurement Goals
Lantz, Cateline (Paris University student)	(2012) Low Albedo Asteroid Space Weathering
Wydysh, Cory	(2012) Renewable Energy Technologies and Energy Efficiency for IC
Viola, Alex	(2013) Performance Assessment of the PRWC Ground Source Heat Sys.
Kelleher, Megan	(2013) Photometric Models of Low Albedo Asteroids
Fischler, Marcell	(2014) Mapping of Asteroid Spectral Parameters
Saltzman, Yoni (Cornell University student)	(2014) Bond Albedo Mapping of Asteroids
Crandall, Linda	(2014) Photometry and Geometric Albedo of Dark Laboratory Materials
Kelleher, Megan	(2015) Image Processing for Photometric Modeling

Ferrone, Salvatore	(2017) Super-resolution Spectral Mapping for OSIRIS-REx
Efremenko, Fedor	(2017) Smear and Edge-effects in 3D Spectral Mapping
Tsangari, Stavri	(2017) Spectral Indices of Hydrated Minerals for OSIRIS-REx
Praet, Alice (Paris University student)	(2018) Spectral Indices for Spectral Mapping
Ferrone, Salvatore	(2018) Projection Effects in Spectral Mapping for OSIRIS-REx
Melikyan, Robert	(2019) Meteor Flux from Bennu's Particle Ejection Events
Sen, Antara	(2020) Spectral Effects of Texture in Mudpie Simulations of Bennu
Ferrone, Salvatore	(2020) Distribution of Carbonates on Bennu
Sen, Antara	(2021) Overview of Space Weathering on Low-Albedo Asteroids

EXTERNAL FUNDING:

- Co-Investigator, NASA New Frontiers Spacecraft Mission: OSIRIS-REx Asteroid Sample Return, Asteroid Science Lead, (PI D. Lauretta, Univ Arizona), \$2.9Million, 2011–2025.
- Principal Investigator, National Science Foundation: Multiwavelength Survey of X/M/P Asteroids Using Arecibo and NASA Infrared Telescope Facility, \$140K, 2009–2012.
- Co-Investigator, NASA Discovery Data Analysis Program: “Small-scale effects of impact on asteroidal surfaces: Application of experimental results to NEAR-Shoemaker observations of Eros” (PI M. Cintala, NASA JSC), \$67K, 2006–2009.
- Co-Investigator, National Science Foundation: Planetary Astronomy Program "Collaborative Research: Multi-wavelength Survey and Analysis of XME Asteroids", (PI M. Shepard, Bloomsburg Univ), \$122K, 2006–2009.
- Principal Investigator, Research Corporation, "Spectroscopy of X-Type Asteroids: Exploration of a Mysterious Class of Objects", \$28K, 2002–2004.
- Principal Investigator, Space Telescope Science Institute IDEAs Grant: "Real and Other-World Applications of Math, Science, and Technology", \$40K, 2000-2002.
- Principal Investigator, NASA-JPL MUSES-CN Asteroid Sample Return Mission, Rover Near-Infrared Spectrometer Team Leader, \$460K, 1999–2007.
- Principal Investigator, Space Telescope Science Institute IDEA Grants, “Using a NASA Mission and Media Hype to Focus Attention on Physics”, \$10K, 1999.

INTERNAL FUNDING:

- Ithaca Fund (2010): Visiting Speakers for the Physics Café and the Physics Banquet \$1.2K
- Ithaca Fund (2010): Physics Pedagogy Workshop Series and Keynote Guest Speaker \$1K
- Ithaca College Office of the Provost Discretionary Fund (2006): CNS Sustainability Group Student-Centered Research Projects” \$4K.
- Ithaca Fund (2006): “Mounting the CNS Wind Turbine”, \$500.
- Academic Project Grant (2006); “A Small Wind Turbine for the CNS”, \$750.
- Ithaca Fund (2005) 2 awards (for a total of \$1100) to support the “Center for Natural Sciences Online Solar Trailer” Co-authors N. Rajan (Physics 2007) and A. Erkan (Comp. Sci.)
- Instructional Development Grant (2004) Office of the Provost. "Integrating MATLAB Computer Programming in *Math Methods for Physics* Courses", \$2K.
- Curriculum Development in Sustainability (2003) PI: Susan Allen-Gil, \$1K.

AWARDS:

- Asteroid 7994 BethEllen, a main-belt asteroid discovered in 1983 at Lowell Observatory, 1999
- NASA Group Achievement Award, Near-Earth Asteroid Rendezvous Mission, 2002
- Ithaca College Excellence in Scholarship Award, 2007
- NASA Silver Medal Achievement Award, for Bennu Astronomy, OSIRIS-REx Mission, 2017
- NASA Group Achievement Award, for successful launch, OSIRIS-REx Mission, 2017
- NASA Group Achievement Award, for Earth Gravity Assist, OSIRIS-REx Mission, 2019

INVITED

TALKS:

Cornell University, Planetary Lunch, Department of Astronomy, May 2020
Science and Suds, Cortland New York, November 2019
University of Florence, Arcetri Observatory, Florence, Italy, September 2019
Riverfront Planetarium, Peoria Illinois, March 2018
Cayuga Planetarium, Aurora NY, November 2017
European Planetary Science Congress, Riga, Latvia, September 2017
Colgate University, November 2016
Cornell University, Department of Astronomy Colloquium, April 2016
Cornell University, Department of Astronomy Colloquium, October 2013
University of Arizona, April 2013
Cornell University, Planetary Lunch, Department of Astronomy, April 2013
Longview, Ithaca, September 2012
University of Central Florida, Astronomy Department, April 2012
Cornell University, National Symposium of the Graduate Women in Science, June 2011
Ithaca College, Office of the President, Clean Energy Summit, October 2010
Cornell University, Planetary Lunch, Department of Astronomy, September 2010
Dawn Science Symposium, Cocoa Beach Florida, June 2008
Museum of the Earth, Natural History at Noon Lecture Series, November 2007
University of Western Ontario, May 2005
Royal Astronomical Society of Canada, May 2005
Japan Aerospace Exploration Agency, September 2005
University of Bloomsburg, October 2005
Hamilton College, October 2005
Naval Research Laboratory, April 2004
Ithaca College, Alumni Weekend, May 2004
Bloomsburg University, October 2003
Cornell University, April 2003

MARRIED

NAME:

Clark Joseph, Beth Ellen