

WILLIAM JON MERLINE (2009 Dec)

EDUCATION

- Ph.D. Planetary Sciences, University of Arizona, 1995
Ph.D. minor: Physics
Dissertation title: *Observations of Small-Amplitude Oscillations in the Radial Velocity of Arcturus*
Dissertation director: Dr. Robert S. McMillan
- B.S. Physics and Astronomy, University of Wisconsin - Madison, 1978
Mathematics, University of Wisconsin - Madison, 1978

BRIEF BIOGRAPHY

Dr. Merline is Principal Investigator of programs, funded by NASA and NSF, to perform a ground-based search for asteroid satellites and asteroid sizes/shapes/poles. The programs employ the relatively new technology of adaptive optics to reduce the blurring caused by the Earth's atmosphere. Dr. Merline led this international team in the first-ever discovery of an asteroid satellite from the Earth (ground-based or HST), 45 Eugenia in 1998. Subsequently, the team discovered the first double asteroid 90 Antiope, the first Trojan binary 617 Patroclus, the first satellites around M- and E-type asteroids and all 6 of the known loosely-bound main-belt binaries; in all, the team has discovered 15 of the 27 known main-belt or Trojan binaries that have been discovered by imaging, as well as participating in the discovery of Ida/Dactyl and of the two new moons of Pluto, and recently accomplished the first-ever optical imaging of a binary near-Earth asteroid. He leads several HST imaging/spectral investigations of satellites. He also led a project under NASA's Applied Information Systems Program to develop artificial-intelligence tools for crater detection and analysis as well as another AIS project to optimize large-scale numerical simulations using active learning. He worked with JPL on a project to produce an on-board software technology-demonstration, using artificial intelligence, to automate, among other tasks, a search for asteroid satellites on future spacecraft missions. The method was applied to NEAR (Near-Earth Asteroid Rendezvous) images of asteroid Eros. He was an Associate Member of the Imaging & Near-Infrared Spectrometer Team of the NEAR spacecraft mission. He had the prime responsibility for the search for satellites of asteroid Mathilde using NEAR images, and during the 1999 flyby and 2000 orbital tour of Eros. He was also an associate of the imaging team of the Galileo mission. He (with C. Chapman) had the prime responsibility for analysis of the Galileo imaging data of the S-L 9 collision with Jupiter, the only direct images of the actual impacts. He assisted in the determination of the orbit and density of Dactyl, the first asteroid moon known and in the search for additional satellites of Ida and Gaspra from Galileo data. He was funded under NASA's NEAR Data Analysis Program to reanalyze the NEAR and Galileo data for asteroid moons. He now participates in NASA's MESSENGER Mission on which he is leading (with Clark Chapman) a search for vulcanoids and satellites of Mercury. His work also involves study of the geology of Mercury, asteroids, and the Galilean satellites through the record of craters and boulders. During his Ph.D. dissertation work, he helped design, build, test, calibrate, and operate a spectrometer designed for extreme sensitivity to small changes in the radial velocities of stars. This instrument was one of the first systems to search for planets around other stars by the radial-velocity method, the method that has been used to find most of the known extrasolar planets. Dr. Merline used this instrument to discover and show that oscillations in the K-giant Arcturus are analogous to solar acoustic oscillations, effectively leading to a new class of variable stars. He has also produced a software simulator of CCDs and has done work on optimization of CCD photometry and of spectroscopic observations for radial velocity measurement.

RECENT POSITIONS

- 2002-present Principal Scientist, **Southwest Research Institute**, Boulder, CO
1998-2002 Senior Research Scientist, **Southwest Research Institute**, Boulder, CO
1997-1998 Research Scientist, **Southwest Research Institute, Boulder, CO**
1996-1997 Postdoctoral Researcher, **Southwest Research Institute**, Boulder, CO

PROFESSIONAL ACTIVITIES, HONORS, & AWARDS

- Member:** International Astronomical Union (IAU), American Astronomical Society (AAS), Division for Planetary Sciences (DPS) of the AAS, Solar Physics Division of the AAS, American Geophysical Union, Meteoritical Society, Planetary Society
- Principal Investigator of multiple NASA/NSF/HST/Spitzer grants, Co-I of multiple NASA/NSF/HST/Spitzer grants
- Service on NASA Planetary Geology & Geophysics Review Panel; HST Solar System Review Panel; External reviewer NASA's Lunar & Asteroid Data Analysis Program, Planetary Astronomy Program, Mars Data Analysis Program, NOAO telescope allocation committee (solar system / extrasolar planet subpanel)
- Multiple awards of time on large telescopes: HST, Keck, VLT, Gemini, CFHT, IRTF, Palomar 200", Mt. Wilson 100" Asteroid 7607 Billmerline named in his honor
- NASA Certificate of Recognition, 2006, "Automated Knowledge Discovery from Simulators"
- NASA Group Achievement Award, 2002, "NEAR-Shoemaker Mission Team: First Rendezvous, Orbit, and Landing on an Asteroid"
- NASA Certificate of Recognition, 1999, "Technically Significant Software: Satellite Detector"
- NASA Certificate of Recognition, 1998, "Technically Significant Software: Onboard UV Spectral Analyzer"

SELECTED PUBLICATIONS

- Weaver, H.A., Feldman, P.D., Merline, W.J., Mutchler, M.J., A'Hearn, M.F., Bertaux, J.-L., Feaga, L.M., Parker, J.W., Slater, D.C., Steffl, A.J., Stern, S.A. "Ultraviolet and visible photometry of asteroid 21 Lutetia using the Hubble Space Telescope", *Astron. & Astrophys.*, submitted Dec 2009 (2010).
- Merline, W.J., Tamblyn, P.M., Drummond, J.D., Christou, J.C., Conrad, A.R., Carry, B., Chapman, C.R., Dumas, C., Durda, D.D., Owen, W.M., Enke, B.L. "S/2009 (317) 1", *IAU Circ.* **9099**, 2 (2009).
- Carry, B., Dumas, C., Kaasalainen, M., Bethier, J., Merline, W.J., Erard, S., Conrad, A., Drummond, J.D., Hestroffer, D., Fulchignoni, M., Fusco, T. "Physical properties of (2) Pallas", in press, *Icarus* (2009).
- Conrad, A.R., Goodrich, R.W., Campbell, R.D., Merline, W.J., Drummond, J.D., Dumas, C., Carry, B. "Keck Observations of Solar System Objects: Perspectives for Extremely Large Telescopes", *Earth, Moon, & Planets* **105**, 115 (2009).
- Durda, D.D., Enke, B.L., Merline, W.J., Richardson, D.C., Asphaug, E., Bottke, W.F. "Comparing the properties of observed main-belt asteroid binaries and modeled escaping ejecta binaries (EEBs) from numerical simulations", *Proc. LPSC* **41** (2010).
- Conrad, A.R., Dumas, C., Merline, W.J., Drummond, J.D., Campbell, R.D., Goodrich, R.W., Le Mignant, D., Chaffee, F.H., Fusco, T., Kwok, S.H., Knight, R.I. "Direct Measurement of the size, shape, and pole of 511 Davida with Keck AO in a single night", *Icarus* **191**, 616 (2007).
- Merline, W.J., Drummond, J.D., Conrad, A.R., Carry, B., Dumas, C., Bouchet, A., Chapman, C.R., Tamblyn, P.M. "Size, shape, and pole of (52) Europa from multiple oppositions with Keck AO", *Icarus*, to be submitted Jan 2010.
- Merline, W.J., Conrad, A.R., Drummond, J.D., Tamblyn, P.M., Dumas, C., Carry, B., Campbell, R.D., Goodrich, R.W., Chapman, C.R., Owen, W.M. "S/2008 (35107) 1" (1st optical imaging of an NEO binary), *IAU Circ.* **8977**, 2 (2008).
- Drummond, J.D., Merline, W.J., Conrad, A.R., Carry, B., Dumas, C., Weaver, H.A., et al. "Triaxial Ellipsoid Dimensions and Rotational Pole of (21) Lutetia", *Astron. & Astrophys.*, to be submitted Jan 2010.
- Drummond, J.D., Merline, W.J., Conrad, A.R., Carry, B., Dumas, C. "Standard Triaxial Ellipsoid Asteroids by Globally Fitting AO Images", *Icarus*, to be submitted Jan 2010.
- Chapman, C.R., Enke, B., Merline, W.J., Tamblyn, P., Nesvorny, D., Young, E.F., Olkin, C. "Young asteroid 832 Karin shows no rotational spectral variations", *Icarus* **191**, 323 (2007).
- Carry, B., Dumas, C., Fulchignoni, M., Merline, W., Berthier, J., Hestroffer, D., Fusco, T., Tamblyn, P. "Near-infrared mapping and physical properties of asteroid 1 Ceres", *Astron. & Astrophys* **478**, 235 (2008).
- Strom, R.G., Chapman, C.R., Merline, W.J., Solomon, S.C., Head, J.W. "Mercury Cratering Record Viewed from MESSNGER's First Flyby", *Science* **321**, 5885 (2008).
- Conrad, A.R., Dumas, C., Merline, W.J., Drummond, J.D., Campbell, R.D., Goodrich, R.W., Le Mignant, D., Chaffee, Kwok, S.H., Knight, R.I. "Comparison of three asteroid limb profiles", *Proc. LPSC* **38**, 1492 (2007).
- Conrad, A.R., Dumas, C., Merline, W.J., Campbell, R.D., Goodrich, R.W., Le Mignant, D., Chaffee, F.H., Fusco, T., Kwok, S.H., Knight, R.I. "Rotation and morphology of asteroid 511 Davida", *Proc. LPSC* 1955 (2006).
- Durda, D.D., Bottke, W.F., Nesvorny, D., Enke, B.L., Merline, W.J., Asphaug, E., Richardson, D.C. "Size-frequency distributions of fragments from SPH/N-body simulations of asteroid impacts: Comparison with observed asteroid families", *Icarus* **186**, 498 (2007).
- Durda, D.D., Bottke, W.F., Nesvorny, D., Enke, B.L., Merline, W.J., Asphaug, E., Richardson, D.C., Leinhardt, Z.M. "The formation of asteroid satellites in large impacts: results from numerical simulations", *Icarus* **170**, 243 (2004).
- Weaver, H.A., Stern, S.A., Mutchler, M.J., Steffl, A.J., Buie, M.W., Merline, W.J., Spencer, J.R., Young, E.F., Young, L.A. "Discovery of two new satellites of Pluto", *Nature* **439**, 943 (2006).
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- Merline, W.J., Tamblyn, P.M., Chapman, C.R., Nesvorny, D., Durda, D.D., Storrs, A.D., Close, L.M., Menard, F. "S/2003 (22899) 1", *IAU Circular* **8232**, 2 (2003).
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- Merline, W.J., Tamblyn, P.M., Dumas, C., Close, L.M., Chapman, C.R., Menard, F. "S/2003 (130) 1", *IAU Circular* **8183**, 1 (2003).
- Merline, W.J., Dumas, C., Siegler, N., Close, L.M., Chapman, C.R., Tamblyn, P.M., Terrell, D., Conrad, A., Menard, F., Duvert, G. "S/2003 (283) 1", *IAU Circular* **8165**, 1 (2003).

