

DR. ALEX HARRISON PARKER

POSTDOCTORAL FELLOW IN PLANETARY ASTRONOMY

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HIGHER EDUCATION

INSTITUTION	FIELD	DEGREE	YEARS
University of Victoria	Astronomy	PhD	2007—2011.
University of Washington	Physics & Astronomy	BSc	2005—2007.
Whatcom Community College	Physics	AAS	2002—2005.

PHD DETAILS

“Ultra-Wide Trans-Neptunian Binaries: Tracers of the Outer Solar System’s History”

- Advised by Dr. JJ Kavelaars, National Research Council of Canada
- Thesis archived online at <http://hdl.handle.net/1828/3400>
- Enrolled September 2007 — Defended July 2011 — Awarded November 2011

PROFESSIONAL APPOINTMENTS

University of California at Berkeley - Postdoctoral Fellow

2013 — Present. *University of California at Berkeley Department of Astronomy*

Ongoing support for *New Horizons* post-Pluto/Kuiper Belt mission development. Kuiper Belt Binaries team lead for CFHT-OSSOS Large Program. See “Ongoing Research” document.

New Horizons Outer Solar System Science Fellow

2011 — 2013. *Harvard-Smithsonian Center for Astrophysics, Cambridge MA USA.*

Survey specialist; searching for candidate Kuiper Belt Objects for NASA’s *New Horizons* spacecraft to visit after its 2015 Pluto encounter. Perform advanced survey image analysis, trajectory analysis, target orbit and physical characterization. Manage central astrometry database and target submission to the Minor Planet Center. Science case development for remote-sensing observations of Kuiper Belt Objects at medium range (0.1-0.5 AU).

National Science Foundation — Graduate Research Fellow

2008 — 2011. *University of Victoria, Victoria BC Canada.*

PhD research in binary Kuiper Belt Object orbits, dynamics, and origin. Measured binary orbit properties using novel ground-based observational techniques. Showed that these binaries demonstrate (a) that one Kuiper Belt component formed in-situ and (b) that the current impactor flux is low. Also developed optimized methods for low signal-to-noise moving object detection in crowded fields, applying in my current work.

SETI Institute + National Science Foundation “Research Experience for Undergrads” Intern
2006. *Carl Sagan Center for the Study of Life in the Universe, Mountain View CA USA.*

Analysis of optical *Mars Global Surveyor* and near-infrared *Mars Odyssey* images; studied fluvial landforms in giant outburst flood channel *Grjotá Valles*. Found little evidence for depositional landforms, indicating low efficiency of flood sediment deposition by Martian flood events.

CURRENT SCIENCE COLLABORATIONS

Large Synoptic Survey Telescope — Solar System Science Collaboration

— Trans-Neptunian objects & binaries, asteroid family dynamical & chemical structure.

New Horizons Kuiper Belt Object Encounter Collaboration

— Image analysis, flyby target characterization, extended mission science case.

Outer Solar System Origins Survey

— Binary topic team lead, binary dynamics modeling.

AWARDS, HONORS, AND SERVICE

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| 2013 | | CERN “Data Visualization Award” at Imagine Science Film Festival |
| 2010 | | Recipient of the AAS Roger Doxsey Travel Prize (\$500). |
| 2008 | — 2011 | National Science Foundation Fellow Abroad (\$121,500). |
| 2007 | | UW-STF grant for campus observatory upgrade (\$47,000). |
| 2007 | | University of Washington Departmental Honors in Astronomy. |
| 2007 | | University of Washington Dean’s Scholar. |
| 2006 | | John Baer Prize Award, UW Astronomy Department (\$350). |
| 2005 | | Whatcom Community College Dean’s Scholar. |
| 2005 | | Whatcom Community College Merit Tuition Scholarship (\$2,000). |
| 2003 | — 2005 | Honors Program, Whatcom Community College. |
| 2003 | — 2005 | Member of Phi Theta Kappa Honors Society. |
| 2004 | — 2005 | President of local Phi Theta Kappa chapter. |

— Referee for *Publication of the Astronomical Society of the Pacific* and *Icarus*

OBSERVING EXPERIENCE

Manastash Ridge Observatory: Classical mode imaging. Monitoring campaign of comet Schwassmann-Wachmann 3’s disintegration.

Shane Telescope, Lick Observatory: Classical mode NIR photometry and spectra of Centaurs and binary asteroids.

Plaskett Telescope, Dominion Astrophysical Observatory: Classical mode spectral typing of local supernovae (11 CBETs produced) and search for Haumea mutual event in 2009 (null result).

WIYN Telescope, Kitt Peak: Classical mode astrometric follow-up of Kuiper Belt Objects. (7 MPECs produced).

Gemini North Observatory: Queue-mode astrometry of Kuiper Belt binaries. 46.8 hours allocated over 2009A-2010B semesters (PI).

Gemini North+South Observatories: 8 hours Queue-mode time allocated in 2013B semester for astrometric follow-up of New Horizons Kuiper Belt targets.

Magellan Baade, Las Campanas Observatory: Nine nights classical-mode observing on IMACS for New Horizons target search.

Subaru Observatory: Classical-mode observing on SuprimeCam for New Horizons target search.

EDUCATION AND PUBLIC OUTREACH

- 2011 — 2013: Produced a series of web-based animations for illustrating a variety of astronomical phenomena, which have been widely circulated. See <http://vimeo.com/alexhp/videos>. “Worlds” animation honored with the CERN/CinéGlobe “Data Visualization Award” at the 2013 Imagine Science Film Festival in New York City, and will be shown at the March 2014 CinéGlobe International Film Festival at CERN.
- 2012 — 2013: Guest blogger for the Planetary Society blog. See <http://www.planetary.org/connect/our-experts/profiles/alex-parker.html>
- 2009—2010: Lab development and instruction for undergraduate Astronomy course “Search For Life in the Universe.” Developed lab activities including CCD measurement of the Vegetation Red Edge, detection of microbial life by metabolic byproducts, measurement of greenhouse gas effect from CO₂ and application to planetary atmospheres, impact simulation and frequency of giant impacts, and others.
- 2009: Member of the University of Victoria Speakers Bureau.
- 2009: Maintained “International Year of Astronomy” events website for Victoria, BC.
- 2007: Awarded **\$47,000** grant to upgrade research facilities for future Astronomy undergraduates at the University of Washington.
- 2007: University of Washington Robinson Center Teaching Assistant for “Physics of Roller Coasters” 5th-6th grade program.
- 2005: Construction of a 21 MHz radio telescope receiver and amplifier for future Whatcom Community College Astronomy labs.

PRESS ITEMS

University of Victoria Media Tip:

— “Planet Neptune Not Guilty of Harassment”

<http://communications.uvic.ca/releases/tip.php?date=05102010#1102>

Related Nature News article:

— <http://www.nature.com/news/2010/101006/full/news.2010.522.html>

Gemini Observatory webfeature:

— “Trans-Neptunian Binaries and the History of the Outer Solar System”

<http://www.gemini.edu/node/11669>

APL web item

— “New Horizons Kuiper Belt fly-through:”

http://pluto.jhuapl.edu/news_center/news/20120801.php

“Supernova Sonata”

— See <http://bit.ly/mXRJd7> (Scientific American blog, and elsewhere)

“Kepler 11: Six-Planet Sonata”

— See <http://bit.ly/LjSdJp> (Scientific American blog, and elsewhere)

“Worlds: The Kepler Planet Candidates”

— See <http://bit.ly/R0v520> (Discovery News, and elsewhere)

PUBLICATIONS

Google Scholar H-index: 6. Citations: 174.

<http://scholar.google.com/citations?user=q5QprUcAAAAJ>

In prep

- Parker, A.** 2013. *The Neptune Trojan Orbit Distribution: Evidence for a Pre-Heated Disk* (in prep).
- Parker, A.** and co-authors, 2013. *The Case for Long-Range Kuiper Belt Object Observations by New Horizons* (in prep for *Icarus* special issue).

Submitted

- Fraser, W., Brown, M., Morbidelli, A., **Parker, A.**, Konstantin, B. 2013. *The Absolute Magnitude Distribution of Kuiper Belt Objects* (submitted to ApJ).

Published

- Parker, A.** and 21 co-authors, 2013. *2011 HM₁₀₂ Discovery of a High-Inclination L5 Neptune Trojan in the Search for a Post-Pluto New Horizons Target* AJ 145, 96.
- Parker, A.** 2012. *Discovery and Characterization of Trans-Neptunian Binaries in Large-Scale Surveys*. Proceedings of “Orbital Couples: Pas de Deux in the Solar System and the Milky Way” ed: F. Arenou, D. Hestroffer. ISBN 2-910015-64-5, p. 19-23.
- Parker, A.**, & Kavelaars, J.J. 2012. *Collisional Evolution of Ultra-Wide Trans-Neptunian Binaries*. *Astrophysical Journal* 744, 139.
- Parker, A.**, Kavelaars, J.J., Petit, J.-M., Jones, L., Gladman, B., & Parker, J. 2011. *Characterization of Seven Ultra-Wide Trans-Neptunian Binaries*. *Astrophysical Journal* 743, 1.
- Parker, A.**, & Kavelaars, J.J. 2010. *Destruction of Binary Minor Planets During Neptune Scattering*. *Astrophysical Journal Letters* 722, L204-L208.
- Parker, A.**, & Kavelaars, J.J. 2010. *Pencil-Beam Surveys for Trans-Neptunian Objects: Limits on Distant Populations*. *Icarus* 209, 766-770.
- Parker, A.**, & Kavelaars, J.J. 2010. *Pencil-Beam Surveys for Trans-Neptunian Objects: Novel Methods for Optimization and Characterization*. *Publications of the Astronomical Society of the Pacific* 122, 549-559.
- LSST Science Collaborations (**Alex Parker** contributing author to sections 5.4.2 and 5.5) 2009. *LSST Science Book*. arXiv:0912.0201
- Parker, A.**, Ivezić, Ž., Jurić, M., Lupton, R., Sekora, M. D., & Kowalski, A. 2008. *The size distributions of asteroid families in the SDSS Moving Object Catalog 4*. *Icarus* 198, 138-155.
- Burr, D. & **Parker, A.** 2006. *Grjotá Valles and implications for flood sediment deposition on Mars*. *Geophysical Research Letters* 33, L22201.

SAMPLE OF CONFERENCE PROCEEDINGS

- Parker, A.**, Ivezić, Ž., Jurić, M., Lupton, R. 2007. *Asteroid Families in the Sloan Digital Sky Survey Moving Object Catalog* 209th Meeting of the American Astronomical Society. Poster.
- Hildebrand, A., **Parker, A.**, Kyte, F., Shukolyukov, A., 2008. *The Brangane Asteroid Family Disruption: Source of the Late Eocene 2.5 Million Years of Dust Deposition, Impacts, and H Chondrite Meteoroids*. Joint Meeting of The Geological Society of America. Oral presentation.
- Parker, A.**, 2008. *The Size Distributions of Asteroid Families in the SDSS MOC 4*. The Sloan Digital Sky Survey: From Asteroids to Cosmology. Oral presentation.
- Parker, A.**, Kavelaars, JJ., 2009. *A Novel Enhancement for Moving Object Pipelines*. 41st Meeting of the Division of Planetary Sciences. Poster.
- Parker, A.**, Kavelaars, JJ., Jones, L., Gladman, B., Petit, J.-M., Parker, J., 2010. *Ultra-Wide Trans-Neptunian Binaries: Orbits, Masses, and Dynamical Lifetimes*. 2010 Meeting of the Canadian Astronomical Society. Oral Presentation.
- Parker, A.**, Kavelaars, JJ., Jones, L., Gladman, B., Petit, J.-M., Parker, J., 2010. *Ultra-Wide Trans-Neptunian Binaries: Orbits, Masses, and Dynamical Lifetimes*. TNO 2010: Dynamical and Physical properties of Trans-Neptunian Objects. Oral Presentation.
- Parker, A.**, Kavelaars, JJ., Jones, L., Gladman, B., Petit, J.-M., Parker, J., 2010. *Wide Trans-Neptunian Binaries as Dynamical Tracers*. 42nd Meeting of the Division of Planetary Sciences. Oral Presentation.
- Parker, A.**, Kavelaars, JJ., 2011. *Characterization of Ultra-Wide Trans-Neptunian Binaries*. 217th Meeting of the American Astronomical Society. PhD Presentation.
- Parker, A.**, 2011. *Inclination Distribution of Ultra-Wide Trans Neptunian Binaries*. 2011 Meeting of the Canadian Astronomical Society. Oral Presentation.
- Parker, A.**, Kavelaars, JJ., Jones, L., Gladman, B., Petit, J.-M., Parker, J., 2011. *Inclination Distribution of Ultra-Wide Trans-Neptunian Binaries*. Joint Meeting of the Division of Planetary Sciences and the European Planetary Science Congress. Oral Presentation.
- Parker, A.** 2011. *Discovery and Characterization of Trans-Neptunian Binaries in Large-Scale Surveys*. Orbital Couples: “Pas De Deux” in the Solar System and the Milky Way.
- Parker, A.** 2012. *Epicyclic Phase Folding: A transit photometry method for detecting hierarchical triple systems.*. 2012 Sagan exoplanet summer workshop. e-Poster.
- Parker, A.** and 22 co-authors. *Discovery and Characterization of an L5 Neptune Trojan in the Search for a New Horizons Encounter Candidate*. 44th Meeting of the Division of Planetary Sciences. Oral Presentation.
- Parker, A.** *Long-Range Kuiper Belt Object Observations: Prospects and Scientific Value* The Pluto System on the Eve of Exploration by New Horizons: Perspectives and Predictions. Oral Presentation.
- Parker, A.** *Characterizing the Neptune Trojan Orbit Distribution* 45th Meeting of the Division of Planetary Sciences. Oral Presentation.