

PROMOTION RECOMMENDATION  
The University of Michigan-Dearborn  
College of Arts, Sciences, and Letters

William I. Clarkson, assistant professor of physics and astronomy, Department of Natural Sciences, College of Arts, Sciences, and Letters, is recommended for promotion to associate professor of physics and astronomy, with tenure, Department of Natural Sciences, College of Arts, Sciences, and Letters.

Academic Degrees:

D.Phil. 2004 The University of Southampton, Southampton, UK  
M.Phys. 2000 Oxford University, Oxford, UK

Professional Record:

2013 – present Assistant Professor, Department of Natural Sciences, College of Arts, Sciences, and Letters, University of Michigan-Dearborn  
2010 – 2013 Visiting Assistant Professor, Department of Astronomy, Indiana University, Bloomington, IN  
2008 – 2010 Post-doctoral Researcher, Division of Astronomy and Astrophysics, University of California-Los Angeles, Los Angeles, CA  
2005 – 2008 Post-doctoral Fellow, Space Telescope Science Institute, Baltimore, MD  
2003 – 2005 Post-doctoral Fellow, Department of Physics and Astronomy, The Open University, Milton Keynes, UK

Summary of Evaluation:

Teaching: Professor Clarkson is rated excellent in teaching. He has taught the full range of courses offered in the astronomy curriculum, as well as provided instruction in introductory courses for both the algebra- and calculus-based physics sequences. He believes that all students, regardless of level or chosen discipline, should be exposed to the “practice of science” as part of their preparation to become well-informed citizens, and he utilizes a large suite of proven pedagogical techniques tailored to meet the varied learning styles of his students to accomplish this goal. His development of “data investigations,” a set of in-class, small-group activities for introductory astronomy courses utilizing Hubble Space Telescope data (and funded through a grant from NASA), stands as a unique and highly successful example of Professor Clarkson’s commitment to bringing modern astronomical data analysis techniques into the classroom. Professor Clarkson’s course and instructor ratings are uniformly strong across all courses at all levels, yielding scores for instructor knowledgeability and preparedness, teaching effectiveness, high standards, fair and equitable treatment of students, and overall excellence that consistently exceed 4.25 on a five-point scale where 5.0 is excellent.

In the area of curriculum development, Professor Clarkson has demonstrated exceptional leadership and initiative, creating two new courses (ASTR 133 The Search for Life in the Universe and ASTR 301 Astrophysical Concepts), and adding three new observational exercises in ASTR 131 Introductory Astronomy Laboratory. Outside the classroom, Professor Clarkson has supervised a total of 23 students as members of the UM-Dearborn Astronomy Research Group, of which 18 have performed research for credit as part of independent study courses (ASTR/PHYS 498 or 499). These projects have provided students with a mentor-mentee relationship similar to what they can expect as a Ph.D. student or an employee in a large technical organization, and they promote the development

of professional skills and attitudes that are essential for success in science-related careers.

**Research:** Professor Clarkson is rated excellent in research. He has achieved an impressive record in research and scholarship as an observational astrophysicist specializing in the study of the distribution and motion of stellar populations in the Milky Way galaxy using both ground- and space-based data. This work is exacting and time-intensive, and it requires the development of effective and enduring professional collaborations for its successful prosecution. Since his hiring, Professor Clarkson and his colleagues have published nine papers, most of which have appeared in *The Astrophysical Journal*, arguably the premier journal in the field. He is also a co-author of a National Academy of Sciences-sponsored white paper on future observing strategies for identifying exoplanets using ground-based data, and a co-editor of a second white paper describing optimal approaches for scheduling and utilizing the Large Synoptic Survey Telescope (LSST), a high-priority, US-led project set to begin operations in 2022.

Since his arrival on campus, Professor Clarkson and his collaborators (including UM-Dearborn students) have been supported by internal and external grants totaling more than \$300k and have made 30 presentations of their work at professional colloquia and regional and national conferences. His work has garnered national attention, having been featured in three major press releases by the Space Telescope Science Institute and on the cover of the monthly National Optical Astronomy Observatories Newsletter.

#### Recent and Significant Publications:

- Clarkson, W., Calamida, A., Sahu, K., Brown, T., Gennero, M., Avila, R., Valenti, J., Debattista, V., Rich, R., Minniti, D., Zoccali, M. & Aufdenberge, E. (2018). Chemically Dissected Rotation Curves of the Galactic Bulge from Main-Sequence Proper Motions. *The Astrophysical Journal*, 858, 46-112.
- Hosek, M., Lu, J., Anderson, J., Do, T., Schlafly, E., Ghez, A., Clarkson, W., Morris, M. & Albers, S. (2018). The Optical/Near-infrared Extinction Law in Highly Reddened Regions. *The Astrophysical Journal*, 855, 13-44.
- Johnson, C., Caldwell, N., Rich, R., Mateo, M., Bailey, J., Clarkson, W., Olszewski, E. & Walker, M. (2017). A Chemical Composition Survey of the Iron-complex Globular Cluster NGC 6273 (M19). *The Astrophysical Journal*, 836, 168-196.
- Hosek, M., Lu, J., Anderson, J., Ghez, A., Morris, M. & Clarkson, W. (2015). The Arches Cluster: Extended Structure and Tidal Radius. *The Astrophysical Journal*, 813, 27-49.
- Calamida, A., Sahu, K., Casertano, S., Anderson, J., Cassisi, S., Gennaro, M., Cignoni, M., Brown, T., Kains, N., Ferguson, H., Livio, M., Bond, H., Buonanno, R., Clarkson, W., Ferraro, I., Pietrinferni, A., Salaris, M. & Valenti, J. (2015). New Insights on the Galactic Bulge Initial Mass Function. *The Astrophysical Journal*, 810, 8-19.
- Stolte, A., Hubmann, B., Olczak, C., Brandner, W., Habibi, M., Ghez, A. M., Morris, M. R., Lu, J. R., Clarkson, W. I., Anderson, J. (2015). Circumstellar discs in Galactic centre clusters: Disc-bearing B-type stars in the Quintuplet and Arches clusters, *Astronomy & Astrophysics*, 578, p4.
- Calamida, A., Sahu, K. C., Anderson, J., Casertano, S., Cassisi, S., Salaris, M., Brown, T., Sokol, J., Bond, H. E., Ferraro, I., Ferguson, H., Livio, M., Valenti, J., Buonanno, R., Clarkson, W., Pietrinferni, A. (2014). First Detection of the White Dwarf Cooling Sequence of the Galactic Bulge. *The Astrophysical Journal*, 790, p164.
- Stolte, A., Hubmann, B., Morris, M. R., Ghez, A. M., Brandner, W., Lu, J. R., Clarkson, W. I., Habibi, M., Matthews, K. (2014). The Orbital Motion of the Quintuplet Cluster—A

Common Origin for the Arches and Quintuplet Clusters? *The Astrophysical Journal*, 789, p115.

Holwerda, B. W., Trenti, M., Clarkson, W., Sahu, K., Bradley, L., Stiavelli, M., Pirzkal, N., De Marchi, G., Andersen, M., Bouwens, R., Ryan, R. (2014). Milky Way Red Dwarfs in the BoRG Survey; Galactic Scale-height and the Distribution of Dwarf Stars in WFC3 Imaging. *The Astrophysical Journal*, 788, p 77.

Service: Professor Clarkson is rated excellent in service. While at UM-Dearborn, Professor Clarkson has compiled an exemplary record of service to the campus, his profession, and the broader external community. Among his contributions to university initiatives, he has served on the UM-Dearborn Faculty Senate Research Committee (three years), as CASL program advisor for astronomy (present), and on the Department of Natural Sciences Poster Session and Colloquium Committees (three-years each), in addition to participating on faculty review and search committees. In the realm of professional service, he has provided manuscript reviews for *The Astrophysical Journal*, *Astronomy & Astrophysics*, and the *Monthly Notices of the Royal Astronomical Society*, and served on grants review panels for both NASA and the NSF. He has provided leadership and analyses as part of the LSST consortium and been a principal organizer of an international LSST science workshop. During the past five years, Professor Clarkson has been deeply involved in astronomy outreach activities for the broader public, having participated in more than 60 observatory open house events and public observing sessions that have attracted more than 3,000 students, parents, and guests to the campus.

External Reviewers:

Reviewer A: “Dr. Clarkson’s first-author paper pioneers a new tool for examining how chemical enrichment relates to the structure and orbital mechanics of the Galactic bulge that can be applied to an overwhelmingly larger sample of stars than was possible prior. This promises to be a high [sic] fruitful path ... with both existing datasets and in the future with large surveys coming, like the Large Synoptic Survey Telescope. Overall, I find Dr. Clarkson’s scholarly activities to be very rigorous, pioneering, and useful to the broader astronomical community.”

Reviewer B: “In summary, Dr. Clarkson’s work over the past 6 years...features well-posed questions that take advantage of the ‘natural experiments’ that observing throughout our Galaxy provides, state-of-the-art techniques and instrumentation, careful consideration of systematic effects that mean the results stand the test of time, and innovative ways to use photometric surveys that will yield fascinating results for many years to come. He has an excellent reputation for his work in proper motion and photometric analysis of hard-to-study populations, and I am impressed with his research efforts (including a paper with an undergraduate student!) over the past years.”

Reviewer C: “...his first-author paper published in 2018 appears to be a result of significant amount of research. Analyses of proper motion data of faint stars require precise and meticulous work and take a lot of time. The paper deals with fundamental properties of the Galactic bulge, one of the major components of the Milky Way galaxy. This kind of research greatly impacts our understanding of the Milky Way, but is not something anyone can easily attack because it requires a tremendous amount of time and proper experience. I find that some of...his other papers belong to this category: deeply fundamental and influential to many other areas in astronomy.”

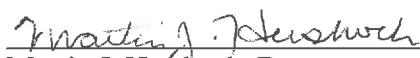
Reviewer D: “The body of work submitted is very impressive in its quality. The quantity of... publications Clarkson has authored and co-authored is also impressive given the combination of relatively large teaching requirements at UM-Dearborn, and... the fact that he has also advised a

large number of undergraduates on research projects over his time at Dearborn. Beyond this ... I believe that Clarkson's research efforts related to the Large Synoptic Survey Telescope project are comparable to his publications in importance... This work ... is of great importance to the scientific community, and it has clearly raised the profile of UM-Dearborn in the astronomical community far more than if Clarkson had used the same amount of time to write several additional high quality journal articles."

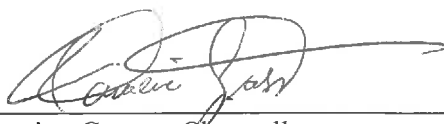
Reviewer E: "You ask for a comparison with others in his peer group; to be frank, I know of no one else who is combining teaching three courses a semester with achieving research of the high standard set by Professor Clarkson, so I cannot identify members of his peer group. He is clearly fulfilling the teaching mission of UM-D in both formal instruction and training undergraduates in research, while maintaining his own research collaborations. His research output has had high impact and I am fully confident this will continue."

Summary of Recommendation:

Professor Clarkson has established an enviable reputation for producing high quality and broadly influential research using large astronomical data sets to address some of the most fundamental questions about the structure and evolution of our galaxy. His expertise in software development to process and analyze large astronomical data sets has made him a sought-after collaborator for national and international research groups, and he continues to play a leading role in the design and implementation of the scheduling and analysis protocols for the LSST project. He is an excellent teacher whose courses effectively promote student learning through the application of proven engagement strategies and innovative, data-driven group activities. His service to the university is exemplary and reflects his commitment to leveraging his extensive research experience. We are very pleased to recommend, with strong support of the College of Arts, Sciences, and Letters Executive Committee, William I. Clarkson for promotion to associate professor of physics and astronomy, with tenure, Department of Natural Sciences, College of Arts, Sciences, and Letters.



Martin J. Hershock, Dean  
College of Arts, Sciences, and Letters



Domenico Grasso, Chancellor  
University of Michigan-Dearborn

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