

PROMOTION RECOMMENDATION
The University of Michigan
College of Literature, Science, and the Arts

Mateusz Ruszkowski, associate professor of astronomy, with tenure, College of Literature, Science, and the Arts, is recommended for promotion to professor of astronomy, with tenure, College of Literature, Science, and the Arts.

Academic Degrees:

Ph.D.	2000	University of Cambridge
M.A.	1997	University of Warsaw

Professional Record:

2013–Present	Associate Professor, Department of Astronomy, University of Michigan
2007–2013	Assistant Professor, Department of Astronomy, University of Michigan
2006–2007	Post-doctoral Fellow, Max Planck Institute for Astrophysics, Garching, Germany
2003–2006	Chandra Post-doctoral Fellow, University of Colorado, Boulder
2001–2003	Post-doctoral Research Associate, University of Colorado, Boulder

Summary of Evaluation:

Teaching: Professor Ruszkowski is an effective teacher of both graduate and undergraduate students. He has taught at all levels, from large undergraduate survey courses, to intensive senior-level courses for majors, to graduate courses. Professor Ruszkowski's evaluations are generally positive and well within departmental averages. While his upper-level classes are challenging, he clearly cares about student learning and offers plenty of student support. Professor Ruszkowski has supervised four graduate students since 2013, one of the highest numbers among the department faculty. Two have received their Ph.D. degrees and have gone on to good postdoctoral fellowships.

Research: Professor Ruszkowski's area of research is the numerical magneto-hydrodynamics (MHD) simulations of plasma in astrophysical contexts. The central topics of his work are the astrophysics of galaxy clusters, galaxies, and accretion onto black holes. His work addresses a long-standing problem: why doesn't the massive hot gas of galaxy clusters radiatively cool and collapse to form stars at a high rate? The solution must involve energy injection from the central supermassive black holes and/or stellar winds and supernovae, but exactly how this works is uncertain. Professor Ruszkowski has shown how magnetic fields and especially cosmic rays are important. He has also made important contributions to understanding cooling flows feeding black hole accretion, gas stripping from galaxies, and other topics. Professor Ruszkowski is a leading figure in this fertile area of the astrophysics of galaxy and galaxy cluster environments.

Recent and Significant Publications:

Gaspari, M., Ruszkowski, M., & Oh, S.P. (2013). Chaotic cold accretion on to black holes. *Monthly Notices of the Royal Astronomical Society*, 432(4), 3401-3422.

- Li, Y., Bryan, G.L., Ruszkowski, M., Voit, G.M., O’Shea, B.W., & Donahue, M. (2015). Cooling, AGN feedback, and star formation in simulated cool-core galaxy clusters. *The Astrophysical Journal*, 811(73). <http://dx.doi.org/10.1088/0004-637X/811/2/73>
- Ruszkowski, M., Yang, H.-Y. K., & Zweibel, E. (2017). Global simulations of galactic winds including cosmic-ray streaming. *The Astrophysical Journal*, 834(2). <http://dx.doi.org/10.3847/1538-4357/834/2/208>
- Wang, C., Ruszkowski, M., Pfrommer, C., Oh, S.P., & Yang, H.-Y.K. (2021). Non-Kolmogorov turbulence in multiphase intracluster medium driven by cold gas precipitation and AGN jets. *Monthly Notices of the Royal Astronomical Society*, 504(1), 898-909.

Service: Professor Ruszkowski’s service to the university, college, and department has utilized his expertise in numerical computation. He served on UMOR’s Research Support Analysis and Data Service Needs Committee both as a general member and as chair of the subcommittee on Engineering and Physical Sciences. Professor Ruszkowski continues to serve as the chair of the department computer committee and has been proactive in surveying department needs and communicating those to LSAIT. In terms of departmental service, he was the chair of graduate admissions three times, served on the preliminary exam committee twice, and has organized two fall preview weekends for prospective students. Professor Ruszkowski has also served on major panel reviews for NASA and the NSF.

External Reviewers:

Reviewer (A): “[Professor Ruszkowski’s] work is well regarded. Certainly he is in the upper tier of researchers in this subject area in his peer group, worldwide...[Professor Ruszkowski] has a fine record of service to the astrophysics community.”

Reviewer (B): “Dr. Ruszkowski has steadily made important contributions to multiple topics of wide astrophysical interest...He has often taken an unappreciated aspect of a problem that superficially appears to be mundane and shown that, if treated properly, it actually can have rather profound importance.”

Reviewer (C): “[Professor Ruszkowski] and his team address difficult and significant physical problems focused on energetic feedback from accreting massive black holes in galaxies and clusters and magnetized winds in disk galaxies driven by ram pressure and star formation... Mateusz has a deep well of physical insight and energy.”

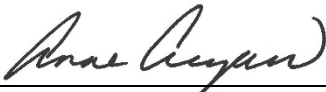
Reviewer (D): “In my opinion, Prof. Ruszkowski is an accomplished and versatile theoretical astrophysicist who has made significant contributions in several fields...Prof. Ruszkowski *really* cares, with a passion, about whether his models are right!”

Reviewer (E): “[Professor Ruszkowski] is an excellent theoretical and computational astrophysicist who has made significant contributions to the application of hydrodynamics, magneto-hydrodynamics, and radiative transfer to the study of a variety of astrophysical systems... I believe that [Professor Ruszkowski’s] work here is the state of the art.”

Reviewer (F): “[Professor Ruszkowski] has emerged as one of the leading experts on numerical simulations of feedback from accretion onto black holes at the center of galaxies, and the plasma physics of the inter-galactic medium in general.”

Summary of Recommendation:

Professor Ruszkowski has carried out frontier research on the astrophysics of galaxy clusters, galaxies, and black hole accretion using numerical magnetohydrodynamics simulations of plasmas, with special emphasis on the role of cosmic rays. He has been an effective teacher of a wide range of the department’s curriculum, and has successfully guided graduate students through their Ph.D. research. His expertise in numerical computation has been put to good use in advising the university on computational and data storage needs. The Executive Committee of the College of Literature, Science, and the Arts and I recommend that Associate Professor Mateusz Ruszkowski be promoted to the rank of professor of astronomy, with tenure, College of Literature, Science, and the Arts.



Anne Curzan, Dean
Geneva Smitherman Collegiate Professor of
English Language and Literature, Linguistics,
and Education
Arthur F. Thurnau Professor
College of Literature, Science, and the Arts

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