

Maciek Wielgus

Max Planck Institute for Radio Astronomy
Auf dem Hugel 69, 53121 Bonn, Germany

✉ maciek@wielgus.info ☎ +48 602417268 🔗 wielgus.info

EDUCATION

Warsaw University of Technology <i>Ph.D. in Machine Design and Maintenance: Photonic Engineering (with a distinction)</i> Dissertation: Adaptive decomposition and analytic signal concept in the interferometric fringe pattern analysis	Sep 2016 (2011 – 2016)
Warsaw University of Technology <i>M.S. in Robotics and Automatic Control: Photonic Engineering (interferometric fringe pattern analysis)</i>	Dec 2010 (2005 – 2010)
Warsaw University <i>B.S. in Mathematics: Numerical Analysis (numerical partial differential equations)</i>	Sep 2010 (2007 – 2010)

PROFESSIONAL EXPERIENCE AND LONGER RESEARCH VISITS

Research Scientist <i>Max Planck Institute for Radio Astronomy, Bonn, Germany</i>	Oct 2021 – present
Visiting Researcher <i>University of Valencia, Spain (reference: Ivan Marti-Vidal)</i>	Mar 2023
Visiting Researcher <i>Paris Observatory Scientific Council grant, Meudon, France (reference: Frederic Vincent)</i>	Jul 2022, Jun 2024
Black Hole Initiative Postdoctoral Fellow <i>Harvard University, Cambridge, USA (mentor: Shep Doeleman)</i>	Jun 2017 – Aug 2021
Confronting Theories of Accretion with Observations, KITP Program <i>Visiting Scholar, UCSB, Santa Barbara, USA</i>	Jan 2017 – Mar 2017
Postdoctoral researcher at Nicolaus Copernicus Astronomical Center <i>Polish Academy of Sciences, Warsaw, Poland (mentors: Wlodek Kluźniak, Marek Abramowicz)</i>	Jan 2017 – May 2017
Internship at Center for Astrophysics Harvard & Smithsonian <i>Cambridge, USA (mentors: Ramesh Narayan, Olek Sądowski)</i>	Oct 2015 – Dec 2015
Visiting Scholar at Kavli Institute for Theoretical Physics, UCSB <i>Santa Barbara, USA (mentors: Omer Blaes, Wlodek Kluźniak)</i>	Jun 2015
Visiting Scholar at Peking University Kavli Institute for Astronomy and Astrophysics <i>Beijing, China (mentors: Marek Abramowicz, Fukun Liu)</i>	Aug 2014
Visiting Scholar at University of Capetown <i>Capetown, South Africa (mentor: George F. R. Ellis)</i>	May 2014
Internship at National Center of the Industrial Technology <i>Buenos Aires, Argentina (mentors: Guillermo Kaufmann, Alejandro Federico)</i>	Oct 2013 – Nov 2013
Internship at Center for Astrophysics Harvard & Smithsonian <i>Cambridge, USA (mentors: Ramesh Narayan, Olek Sądowski)</i>	Jun 2013 – Aug 2013
Internship at the College of Charleston <i>Charleston, USA (mentor: Chris Fragile)</i>	May 2013 – Jun 2013
Engineer at the Institute of Electron Technology <i>Warsaw, Poland</i>	2011 – 2013

RESEARCH INTERESTS

- astrophysics of compact objects
- very long baseline radio interferometry
- physics of accretion and AGN jets
- machine learning and AI for research in astronomy
- Event Horizon Telescope project
- observational tests of general relativity
- magnetohydrodynamics
- applied signal and image processing

AWARDS

EHT Early Career Award (individual)	2020, 2021, 2022, 2023
Group Award (A) from the Royal Astronomical Society (EHT collaboration)	2021
Albert Einstein medal (EHT collaboration)	2020
Bruno Rossi Prize for a contribution to High Energy Astrophysics (EHT collaboration)	2020
Breakthrough Prize in Fundamental Physics (EHT collaboration)	2020
Smithsonian Institute American Ingenuity Award (EHT collaboration)	2019
Black Hole Initiative Prize for scientific contributions to the EHT project (individual)	2019
National Science Foundation Diamond Achievement Award (EHT collaboration)	2019
First prize in IXth Nationwide Competition "Young Innovators" for the best PhD Thesis	2017
Polish Prime Minister Award for the best PhD thesis in Engineering	2017
Foundation for Polish Science START award (in 2015 with distinction as 1 of 5 young scientists nationwide)	2015 – 2016
First degree scientific performance team award from the President of the Warsaw University of Technology	2014
Academic performance award from Polish Ministry of Science and Higher Education	2013
Scientific scholarship and travel award from the Center for Advanced Studies Warsaw University of Technology	2012 – 2013
SPIE best student presentation award, International Conference on Advanced Topics in Optoelectronics, Microelectronics and Nanotechnology, Constanza, Romania	2012
Distinction in the PKOpto XXth prof. A. Smolinski national competition for the best master thesis in optoelectronics	2011
Laureate (6th place nationwide) of the National Mathematics Competition for high school students in Poland	2005

BIBLIOMETRICS

112 published or accepted reviewed journal papers, 136 items **listed on ADS** with 14091 citations, h-index=43, and 91 items cited at least 10 times (ADS, August 2024). 26 **ADS-listed** publications as a first author (including 18 reviewed journal papers), with a total of 537 citations, h-index=13, and 15 papers cited at least 10 times (ADS, August 2024). 40 reviewed journal papers as a first, second, or third author.

GRANTS AND FORMAL PROJECTS

M2FINDERS: Mapping Magnetic Fields with INterf. Down to Event hoRizon Scales <i>ERC Advanced grant. Leader of 1/3 Working Packages. PI: J. Anton Zensus</i>	2021 – 2026
Foreign Expert: Transformation of the form and method of education <i>at the Silesian University in Opava, Czechia</i>	2022 – 2024
PI: Dynamics of the Centaurus A jet base on a light-day scale	2022

ALMA cycle 8 VLBI observations

Co-PI: Probing relativistic jets through mm-VLBI of X-ray binaries 2022

GMVA VLBI observations, PI: Alex Tetarenko

Co-PI: Ultra-high resolution imaging of 3C84 2022

ALMA cycle 8 VLBI observations

PI: Thin disks GRRMHD simulations 2018 – 2022

3×10^7 CPU hours on PROMETHEUS supercomputer from PLGRID

Named participant: Variable accretion flows 2013 – 2018

Polish National Science Center Maestro Grant, PI: Wlodek Kluźniak

Co-PI: Adaptive processing of fringe patterns in optical whole-field measurements 2013 – 2015

Polish National Science Center Opus Grant, PI: Krzysztof Paturski

PI: Advanced single-frame fringe processing algorithms 2012 – 2013

Dean's Grant at the Faculty of Mechatronics, Warsaw University of Technology

PI: Automatic image analysis for nanomaterials research 2012 – 2014

Foundation for Polish Science VENTURES Grant

Named participant: Turbulent viscosity in non-stationary black hole accretion disks 2012 – 2014

Polish National Science Center Opus Grant, PI: Marek Abramowicz

OTHER ACTIVITIES

- leading the EHT Time Domain Working Group 2018-2022
- EHT Early Career Award 2020 "for his role and contributions to data processing, validation, and analysis of the 2017 EHT data, leading to the results published in the first six papers of the EHT"
- EHT Early Career Award 2021 "for his demonstration of the persistence of the M87 ring using years of historical EHT data"
- EHT Early Career Award 2022 "for his contribution to the calibration, analysis and interpretation of the EHT results of Sgr A*, and his leadership in the analysis and calibration of the ALMA data"
- EHT Early Career Award 2023 "for a leading role in analysis of NRAO 530 and J1924-2914 observations"
- key contributor to the EHT data set reduction and inspection pipeline development
- paper coordinator for the collaboration paper EHTC, ApJL 875 L3 (2019)
- key contributor and paper writing team member for a number of alphabetic-author-list EHT publications
- reviewer for MNRAS, A&A, ApJ, PRL, New Astronomy, Applied Optics, Optics Express, Optics Letters
- SOC member for EHT Polarization Workshop, Max-Planck Institute for Radio Astronomy, July 2019 and EHT Collaboration Meeting, Granada, June 2022
- mentoring multiple PhD and undergraduate students on their research projects: J. Vos, J. Roeder, W. Yan, D. Bollimpalli, S. Steel, D. Lancova, A. Yfantis, among others
- PhD co-supervisor of A. Yfantis at Radboud University, Netherlands (2024)
- jury member, MSc defence of L. F. Dias da Silva at Lisbon University (2024)
- named participant on tens of radio/VLBI observational proposals with EHT, GMVA, LMT, ALMA
- reviewer of grant proposals at the Czech Science Foundation in the Astronomy panel
- member of the Polish Astronomical Society and the European Astronomical Society
- active popularizer of astronomy

TEACHING EXPERIENCE

Lecturer of astrophysics at the Relativistic Accretion Workshop, University of Bremen Sep 2016

Transonic flows, ideal MHD, MRI

Teaching at Warsaw University of Technology 2011 – 2015

Optomechatronics lab, Mechatronic systems lab, and Instrumental optics lab

Teaching assistant and tutor at Warsaw University 2010 – 2011

Calculus I & II, linear algebra for math students

LANGUAGES

- Polish (native)
- English (fluent)
- Spanish (A2, learning in progress)

SELECTED RECENT PROFESSIONAL TALKS

I have given 100+ professional talks and presentations. Some recent talks below, full list on wielgus.info

20. 2024-07-19, COSPAR 2024: 45th Scientific Assembly, Busan, South Korea (invited talk),
19. 2024-06-20, Physics Department, Ecole Normale Supérieure, Paris, France (invited talk),
18. 2024-03-11, ASIAA, Taipei, Taiwan (invited seminar),
17. 2023-11-29, 25th RAGtime Meeting, Opava, Czechia (keynote conference talk),
16. 2023-10-16, Harvard/SAO/EHT Group Meeting, Cambridge, USA (invited seminar),
15. 2023-07-14, EAS Meeting 2023, Krakow, Poland (invited),
14. 2023-05-09, Goethe University, Frankfurt, Germany (invited seminar),
13. 2023-05-02, Radboud University, Nijmegen, Netherlands (invited seminar),
12. 2023-04-18, University of Geneva, Switzerland (invited seminar),
11. 2023-03-14, University of Valencia, Spain (invited seminar),
10. 2023-02-10, Improving Accretion Models with Plasma Theory workshop, Princeton, USA (invited),
9. 2023-01-12, Reconnection and Sgr A* flares workshop, Paris Observatory, Meudon, France (invited),
8. 2022-11-29, Astronomical Observatory of the University of Warsaw, Poland (invited seminar),
7. 2022-11-10, Chandra X-ray Space Telescope Operations Control Center, Burlington, USA (invited seminar),
6. 2022-11-02, HEAD CfA | Harvard & Smithsonian, Cambridge, USA (invited seminar),
5. 2022-09-14, 31st Texas Symposium on Relativistic Astrophysics, Prague, Czechia,
4. 2022-08-22, Max Planck Institute for Extraterrestrial Physics, Garching, Germany (invited seminar),
3. 2022-07-07, Paris Observatory, France (invited seminar),
2. 2022-06-09, KIPAC, Stanford University, USA (invited seminar, online),
1. 2022-05-20, 5th Black Hole Initiative Conference, Harvard University, USA (invited),

OUTREACH TALKS AND LECTURES 2019+

17. 2023-09-02, Astronomy Club Almukantarat 40th Anniversary, Frombork, Poland,
16. 2022-12-09, Astronomy Club at Sacred Heart Preparatory, Atherton, USA (online),
15. 2022-09-13, 31st Texas Symposium on Relativistic Astrophysics, Prague, Czechia (public talk),
14. 2022-05-17, Harvard University Science Center, Cambridge, USA (public talk and panel discussion),
13. 2021-11-17, XL Żeromski High School, Warsaw, Poland (invited talk for high school students),
12. 2021-07-16, Almukantarat Astronomy Club Summer Camp, Zalecze Wielkie, Poland (popular lecture),
11. 2021-03-29, N. Copernicus Astronomy Center: Meetings with Astronomy (outreach lecture series),
10. 2021-01-21, Copernicus Science Center, Warsaw, Poland (public lecture),
9. 2020-11-30, Photo: Science/Photography and Scientific Discourses, Prague, Czechia (keynote talk),
8. 2020-09-20, N. Copernicus Astronomy Center: Meetings with Astronomy (outreach lecture series),
7. 2020-03-04, Silesian University in Opava, Czechia (public lecture),
6. 2019-11-06, Mellow Mushroom pub, Charleston, USA (Astronomy on Tap pub talk),
5. 2019-09-23, PLNOG 23, Cracow, Poland (invited lecture at an IT conference),
4. 2019-09-14, PyCon PL 2019, Zawiercie, Poland (keynote lecture at an IT conference),
3. 2019-07-31, Polish Scientific Network in Boston meeting, MIT, Cambridge, USA (popular talk),
2. 2019-04-27, Copernicus Science Center, Warsaw, Poland (public talk),
1. 2019-04-15, Harvard University Science Center, USA (public talk and panel discussion)

Refereed journal papers

118. *A multi-frequency study of sub-parsec relativistic jets with the Event Horizon Telescope*, Roeder, J., **Wielgus, M.**, Lobanov, A., et al. + EHTC, under internal EHTC review,
117. *Imaging the black hole shadow and extended jet of M87*, Kim, J.-S. + 7 authors, submitted to A&A,
116. *Hot-spots around Sagittarius A*: Joint fits to astrometry and polarimetry*, Yfantis, A., **Wielgus, M.**, and Moscibrodzka, M., submitted to A&A, arXiv:2408.07120,
115. *The putative center in NGC 1052*, Baczko A.-K., Kadler, M., Ros, E., Fromm, C. M., **Wielgus, M.**, et al. + EHTC, submitted to A&A,
114. *Broadband Multi-wavelength Properties of M87 during the 2018 EHT Campaign and a Very High Energy Flaring Episode*, Algaba et al. + EHTC, submitted to A&A, arXiv:2404.17623,
113. *Kilogauss magnetic field and jet dynamics in the quasar NRAO 530*, Lisakov, M., Jorstad, S., **Wielgus, M.**, et al., submitted to A&A,
112. *Particle motion around luminous neutron stars: effects of deviation from Schwarzschild spacetime*, Vieira, R., and **Wielgus, M.**, accepted in PRD, arXiv:2403.01006,
111. *Circular Polarization of Simulated Images of Black Holes*, Yoshi, A., Prather, B., Chan, C.-K., **Wielgus, M.**, and Gammie, C., accepted in ApJ, arXiv:2406.15653,
110. *First Very Long Baseline Interferometry Detections at 870 μ m*, Raymond, A., Doeleman, S., et al. + EHTC, Astron. Journal 168:130 (2024),
109. *First VLBI detection of Fornax A*, Paraschos, G., **Wielgus, M.**, Benke, P. + 10 authors, A&A 687, L6 (2024), arXiv:2406.02660,
108. *Hotspots and Photon Rings in Spherically-Symmetric Spacetimes*, Kocherlakota, P., Rezzolla, L., Roy, R., and **Wielgus, M.**, MNRAS 531, 3606 (2024), arXiv:2403.08862,
107. *Fitting Sagittarius A* light curves with a hot spot model: Bayesian modeling of QU loops in millimeter band*, Yfantis, A., Moscibrodzka, M., **Wielgus, M.** + 2 authors, A&A 685, A142 (2024), arXiv:2310.07762,
106. *Polarized signatures of orbiting hot spots: special relativity impact and probe of spacetime curvature*, Vincent, F., **Wielgus, M.** + 3 authors, A&A 684, A194 (2024), arXiv:2309.10053,
105. *Orbital Polarimetric Tomography of a Flare Near Sagittarius A* Supermassive Black Hole*, Levis, A., Bouman, K., Chael, A., **Wielgus, M.**, and Srinivasan, P., Nat Astron 8, 765-773 (2024), arXiv:2310.07687,
104. *First Sagittarius A* Event Horizon Telescope Results. VIII. Physical Interpretation of the Polarized Ring*, EHTC, ApJL 964, L26 (2024),
103. *First Sagittarius A* Event Horizon Telescope Results. VII. Polarization of the Ring*, EHTC, ApJL 964, L25 (2024),
102. *Prospects for Future Experimental Tests of Gravity with Black Hole Imaging: Spherical Symmetry*, Kocherlakota, P., Rezzolla, L., Roy, R., and **Wielgus, M.**, PRD 109, 064064 (2024), arXiv:2307.16841,
101. *The internal Faraday screen of Sagittarius A**, **Wielgus, M.**, Issaoun, S., Marti-Vidal, I., + 5 authors, A&A 682, A97 (2024), arXiv:2308.11712,
100. *Ordered magnetic fields around the 3C 84 central black hole*, Paraschos, G. F., Kim, J.-Y., **Wielgus, M.**, et al. + EHTC, A&A 682, L3 (2024), arXiv:2402.00927,
99. *The persistent shadow of the supermassive black hole of M87 I. Observations, calibration, imaging and analysis*, EHTC, A&A 681, A79 (2024),
98. *Energy distribution and substructure formation in astrophysical MHD simulations*, Kayanikhoo, F., Cemeljic, M., **Wielgus, M.**, and Kluzniak, W., MNRAS 527, 10151 (2024), arXiv:2308.16062,
97. *A search for pulsars around Sgr A* in the first Event Horizon Telescope dataset*, Torne, P. et al. + EHTC, ApJ 959, 14 (2023), arXiv:2308.15381,
96. *Polarimetric geometric modeling for mm-VLBI observations of black holes using calibration-invariant data products*, Roelofs, F., Johnson, M., Chael, A., Janssen, M., **Wielgus, M.** et al. + EHTC, ApJL 957, L21 (2023),
95. *First M87 Event Horizon Telescope Results IX: Limits on Near-Horizon Circular Polarization*, EHTC, ApJL 957, L20 (2023), arXiv:2311.10976,

94. *Reference Array and Design Consideration for the next-generation Event Horizon Telescope*, Doeleman, S. S. et al., *Galaxies* 11(5), 107 (2023), arXiv:2306.08787,
93. *Orbital configurations of spaceborne interferometers for studying photon rings of supermassive black holes*, Hudson, B., Gurvits, L., **Wielgus, M.** + 3 authors, *Acta Astronautica* 213, 681-693 (2023), arXiv:2309.17127,
92. *The EB-correlation in Resolved Polarized Images: Connections to Astrophysics of Black Holes*, Emami, R., Doeleman, S., **Wielgus, M.**, et al., *ApJ* 955, 6 (2023), arXiv:2305.00387,
91. *Polarimetry and Astrometry of NIR Flares as Event Horizon Scale, Dynamical Probes for the Mass of Sgr A**, GRAVITY Collaboration et al., *A&A* 677, L10 (2023), arXiv:2307.11821,
90. *Unraveling Twisty Linear Polarization Morphologies in Black Hole Images*, Emami, R., Ricarte, A., Wong, G., + 26 authors, *ApJ* 950, 38 (2023), arXiv:2210.01218,
89. *Comparison of Polarized Radiative Transfer Codes used by the EHT Collaboration*, Prather, B., Dexter, J., Moscibrodzka, M., + 270 authors, *ApJ* 950, 35 (2023), arXiv:2303.12004,
88. *Key Science Goals for the Next-Generation Event Horizon Telescope*, Johnson, M., Akiyama, K., Blackburn, L., et al., *Galaxies* 11(3), 61 (2023), arXiv:2304.11188,
87. *Spectra of Puffy Accretion Discs: the kynbb Fit*, Lancova, D., Yilmaz, A., **Wielgus, M.**, + 3 authors, *Astronomical Notes* 344, e20230023 (2023), arXiv:2209.03713,
86. *The Event Horizon Telescope Image of the Quasar NRAO 530*, Jorstad, S., **Wielgus, M.**, Lico, R., + 267 authors, *ApJ* 943, 170 (2023), arXiv:2302.04622,
85. *Tracing hot spot motion using the next generation Event Horizon Telescope*, Emami, R., Tiede, P., Doeleman, S. S., Roelofs, F., **Wielgus, M.**, + 17 authors, *Galaxies* 11(1), 23 (2023), arXiv:2211.06773,
84. *Probing plasma composition with the next generation Event Horizon Telescope (ngEHT)*, Emami, R., Anantua, R., Ricarte, A., + 15 authors, *Galaxies* 11(1), 11 (2023), arXiv:2211.07306,
83. *Polarimetric signatures of hot spots in black hole accretion flows*, Vos, J., Moscibrodzka, M., and **Wielgus, M.**, *A&A* 668, A185 (2022), arXiv:2209.09931,
82. *Photon ring test of the Kerr hypothesis: variation in the ring shape*, Pagnat, H., Lupsasca, A., Vincent, F., and **Wielgus, M.**, *A&A* 668, A11 (2022), arXiv:2206.02781,
81. *Images and photon ring signatures of thick disks around black holes*, Vincent, F., Gralla, S., Lupsasca, A., and **Wielgus, M.**, *A&A* 667, A170 (2022), arXiv:2206.12066,
80. *Collimation of the relativistic jet in the quasar 3C 273*, Okino, H., Akiyama, K., Asada, K., +32 authors, *ApJ* 940, 65 (2022), arXiv:2112.12233,
79. *A first search of transients in the galactic center from 230 GHz ALMA observations*, Mus, A., Marti-Vidal, I., **Wielgus, M.**, and Stroud, G., *A&A* 666, A39 (2022), arXiv:2208.08248,
78. *Orbital motion near Sagittarius A*. Constraints from polarimetric ALMA observations*, **Wielgus, M.**, Moscibrodzka, M., Vos, J., Gelles, Z., + 5 authors, *A&A* 665, L6 (2022), arXiv:2209.09926,
77. *A robust test on the existence of primordial black holes in galactic dark matter halos*, Abramowicz, M., Bejger, M., Udalski, A., and **Wielgus, M.**, *ApJL* 935, L28 (2022), arXiv:2206.13335,
76. *The photon ring in M87**, Broderick, A., Pesce, D., Gold, R. + 48 authors, *ApJ* 935, 61 (2022), arXiv:2208.09004,
75. *Resolving the inner parsec of the blazar J1924–2914 with the Event Horizon Telescope*, Issaoun, S., **Wielgus, M.**, Jorstad, S., Krichbaum, T. + 264 authors, *ApJ* 934, 145 (2022), arXiv:2208.01662,
74. *Observational properties of puffy disks: radiative GRMHD spectra of mildly sub-Eddington accretion*, **Wielgus, M.**, Lancova, D., Straub, O., Kluzniak, W. + 6 authors, *MNRAS* 514, 780 (2022), arXiv:2202.08831,
73. *Characterizing and Mitigating Intraday Variability: Reconstructing Source Structure in Accreting Black Holes with mm-VLBI*, Broderick, A., Gold, R., Georgiev, B., + 264 authors, *ApJL* 930, L21 (2022),
72. *A Universal Power-law Prescription for Variability from Synthetic Images of Black Hole Accretion Flows*, Georgiev, B., Pesce, D., Broderick, A., Wong, G., Dhruv, V., **Wielgus, M.** + 263 authors, *ApJL* 930, L20 (2022),
71. *Millimeter Light Curves of Sagittarius A* Observed during the 2017 Event Horizon Telescope Campaign*, **Wielgus, M.**, Marchili, N., Marti-Vidal, I., Keating, G. K. + 263 authors, *ApJL* 930, L19 (2022), arXiv:2207.06829,
70. *Selective Dynamical Imaging of Interferometric Data*, Farah, J., Galison, P., Akiyama, K., Bouman, K., Bower, G., Chael, A., Fuentes, A., Gomez, J. L., Narayan, R., Honma, M., Johnson, M. D., Moriyama, K., Kofuji, Y., **Wielgus, M.** + 221 authors, *ApJL* 930, L18 (2022),

69. *First Sagittarius A* Event Horizon Telescope Results. VI. Testing the Black Hole Metric*, EHT Collaboration (270 authors), *ApJL* 930, L17 (2022),
68. *First Sagittarius A* Event Horizon Telescope Results. V. Testing Astrophysical Models of the Galactic Center Black Hole*, EHT Collaboration (274 authors), *ApJL* 930, L16 (2022),
67. *First Sagittarius A* Event Horizon Telescope Results. IV. Variability, Morphology, and Black Hole Mass*, EHT Collaboration (269 authors), *ApJL* 930, L15 (2022),
66. *First Sagittarius A* Event Horizon Telescope Results. III. Imaging of the Galactic Center Supermassive Black Hole*, EHT Collaboration (270 authors), *ApJL* 930, L14 (2022),
65. *First Sagittarius A* Event Horizon Telescope Results. II. EHT and Multiwavelength Observations, Data Processing, and Calibration*, EHT Collaboration (337 authors), *ApJL* 930, L13 (2022),
64. *First Sagittarius A* Event Horizon Telescope Results. I. The Shadow of the Supermassive Black Hole in the Center of the Milky Way*, EHT Collaboration (388 authors), *ApJL* 930, L12 (2022),
63. *The science case and challenges of space-borne sub-millimeter interferometry*, Gurvits, L., Paragi, Z. + 52 authors, *Acta Astronautica* 196, 314-333 (2022), [arXiv:2204.09144](#),
62. *MeqSilhouette v2: Spectrally-resolved polarimetric synthetic data generation for the Event Horizon Telescope*, Natarajan, I., Deane, R., Marti-Vidal, I., Roelofs, F., Janssen, M., **Wielgus, M.** +14 authors, *MNRAS* 512, 490 (2022), [arXiv:2202.11478](#),
61. *The intrinsic structure of Sagittarius A* at 1.3 cm and 7 mm*, Cho, I., Zhao, G.-Y., Kawashima, T., +63 authors, *ApJ* 926, 108 (2022), [arXiv:2112.04929](#),
60. *The Variability of the Black-Hole Image in M87 at the Dynamical Time Scale*, Satapathy, K., Psaltis, D., Ozel, F., Medeiros, L., Dougall, S. T., Chan, C., **Wielgus, M.**, +231 authors, *ApJ* 925, 13 (2022), [arXiv:2111.01317](#),
59. *Photon rings of spherically symmetric black holes and robust tests of non-Kerr metrics*, **Wielgus, M.**, *PRD* 104, 124058 (2021), [arXiv:2109.10840](#),
58. *Event Horizon Telescope observations of the jet launching and collimation zone in Centaurus A*, Janssen, M., Falcke, H., Kadler, M., Ros, E., **Wielgus, M.**, +266 authors, *Nat Astron* 5, 1017-1028 (2021), [arXiv:2111.03356](#),
57. *Persistent Non-Gaussian Structure in the Image of Sagittarius A* at 86 GHz*, Issaoun, S., Johnson, M., Blackburn, L., Broderick, A., Tiede, P., **Wielgus, M.**, + 23 authors, *ApJ* 915, 99 (2021), [arXiv:2104.07610](#),
56. *Three-dimensional general relativistic Poynting-Robertson effect. IV. Slowly rotating and non-spherical quadrupolar massive source*, De Falco, V., **Wielgus, M.**, *PRD* 103, 084056 (2021), [arXiv:2103.17165](#),
55. *Constraints on black-hole charges with the 2017 EHT observations of M87**, Kocherlakota, P. + 236 authors, *PRD* 103, 104047 (2021), [arXiv:2105.09343](#),
54. *The Polarized Image of a Synchrotron Emitting Ring of Gas Orbiting a Black Hole*, Narayan, R., et al., *ApJ* 912, 35 (2021), [arXiv:2105.01804](#),
53. *Light echos and coherent autocorrelations in a black hole spacetime*, Chesler, P., Blackburn, L., Doeleman, S., Johnson, M., Moran, J., Narayan, R., **Wielgus, M.**, *Class. Quantum Grav.* 38, 13 (2021), [arXiv:2012.11778](#),
52. *Broadband Multi-wavelength Properties of M87 During the 2017 Event Horizon Telescope Campaign*, Algaba, J. C., + 744 authors, *ApJL* 911, L11 (2021), [arXiv:2104.06855](#),
51. *Polarimetric Properties of Event Horizon Telescope Targets from ALMA*, Goddi, C., + 249 authors, *ApJL* 910, L14 (2021),
50. *First M87 Event Horizon Telescope Results. VIII. Magnetic Field Structure near The Event Horizon*, EHT Collaboration (240 authors), *ApJL* 910, L13 (2021),
49. *First M87 Event Horizon Telescope Results. VII. Polarization of the Ring*, EHT Collaboration (239 authors), *ApJL* 910, L12 (2021),
48. *Elliptical accretion disk as a model for TDEs*, Liu, F., Cao, C., Abramowicz, M., **Wielgus, M.**, Cao, R., Zhou, Z., *ApJ* 908, 179 (2021), [arXiv:2012.05552](#),
47. *Geometric modeling of M87* as a Kerr black hole or a non-Kerr compact object*, Vincent, F., **Wielgus, M.**, Abramowicz, M., Gourgoulhon, E., J. P. Lasota, + 2 authors, *A&A* 646, A37 (2021), [arXiv:2002.09226](#),
46. *Reflection-asymmetric wormholes and their double shadows*, **Wielgus, M.**, Horák, J., Vincent, F., Abramowicz, M., *PRD* 102, 084044 (2020), [arXiv:2008.10130](#),
45. *Gravitational Test Beyond the First Post-Newtonian Order with the Shadow of the M87 Black Hole*, Psaltis, D., + 187 authors, *PRL* 125, 141104 (2020), [arXiv:2010.01055](#),

44. *Monitoring the Morphology of M87* in 2009-2017 with the Event Horizon Telescope*, **Wielgus, M.**, Akiyama, K., Blackburn, L., + 216 authors, *ApJ* 901, 67 (2020), arXiv:2009.11842,
43. *Event Horizon Telescope imaging of the archetypal blazar 3C 279 at an extreme 20 microarcsecond resolution*, Kim, J.-Y., Krichbaum, T., Broderick, A., **Wielgus, M.**, + 349 authors, *A&A* 640, A69 (2020),
42. *Verification of Radiative Transfer Schemes for the EHT*, Gold, R., + 207 authors, *ApJ* 897, 148 (2020),
41. *THEMIS: A Parameter Estimation Framework for the Event Horizon Telescope*, Broderick, A., + 193 authors, *ApJ* 897, 139 (2020),
40. *Closure Statistics in Radio Interferometric Data*, Blackburn, L., Pesce, D., Johnson, M., **Wielgus, M.**, Chael, A., Christian, P., Doeleman, S., *ApJ* 894, 31 (2020), arXiv:1910.02062,
39. *SYMBA: An end-to-end VLBI synthetic data generation pipeline. Simulating Event Horizon Telescope observations of M 87*, Roelofs, F., Janssen, M., + 207 authors, *A&A* 636, A5 (2020)
38. *Universal Interferometric Signatures of a Black Hole's Photon Ring*, Johnson, M., + 16 authors, *Science Advances* 6, eaaz1310 (2020), arXiv:1907.04329,
37. *Optically thin outbursts of rotating neutron stars can not be spherical*, **Wielgus, M.**, *MNRAS*, 488, 4937 (2019), arXiv:1907.11268,
36. *Puffy Accretion Disks: Sub-Eddington, Optically Thick, and Stable*, Lančová, D., Abarca, D., Kluźniak, W., **Wielgus, M.**, + 5 authors, *ApJL* 884, L37 (2019), arXiv:1908.08396,
35. *EHT-HOPS Pipeline for Millimeter VLBI Data Reduction*, Blackburn, L., Chan, C.-K., Crew, G., Fish, V., Issaoun, S., Johnson, M. D., **Wielgus, M.**, + 8 authors, *ApJ* 882, 23 (2019), arXiv:1903.08832,
34. *Atmospheric oscillations provide simultaneous measurement of neutron star mass and radius*, Bollimpalli, D., **Wielgus, M.**, Abarca, D., Kluźniak, W., *MNRAS* 487, 5129 (2019), arXiv:1812.01299,
33. *The Event Horizon General Relativistic Magnetohydrodynamic Code Comparison Project*, Porth, O., + 220 authors, *ApJSS* 243, 26 (2019), arXiv:1904.04923,
32. *Calibration of ALMA as a Phased Array. ALMA Observations During the 2017 VLBI Campaign* Goddi, C., Martí-Vidal, I., Messias, H., + 14 authors, *PASP* 131, 075003 (2019), arXiv:1901.09987,
31. *rPICARD: A CASA-based calibration pipeline for VLBI data. Calibration and imaging of 7 mm VLBA observations of the AGN jet in M 87* Janssen, M., + 9 authors, *A&A* 626, A75 (2019), arXiv:1902.01749,
30. *First M87 Event Horizon Telescope Results. VI. The Shadow and Mass of the Central Black Hole*, EHT Collaboration (214 authors), *ApJL* 875, L6 (2019), arXiv:1906.11243,
29. *First M87 Event Horizon Telescope Results. V. Physical Origin of the Asymmetric Ring*, EHT Collaboration (221 authors), *ApJL* 875, L5 (2019), arXiv:1906.11242,
28. *First M87 Event Horizon Telescope Results. IV. Imaging the Central Supermassive Black Hole*, EHT Collaboration (215 authors), *ApJL* 875, L4 (2019), arXiv:1906.11241,
27. *First M87 Event Horizon Telescope Results. III. Data Processing and Calibration*, EHT Collaboration (217 authors, paper coordinated by Blackburn, L., Issaoun, S., **Wielgus, M.**), *ApJL* 875, L3 (2019), arXiv:1906.11240,
26. *First M87 Event Horizon Telescope Results. II. Array and Instrumentation*, EHT Collaboration (341 authors), *ApJL* 875, L2 (2019), arXiv:1906.11239,
25. *First M87 Event Horizon Telescope Results. I. The Shadow of the Supermassive Black Hole*, EHT Collaboration (348 authors), *ApJL* 875, L1 (2019), arXiv:1906.11238,
24. *Multi-wavelength torus-jet model for Sagittarius A**, Vincent, F., Abramowicz, M., Zdziarski, A., **Wielgus, M.**, Paumard, T., Perrin, G., Straub, O., *A&A* 624, A52 (2019), arXiv:1902.01175,
23. *The Size, Shape, and Scattering of Sagittarius A* at 86 GHz: First VLBI with ALMA*, Issaoun, S., Johnson, M., Blackburn, L., + 41 authors, *ApJ* 871, 30 (2019), arXiv:1901.06226,
22. *Collisions of Neutron Stars with Primordial Black Holes as Fast Radio Bursts Engines*, Abramowicz, M., Bejger, M., **Wielgus, M.**, *ApJ* 868, 17 (2018), arXiv:1704.05931,
21. *Double Compton and Cyclo-Synchrotron in Super-Eddington Discs, Magnetized Coronae, and Jets*, McKinney, J. C., Chluba, J., **Wielgus, M.**, Narayan, R., Sądowski, A., *MNRAS* 467, 2241 (2017), arXiv:1608.08627,
20. *Radiative, two-temperature simulations of low-luminosity black hole accretion flows in general relativity*, Sądowski, A., **Wielgus, M.**, Narayan, R., Abarca, D., McKinney, J. C., Chael, A., *MNRAS* 466, 705 (2017), arXiv:1605.03184,

19. *Levitating atmospheres of Eddington-luminosity neutron stars*, **Wielgus, M.**, Sądowski, A., Kluźniak, W., Abramowicz, M., Narayan, R., MNRAS, 458, 3420 (2016), arXiv:1512.00094,
18. *Limits on thickness and efficiency of Polish doughnuts in application to the ULX sources*, **Wielgus, M.**, Yan, W., Lasota, J.-P., Abramowicz, M., A&A 587, A38 (2016), arXiv:1512.00749,
17. *Stable, levitating, optically thin atmospheres of Eddington-luminosity neutron stars*, **Wielgus, M.**, Kluźniak, W., Sądowski, A., Narayan, R., Abramowicz, M., MNRAS 454, 3766 (2015), arXiv:1505.06099,
16. *Two-frame tilt-shift error estimation and phase demodulation algorithm*, **Wielgus, M.**, Sunderland, Z., Patorski, K., Optics Letters 40, 3460 (2015),
15. *Local stability of strongly magnetized black hole tori*, **Wielgus, M.**, Fragile, P. C., Wang, Z., Wilson, J., MNRAS 447, 3593 (2015), arXiv:1412.4561,
14. *Cosmic background radiation in the vicinity of a Schwarzschild black hole: no classic firewall*, **Wielgus, M.**, Ellis, G. F. R., Vincent F., Abramowicz, M., PRD 90, 124024 (2014), arXiv:1406.6551,
13. *Continuous phase estimation from noisy fringe patterns based on the implicit smoothing splines*, **Wielgus, M.**, Patorski, K., Etchepareborda, P., Federico, A., Optics Express 22, 10775 (2014),
12. *Denoising and extracting background from fringe patterns using midpoint-based bidimensional empirical mode decomposition*, **Wielgus, M.**, Patorski, K., Applied Optics 53, B215 (2014),
11. *The perihelion of Mercury advance and the light bending calculated in (enhanced) Newton's theory*, Abramowicz, M., Ellis, G. F. R., Horák, J., **Wielgus, M.**, General Relativity and Gravitation 46:1630 (2014), arXiv:1303.5453,
10. *Nanocoral ZnO films fabricated on flexible poly(vinyl chloride) using a carrier substrate*, Borysiewicz, M., Wojciechowski, T., Dynowska, E., **Wielgus, M.**, Bar, J., Wojtowicz, T., Kamińska, E., Piotrowska, A., Thin Solid Films 550, 145 (2014),
9. *Advanced processing of optical fringe patterns by automated selective reconstruction and enhanced fast empirical mode decomposition*, Trusiak, M., **Wielgus, M.**, Patorski, K., Optics and Lasers in Engineering 52, 230 (2014),
8. *Escape, capture, and levitation of matter in Eddington outbursts*, Stahl, A., Kluźniak, W., **Wielgus, M.**, Abramowicz, M., A&A 555, A114 (2013), arXiv:1306.6556,
7. *AFM nanomoiré technique with phase multiplication*, Patorski, K., **Wielgus, M.**, Ekielski, M., Kaźmierczak, P., Measurement Science and Technology 24, 035402 (2013),
6. *Adaptive enhancement of optical fringe patterns by selective reconstruction using FABEMD algorithm and Hilbert spiral transform*, Trusiak, M., Patorski, K., **Wielgus, M.**, Optics Express 20, 23463 (2012),
5. *Oscillations of the Eddington capture sphere*, **Wielgus, M.**, Stahl, A., Abramowicz, M., Kluźniak, W., A&A 545, A123 (2012), arXiv:1208.2939,
4. *Eddington capture sphere around luminous stars*, Stahl, A., **Wielgus, M.**, Abramowicz, M., Kluźniak, W., Yu, W., A&A 546, A54 (2012), arXiv:1208.2231,
3. *From porous to dense thin ZnO films through reactive DC sputter deposition onto Si (100) substrates*, Borysiewicz, M., Dynowska, E., Kolkovsky, V., Dyczewski, J., **Wielgus, M.**, Kamińska, E., Piotrowska, A., Physica Status Solidi A 209, 2463 (2012),
2. *Stability of radiation-pressure dominated disks. I. The dispersion relation for a delayed heating α -viscosity prescription*, Ciesielski, A., **Wielgus, M.**, Kluźniak, W., Sądowski, A., Abramowicz, M., Lasota, J.-P., Rebusco, P., A&A 538, A148 (2012), arXiv:1106.2335,
1. *Evaluation of amplitude encoded fringe patterns using the bidimensional empirical mode decomposition and the 2D Hilbert transform generalizations*, **Wielgus, M.**, Patorski K., Applied Optics 50, 5513 (2011)

Other publications

36. *The Black Hole Explorer: Motivation and Vision*, Johnson, M. et al., Proc. SPIE (2024), arXiv:2406.12917,
35. *Energy dissipation in astrophysical simulations: results of the Orszag-Tang test problem*, Kayanikhoo, F., Cemeljic, M., **Wielgus, M.**, Kluźniak, W., Proceedings of RAGtime (2024), arXiv:2312.06675,
34. *Fundamental Physics Opportunities with the Next-Generation Event Horizon Telescope*, Ayzenberg, D., et al. (2023), arXiv:2312.02130,

33. *The Event Horizon Explorer mission concept*, Kurczynski, P., Johnson, M., Doeleman, S., + 41 authors, Proc. SPIE 12180 (121800M), Space Telescopes and Instrumentation (2022),
32. *Od obserwacji Eddingtona do obrazu czarnej dziury (From Eddington's observation to the shadow of a black hole)*, **Wielgus, M.**, Delta, March 2020, link,
31. *First M87 Event Horizon Telescope Results and the Role of ALMA*, Goddi, C., Crew, G., Impellizzeri, V., + 42 authors, The Messenger 177, 25 (2019), arXiv:1910.10193,
30. *Studying black holes on horizon scales with space-VLBI*, Johnson, M., + 27 authors, Astro2020 white paper (2019), arXiv:1909.01405,
29. *Extremely long baseline interferometry with Origins Space Telescope*, Pesce, D., Haworth, K., Melnick, G., Blackburn, L., **Wielgus, M.**, + 6 authors, Astro2020 white paper, arXiv:1909.01408,
28. *Studying Black Holes on Horizon Scales with VLBI Ground Arrays*, Blackburn, L., + 37 authors, Astro2020 white paper, arXiv:1909.01411,
27. *Cień czarnej dziury (The shadow of a black hole)*, **Wielgus, M.**, Urania - Postępy Astronomii, 3/2019,
26. *Black Hole Physics on Horizon Scales* Doeleman, S., + 15 authors, Astro2020 white paper, BAAS, 51, 537 (2019),
25. *Global calibration of instrumental polarimetric phase gains*, Steel, S., **Wielgus, M.**, Blackburn, L., Issaoun, S., Johnson, M., EHT Memo Series, 2019-CE-03 (2019),
24. *EHT data set validation and characterization of errors*, **Wielgus, M.**, Blackburn, L., Issaoun, S., Janssen, M., Johnson, M., Koay, J.-Y., EHT Memo Series, 2019-CE-02 (2019),
23. *Flux Density Calibration of the EHT Array*, Janssen, M., Blackburn, L., Issaoun, S., Krichbaum, T., **Wielgus, M.**, EHT Memo Series, 2019-CE-01 (2019),
22. *The electromagnetic afterglows of gravitational waves as a test for Quantum Gravity*, Abramowicz, M., Bulik, T., Ellis, G. F. R., Meissner, K., **Wielgus, M.**, (2016), arXiv:1603.07830,
21. *Eddington capture sphere around luminous relativistic stars*, **Wielgus M.**, Proceedings IAU 312, 131, Beijing, China (2014),
20. *Stress-energy tensor of a radiating sphere inclosing black hole*, **Wielgus M.**, Abramowicz M., Proceedings of RAGtime 14-16, 293 (2014), arXiv:1501.01540,
19. *Evaluation of the implicit smoothing splines algorithm for the interferometric fringe pattern phase retrieval*, **Wielgus M.**, Patorski, K., Proc. SPIE 944112 (2014),
18. *Evaluation of optical parameters of quasi-parallel plates with single-frame interferogram analysis methods and eliminating the influence of camera parasitic fringes*, Sunderland, Z., Patorski, K., **Wielgus, M.**, Pokorski, K., Proc. SPIE 944111 (2014),
17. *Hilbert-Huang processing and analysis of complex fringe patterns*, Trusiak, M., Patorski, K., **Wielgus, M.**, Proc. SPIE 92030K-15 (2014),
16. *Fast adaptive processing of low quality fringe patterns by automated selective reconstruction and enhanced fast empirical mode decomposition*, Trusiak, M., Patorski, K., **Wielgus, M.**, Fringe 2013, 185, Stuttgart, Germany (2014),
15. *Filtering ESPI fringes with non-local means algorithm*, **Wielgus M.**, Patorski K., Fringe 2013, 317, Stuttgart, Germany (2014),
14. *Denoising and extracting background from fringe patterns using midpoint-based bidimensional empirical mode decomposition*, **Wielgus, M.**, Patorski, K., Proc. SPIE 90660K-9 (2013),
13. *Nanocrystalline thin films statistical structural analysis by the automatic image processing*, **Wielgus, M.**, Sunderland, Z., Koguciuk, D., Patorski, K., Słowik, G., Proc. SPIE 89234S-7 (2013),
12. *Enhanced measurements of displacements and strains in quasiperiodic nanostructures*, **Wielgus, M.**, + 4 authors, MRS Proceedings 1554, mrs13-1554-u04-07 (2013),
11. *Filtering fringe patterns with the extended non local means algorithm*, **Wielgus, M.**, Patorski, K., PHOTOPTICS 2013, Barcelona, Spain (2013),
10. *Sputter deposited ZnO porous films for sensing applications*, Borysiewicz, M., Dynowska, E., Kolkovsky, V., **Wielgus, M.**, + 6 authors, MRS Proceedings 1494, mrsf12-1494-z04-38 (2013),

9. *Comparative analysis of image fusion performance evaluation methods for the real-time environment monitoring system*, **Wielgus, M.**, Putz, B., Image Processing and Communications Challenges 4, Advances in Intelligent Systems and Computing 184, 119 (2012),
8. *Real-time Image Fusion Monitoring System: Problems and Solutions*, Putz, B., Bartyś, M., Antoniewicz, A., Klimaszewski, J., Kondej, M., **Wielgus, M.**, Image Processing and Communications Challenges 4, Advances in Intelligent Systems and Computing 184, 143 (2012),
7. *Continuous wavelet transform for d-space distribution analysis in nanocrystalline materials*, **Wielgus, M.**, Grochowski, J., Kamińska, E., Patorski, K., Proc. SPIE 84110A-6, (2012),
6. *Fast and Adaptive Bidimensional Empirical Mode Decomposition for the Real-time Video Fusion*, **Wielgus, M.**, Bartyś, M., Antoniewicz, A., Putz, B., Proc. IEEE 15th International Conference on Information Fusion, 649, Singapore (2012),
5. *Non-local fringe image filtration: a new interferometric data filtration paradigm?*, **Wielgus M.**, Patorski K., Photonics Letters of Poland, 4, 66 (2012),
4. *Multispectral phase shifting interferometry algorithm*, Wengierow, M., Sałbut, L., **Wielgus, M.**, Photonics Letters of Poland 4, 60 (2012),
3. *Amplitude demodulation of interferometric signals with a 2D Hilbert transform*, **Wielgus M.**, Challenges of modern technology 2, 8 (2011),
2. *Information retrieval from amplitude modulated fringe patterns using single frame processing methods*, Patorski, K., Pokorski, K. **Wielgus, M.**, Proc. SPIE 8338, 833802 (2011),
1. *Perona-Malik equation and its numerical properties*, **Wielgus, M.**, Bachelor thesis at the Faculty of Mathematics, Informatics and Mechanics, University of Warsaw (2010), arXiv:1412.6291