

Michał Bejger

Scientific areas

Data analysis and detection of gravitational waves, machine learning, dense matter equation of state, numerical simulations of relativistic compact objects, high-performance computing

Contact

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Languages (CERF scale)
English (C2), German (B2),
Italian (A2)

Bibliometry

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Citations: 101118
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[SAO/NASA ADS](#)

Education

2013	Habilitation "Astrophysical parameters of neutron stars as tests of the dense matter properties" (25.10.2013)	Nicolaus Copernicus Astronomical Center, PAS
2001–2005	PhD in physics (astrophysics) "Neutron stars dynamics and the equation of state of dense matter". Supervisor: Paweł Haensel (16.06.2005; with distinction from the NCAC Scientific Council).	Nicolaus Copernicus Astronomical Center, PAS
1996–2001	Master of Science	Warsaw University, Faculty of Physics

Positions

2021–present	Associate professor	Istituto Nazionale di Fisica Nucleare, Ferrara, Italy
2014–present	Associate professor	Nicolaus Copernicus Astronomical Center, PAS, Warsaw, Poland
2018–2019	Researcher	AstroParticule et Cosmologie (APC), CNRS, Paris, France
2008–2014	Assistant professor	Nicolaus Copernicus Astronomical Center, PAS, Warsaw, Poland
2007–2008	Post-doc	Nicolaus Copernicus Astronomical Center, PAS, Warsaw, Poland
2006–2007	Marie Curie Fellow post-doc	Observatoire de Paris, LUTH, Paris-Meudon, France

Fellowships and awards

10.10.2016	W. Rubinowicz Science Prize from Polish Physical Society for the discovery of gravitational waves
04.05.2016	Gruber Cosmology Prize, Gruber Prize foundation, for the discovery of gravitational waves
02.05.2016	Special Breakthrough Prize in fundamental physics for the authors of the first direct detection of gravitational waves
15.03.2016	Nicolaus Copernicus Medal of the Polish Academy of Sciences (for members of the Virgo-POLGRAW team)
09–11.2015	DAAD Research Stay for University Academics and Scientists (Steinbuch Centre for Computing, Karlsruhe Institute of Technology, Germany)
04.2008–03.2011	Marie Curie Re-integration Fellowship (NCAC, Warsaw, Poland)
03.2006–08.2007	Marie Curie Intra-European Fellowship (LUTH, Paris, France)

Invited talks

Peer review service

AAS & APS Journals (ApJ, ApJ, Phys. Rev. D, Phys. Rev. Lett.), MNRAS, A&A, EPJA, MLST, General Relativity and Gravitation, NWA

Institutional responsibilities

2014–2018: Proceedings of the Polish Astronomical Society editor

2009–2021: Member of the Scientific Council, NCAC

2008–2012: Institute Journal Club host, NCAC

- 29.10.2025 CoCoNuT meeting, Strasbourg, France, "Machine learning applications to gravitational wave data analysis"
- 21.02.2025 PAIP Warsaw 2025, "LIGO-Virgo-KAGRA gravitational-wave sources and observational results"
- 09.01.2025 TMEX Vietnam 2025, "LIGO-Virgo-KAGRA gravitational-wave sources and observational results"
- 16.09.2024 GEMMA2, Rome, Italy, "LIGO-Virgo-KAGRA gravitational-wave sources and observational results"
- 09.01.2023 TMEX Vietnam 2023, "Dense-matter equation of state from GW observations"
- 24.10.2022 From holography to machine learning, Helsinki Finland, "Machine learning methods in gravitational wave astrophysics"
- 05.10.2022 3rd Gravi-Gamma Workshop, Volterra Italy, "Continuous GWs from known and unknown sources: O3 observations and beyond"
- 23.11.2021 Cortona TNPI2021, "Unraveling the character of possible dense-matter state transition from neutron stars observations", Pisa Italy (online)
- 07.07.2021 Marcel Grossman MG16, "Search for gravitational waves from r-mode oscillations in PSR J0537-6910", on behalf of the LIGO-Virgo-KAGRA Collaboration and NICER Team, (online)

Leader roles in research grants

- 2021–present LIGO-Virgo-KAGRA Collaboration data analysis (Continuous Waves) working group co-chair
- 2021–present Einstein Telescope Observation Science Board division 9 coordinator
- 2024-2026 Local PI at NCAC in "Virgo-PL: Polish contribution to Virgo gravitational-wave observatory", Ministry of Science and Higher Education project (2023/WK/13 (anex 2024/WK/03))
- 2024-2028 Local PI at NCAC in "Science with Gravitational Waves in the Era of LIGO-Virgo-KAGRA Discoveries" OPUS project, funding NCN (2023/49/B/ST9/02777)
- 10.2023-02.2026 Local PI (INFN Ferrara) in "Model discovery in the complex parameter space of unmodeled gravitational waveform reconstructions", funding MUR, PRIN 2022275HT58
- 2022-2027 PI at NCAC in "Calm before the storm: rethinking the gravitational-wave analysis toolbox in the face of future challenges" OPUS project, funding NCN (2021/43/B/ST9/01714)
- 2018-2023 Management Committee Member and Work Group Leader in the COST Action "A network for Gravitational Waves, Geophysics and Machine Learning", funding: EU Horizon2020 (COST Action CA17137)
- 2018-2022 PI at NCAC in "Gravitational-wave astronomy: participation of the Polgraw group in Advanced Virgo and Advanced LIGO projects" HARMONIA project, funding: NCN (2017/26/M/ST9/00978)
- 2017-2022 PI in "Transient gravitational waves from neutron stars: models and data analysis" SONATA BIS project, funding: NCN (2016/22/E/ST9/00037)

10 recent selected publications

- "*Dynamical Tides in Neutron Stars with First-Order Phase Transitions: The Role of the Discontinuity Mode*", Pereira, Jonas P., Lucas Tonetto, Michał Bejger, J. Leszek Zdunik, and Paweł Haensel
Phys. Rev. Lett. 135.23, 231401 (Dec. 2025) p. 231401. 2025 (arXiv: [2504.16911](#) (astro-ph.HE))
- "*Microlensing of long-duration gravitational wave signals originating from Galactic sources*", Suyamprakasam, Sudhagar, Sreekanth Harikumar, Paweł Cieciel g, Przemysław Figura, Michał Bejger, and Marek Biesiada
Phys. Rev. D 112.12, 124019 (Dec. 2025) p. 124019. 2025 (arXiv: [2503.21845](#) (gr-qc))
- "*APRIL: Auxiliary Physically-Redundant Information in Loss - A physics-informed framework for parameter estimation with a gravitational-wave case study*", Scialpi, Matteo, Francesco Di Clemente, Leigh Smith, and Michał Bejger
arXiv e-prints, arXiv:2510.13677 (Oct. 2025) arXiv:2510.13677. 2025 (arXiv: [2510.13677](#) (gr-qc))
- "*Neural posterior estimation of neutron star equations of state*", Carvalho, Valéria, Márcio Ferreira, Michał Bejger, and Constança Providênci
Phys. Rev. D 112.8, 083044 (Oct. 2025) p. 083044. 2025 (arXiv: [2507.23506](#) (nucl-th))
- "*Approximating neutron-star radii using gravitational-wave only measurements with symbolic regression*", Bejger, M.
Phys. Rev. D 112.2, 023044 (July 2025) p. 023044. 2025 (arXiv: [2504.19962](#) (gr-qc))
- "*Explainable autoencoder for neutron star dense matter parameter estimation*", Di Clemente, Francesco, Matteo Scialpi, and Michał Bejger
Machine Learning: Science and Technology 6.2, 025044 (June 2025) p. 025044. 2025 (arXiv: [2501.15222](#) (physics.comp-ph))
- "*The Science of the Einstein Telescope*", Abac, Adrian et al.
arXiv e-prints, arXiv:2503.12263 (Mar. 2025) arXiv:2503.12263. 2025 (arXiv: [2503.12263](#) (gr-qc))
- "*Conditional variational autoencoder inference of neutron star equation of state from astrophysical observations*", Ferreira, Márcio and Michał Bejger
Phys. Rev. D 111.2, 023035 (Jan. 2025) p. 023035. 2025 (arXiv: [2403.14266](#) (nucl-th))
- "*Neural network time-series classifiers for gravitational-wave searches in single-detector periods*", Trovato, A., E. Chassande-Mottin, M. Bejger, R. Flmary, and N. Courty
Classical and Quantum Gravity 41.12, 125003 (June 2024) p. 125003. 2024 (arXiv: [2307.09268](#) (gr-qc))
- "*Detecting the third family of compact stars with normalizing flows*", Carvalho, Valéria, Márcio Ferreira, Constança Providênci, and Michał Bejger
Phys. Rev. D 109.10, 103032 (May 2024) p. 103032. 2024 (arXiv: [2403.09398](#) (nucl-th))

Teaching

Software projects

TDFstat

Data-analysis pipeline, implementing the network-of-detectors time-domain \mathcal{F} -statistic method search for almost monochromatic gravitational wave signals (github.com/Polgrav/TDFstat)

SageManifolds

Contribution to the free and open source computer algebra system *SageMath* (www.sagemath.org) with the implementation of the differential geometry and symbolic tensor calculus package *SageManifolds* (sagemanifolds.obspm.fr)

27.10.20–09.02.21	Gravitational waves , monograph lecture at Nicolaus Copernicus Center, winter semester 2020/21, Warsaw, Poland
8–22.07.17	4th Cosmology School: Introduction to cosmology lecturer, "Cosmology with Gravitational Waves", Kraków, Poland
17.07.17	Helmholtz International Summer School " Nuclear theory and astrophysical applications " lecturer, "Gravitational waves from neutron stars in the era of Advanced LIGO and Advanced Virgo detectors", Dubna, Russia
24–28.10.16	Fifth GraWIToN School (GW Initial Training Network) lecturer, "Computational aspects of continuous wave data analysis and its optimization", Rome, Italy
Spring 14	Monographic lecture for graduate students <i>tic Astrophysics and Related Computational Methods</i> (https://users.camk.edu.pl/bejger/lectures)
2015–	Supervision of theses: PhD - 6, master - 1, bachelor - 1

Popularization of science

2011–2023	Astronomy editor at the "Delta" monthly magazine, aimed at the high-school and pre-graduate students interested in mathematics, computer science, physics and astronomy (in Polish: journal author's website)
see also	Scientific outreach site for the list of texts and recordings
2015–2021	Polgrav-Virgo Collaboration outreach representative

Organization of scientific meetings

24–26.09.2020	Conference of the Polish Society on Relativity (Polskie Towarzystwo Relatywistyczne, SOC, 194 participants online)
2–5.09.2019	LIGO-Virgo Collaboration meeting, Warsaw, Poland (LOC, 250 participants)
26–28.03.2018	POLNS18, Warsaw, Poland (SOC & LOC, 57 participants)
27–31.03.2017	Annual NewCompStar Conference 2017, Warsaw, Poland (SOC & LOC, 150 participants)

Collaborations and memberships

2021–present	Member of the Einstein Telescope Observational Science Board
2011–present	Member of the Virgo gravitational-wave detector project and the LIGO-Virgo collaboration
2013–2017	Polish Einstein Telescope design & study team
2015–present	International Astronomical Union
2016–present	Polish Astronomical Society