Alessandro Peca | Scientific CV

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Current position

Eureka Scientific **New Haven, CT, USA**
Post Doctoral Researcher *May 2024 - Current*
Post-doctoral research position to work on supermassive black holes and their evolution.
Adivsor: Dr. M. Koss

Yale University, Department of Physics **New Haven, CT, USA**
Laboratory Associate *June 2024 - Current*
Post-doctoral research position to work on supermassive black holes and their evolution.
Sponsor: Prof. M. Urry

Education

Ph.D. in Physics **May 10th, 2024**
University of Miami, Department of Physics, Coral Gables, FL, USA *2019–2024*
Thesis: *Unveiling the Dark Side of the Universe: Harnessing the Power of Big Data to Reveal a Hidden and Heavily Obscured AGN Population;* Advisor: N. Cappelluti.

Visiting student
University of Maryland (UMD), College Park, MD, USA *08/2023*
Research activity on the effects of UV/optical dust extinction in active galactic nuclei survey detection, with the supervision of Professor R. Mushotzky.

Visiting student
Yale University, New Haven, CT, USA *08/2022*
Research activity on X-ray spectral analysis of active galactic nuclei in the Stripe82X field, with the supervision of Professor M. Urry.

Master's of Science
University of Miami, Coral Gables, FL, USA *2019-2021*
Physics Major; Award of Academic Merit., Advisor: N. Cappelluti.

Research fellowship
INAF-OAS, Bologna, Italy *01/2019 - 07/2019*
Winner of the public competition "Measurement of spectral properties in the X-ray band and photometric redshift of a sample of X-ray selected AGN in SDSS field J1030+0524". Research activity with the supervision of Doctor R. Gilli.

Master's of Astrophysics and Cosmology
Alma Mater Studiorum, Bologna, Italy *2015–2018*

Thesis: *Obscured AGN in the field of J1030: the X-ray and optical/infrared perspective*, *110/110 cum Laude; Supervisors: Professor C. Vignali, Doctor R. Gilli, Doctor M. Mignoli.*

Bachelor of Physics
Alma Mater Studiorum, Bologna, Italy *2010–2014*
Thesis: *Fundamentals and applications of plasmonics*, Supervisor: Professor L. Pasquini.

Professional Experience

Early Career Editorial Member
MDPI/Universe *2025 - present*

GO Panelist/Peer Reviewer
ALMA observatory *2025 - present*

GO Panelist/Peer Reviewer
NASA/NuSTAR observatory *2025 - present*

GO Panelist/Peer Reviewer
NASA/Swift observatory *2024 - present*

GO Panelist/Peer Reviewer
NASA/NICER observatory *2024 - present*

Reviewer/referee for A&A journals
Astronomy and Astrophysics *2023 - present*

Reviewer/referee for AAS journals
American Astronomical Society, The Astrophysical Journal. *2023 - present*

LSST AGN science team member
link: https://agn.science.lsst.org/ *2024 - present*

BASS survey team member
link: https://www.bass-survey.com/ *2024 - present*

AGN-DataBase team member
link: agndb.physics.miami.edu *2019 - present*

AHA (Accretion History of AGN) team member
link: https://project.ifa.hawaii.edu/aha/team/ *2019 - present*

J1030 team member
link: http://j1030-field.oas.inaf.it/team.html *2018 - present*

Graduate students representative
Department of Physics, University of Miami (UM), Coral Gables, FL, USA08/2023 - 05/2024

K-12 Teacher Volunteer
University of Florida (UF), Gainesville, FL, USA *2022 - 2024*
Scientist in Every Florida School Project

Teaching Assistant
Department of Physics, University of Miami (UM), Coral Gables, FL, USA *2019 - 2022*

Physics laboratory for undergraduate students.

Science communicator

SOFOS, Bologna, Italy *2017 - 2019*

Astronomical communication activities for schools (such as conferences, workshops, etc.); Guided visits and sky observations at the telescopes of the Bologna Astronomical Observatory in Loiano (BO).

Mentoring experience

Co-supervised summer students at the University of Miami and other institutions starting in summer 2021, providing guidance and mentorship in their research endeavors. In particular:

- Andrade, K., Northwestern University, Co-supervised with Meg Urry. The student will present the summer work *"A Spectroscopic Analysis of the Little Red Dots"* at the next 2026 American Astronomical Society Meeting.
- Schussheim, R., Yale University, main supervisor Meg Urry. The student presents the work *"Little Red Dots: The Search for AGN in $z > 7$ Galaxies Imaged with the JADES Survey"* at the 245th American Astronomical Society Meeting, Abstract ID 3360.
- Aspegren, O., Yale University, main supervisor Meg Urry. The student presented the work *"The Relative Sensitivity of eROSITA and Chandra or XMM to Heavily Obscured AGN"* at the 241st American Astronomical Society Meeting, Poster ID 301.11.
- Cook, C., University of Kansas, main supervisor Allison Kirkpatrick. The student presented the work *"The Relative Sensitivity of eROSITA and Chandra or XMM to Heavily Obscured AGN"* at the 237th American Astronomical Society Meeting, Poster ID 138.14.

Research Interests

I specialize in the study of Active Galactic Nuclei (AGN), with a focus on variability, multiband surveys, and obscuration processes in both local and high-redshift AGN. My research combines X-ray and multiband data to investigate obscuration processes, the physical drivers of AGN variability, and the co-evolution of AGN with their host galaxies. I also study optical and infrared emission line diagnostics, such as [Ne V], a strong tracer of AGN activity, to characterize these systems and their evolution across cosmic time. In addition, I work extensively with Big Data, applying AI and machine-learning techniques to AGN catalogs for population and evolution studies, with the broader goal of advancing our understanding of AGN physics and cosmic evolution. Beyond research, I am deeply committed to mentoring students and early-career researchers, fostering their growth in both astrophysics and data-driven science.

First Author Publications

08-2025 *"BASS. XLIX. Characterization of highly luminous and obscured AGNs: local X-ray and [NeV]λ3426 emission in comparison with the high-redshift Universe",* The Astrophysical Journal, **Peca**, Koss, Oh et al., DOI: 10.3847/1538-4357/adec9a.

07-2025 *"NuSTAR Detection of an Absorption Feature in ESP 39607: Evidence for an*

Ultrafast Inflow?", The Astrophysical Journal, **Peca**, Koss, Serafinelli et al., DOI: 10.3847/1538-4357/adea4a.

2025 *"The AGN-DataBase (AGN-DB): A Comprehensive Multi-Band Database Unifying the Properties of Active Galactic Nuclei",* The Astrophysical Journal, **Peca**, Cappelluti, Urry et al., in prep. (close to submission and already presented at AAS High Energy Astrophysics Division meeting #20, id. 100.31. Bulletin of the American Astronomical Society, Vol. 55, No. 4 e-id 2023n4i100p31)

07/2024 *"Stripe 82-XL: the ∼54.8 deg^2 and ∼18.8 Ms Chandra and XMM-Newton point source catalog and number of counts",* The Astrophysical Journal, **Peca**, Cappelluti, Urry et al., DOI: 10.3847/1538-4357/ad6df4.

11/2023 *"X-ray Redshift for obscured AGN with AXIS deep and intermediate surveys",* AXIS white paper, **Peca**, Cappelluti, Marchesi et al., DOI: 10.3390/universe10060245.

02/2023 *"On the cosmic evolution of AGN obscuration and the X-ray luminosity function: XMM-Newton and Chandra spectral analysis of the 31.3 deg2 Stripe 82X",* The Astrophysical Journal, **Peca**, Cappelluti, Urry et al., DOI: 10.3847/1538-4357/acac28.

01/2021 *"X-ray redshifts for obscured AGN: a study case in the J1030 deep field",* The Astrophysical Journal, **Peca**, Vignali, Gilli et al., DOI: 10.3847/1538-4357/abc9c7.

Co-Author Relevant Publications

08-2025 *"A big red dot at cosmic noon",* Astronomy & Astrophysics, Loiacono, Gilli, Mignoli, ..., **Peca** et al., Accepted, arXiv:2506.12141.

07-2025 *"Insights for Early Massive Black Hole Growth from JWST Detection of the [Ne V]λ3427 Emission Line",* The Astrophysical Journal,, Loiacono, Gilli, Mignoli, ..., **Peca** et al., Accepted, arXiv:2506.12141.

06/2025 *"Tracing High-z Galaxies in X-Rays with JWST and Chandra",* The Astrophysical Journal, Kaminsky, Cappelluti, Hasinger, ..., **Peca**, et al., DOI: 10.3847/1538-4357/adcede.

01/2025 *"BASS XLV: Quantifying AGN Selection Effects in the Chandra COSMOS-Legacy Survey with BASS",* The Astrophysical Journal, Tokayer, ..., **Peca**, et al., DOI: 10.48550/arXiv.2501.16708.

01/2025 *"Estimating Black Hole Masses in Obscured AGN from X-ray and Optical Emission Line Luminosities",* The Astrophysical Journal, LaMassa, ..., **Peca**, et al., DOI: 10.48550/arXiv.2501.14072

10/2024 *"Stripe 82X Data Release 3: Multiwavelength Catalog with New Spectroscopic Redshifts and Black Hole Masses ",* The Astrophysical Journal, LaMassa, **Peca**, Urry et al., DOI: 10.3847/1538-4357/ad6e7d.

08/2023 *"X-ray properties and obscured fraction of AGN in the J1030 Chandra field"*, Astronomy & Astrophysics, Signorini, Marchesi, Gilli,.., **Peca** et al., DOI: 10.1051/0004-6361/202346364.

12/2021 *"Redshift identification of X-ray-selected active galactic nuclei in the J1030 field: searching for large-scale structures and high-redshift sources"*, Astronomy & Astrophysics, Marchesi,.., **Peca** et al., DOI: 10.1051/0004-6361/202141416.

05/2020 *"The deep Chandra survey in the SDSS J1030+0524 field"*, Astronomy & Astrophysics, Nanni,.., **Peca** et al., DOI: 10.1051/0004-6361/202037914.

12/2019 *"Discovery of a galaxy overdensity around a powerful, heavily obscured FRII radio galaxy at z = 1.7: star formation promoted by large-scale AGN feedback?"*, Astronomy & Astrophysics, Gilli, Mignoli, **Peca** et al., DOI: 10.1051/0004-6361/201936121.

Accepted proposals

NuSTAR GO Large Program
Probing the structure of AGN tori with NuSTAR *05/2025*
Proposal ID 11223 NuSTAR Cycle 11, **PI:Alessandro Peca**, Approved Time: 750 ks.
Approved budget: $128,955

Palomar/NGPS
Tracing [NeV] Emission in Compton-thick AGN and Galaxy Mergers with BASS *04/2025*
Semester 2025B, **PI:Alessandro Peca**, Approved Time: 4 full nights.

XMM-Newton GO
Confirming a Potential Ultra-Fast Inflow with XMM-Newton *11/2024*
Proposal ID 096085 XMM-Newton AO24, **PI:Alessandro Peca**, Approved Time: 46 ks.
Approved budget: $50,000

Joint NuSTAR-XMM-Newton GO
Decoding Luminous, High-Redshift, and Obscured eROSITA AGN *04/2023*
Proposal ID 9160 NuSTAR cycle 9, **PI:Alessandro Peca**, Approved Time: 220 ks NuSTAR, 48 ks XMM-Newton.
Approved budget: $83,600

XMM-Newton GO
The unknown giant: a backyard beacon of large-scale structure formation *11/2022*
Proposal ID 092132 XMM-Newton AO22, PI: Quirino D'Amato, **CO-I:Alessandro Peca**, Approved time: 17 ks.

XMM-Newton GO
Decoding Luminous, High-Redshift, and Obscured eROSITA AGN *11/2022*
Proposal ID 092080 XMM-Newton AO22, **PI:Alessandro Peca**, Approved time: 112 ks.

Astrophysics Data Analysis Program (ADAP)
A multiwavelength study of AGN evolution from z=7 to z=0 *10/2022*
Proposal ID 22-ADAP22-0083, PI: Nico Cappeluti, **CO-I:Alessandro Peca**, Approved budget: $644,573

Chandra Archival
The Large STRIPE-82 X-Ray (S82XL) Survey *09/2021*
Proposal ID 23700328, Bibcode:2021cxo..prop.6191P, **PI:Alessandro Peca**, Approved budget: $85,000.

Talks and Conferences

Invited Talks

11/2025 *"Probing the structure of AGN tori with X-ray variability",* UMBRELA Dialogue, 18/11 Cambridge, Ma, USA.

11/2024 *"X-ray Redshifts for Obscured Active Galactic Nuclei with AXIS Deep and Intermediate Surveys",* AXIS seminar series, 10/30 Online seminar, USA.

03/2023 *"Estimating Obscured Chandra Source Catalog AGN Redshifts using the XZ Method and Machine Learning",* 20th HEAD Conference, 26-30/03 Waikoloa, HI, USA.

Contributed Talks

10/2025 *"X-ray and optical/UV insights into highly luminous, obscured, variable AGN: feedback, enhanced [NeV] emission missing in JWST X-ray weak sources, and a rare ultra-fast inflow from the BASS survey",* HEAS 22nd Conference, 12-16/10, St. Louis, MO, USA.

05/2025 *"The AXIS View of Highly Obscured AGN Across Cosmic Time",* AXIS Community Science Conference, 14-16/05, Annapolis, MD, USA.

02/2025 *"Compton-thick fraction evolution from local to high redshift (and maybe little red dots!)",* AXIS SWG seminar series, 03/02, Online.

04/2024 *"Unveiling the Dark Side of the Universe: Harnessing the Power of Big Data to Reveal a Hidden and Heavily Obscured AGN Population",* 21th HEAD Conference, 7-12/04 Horseshoe Bay, TX, USA.

01/2024 *"Unveiling the Dark Side of the Universe: Harnessing the Power of Big Data to Reveal a Hidden and Heavily Obscured AGN Population",* Dissertation talk, 243rd AAS Conference, 11/01 New Orleans, LA, USA.

12/2023 *"On the evolution of high luminosity and obscured AGN in the Stripe 82X field",* The HEAD Frontier Seminar Series, 08/12 Online.

11/2023 *"Harnessing the power of big data: using large surveys and multi-wavelength catalogs to unveil the obscured AGN Universe",* Seminar series in Europe: 26/11 National Observatory of Athens, Athens, Greece; 21/11 Tor Vergata University, Rome, Italy, 29/11 INAF - Osservatorio Astrofisico di Arcetri, Florence, Italy; 05/12 University of Bologna, Bologna, Italy.

11/2023 *"Harnessing the power of big data: using large surveys and multi-wavelength catalogs to unveil the obscured AGN Universe",* NASA-GSFC AGN Seminar, 09/11, NASA Goddard space flight center, Greenbelt, MD, USA.

11/2023 *"The 55 deg^2 release of the Stripe 82 X-Ray Large (S82XL) Survey: The Point Source Catalog",* High Energy Seminar at Center for Astrophysics | Harvard & Smithsonian, 01/11 Cambridge, MA, USA.

10/2023 *"Is the black hole accretion density tracing a missing heavily obscured AGN population?",* Galaxy lunch Seminar at Yale University, 11/10 New Haven, CT, USA.

06/2023 *"Uncovering the dark side of the universe: are we missing a hidden and heavily Compton-thick AGN population?",* The X-ray Universe 2023 Conference, 16/06 Athens, Greece.

01/2023 *"On the cosmic evolution of AGN obscuration and the X-ray luminosity function: XMM-Newton and Chandra spectral analysis of the 31.3 deg2 Stripe 82X",* 241st AAS Conference, 11/01 Seattle, WA, USA.

01/2021 *"Spectral analysis in S82X: XMM-Newton and Chandra",* Accretion History of AGN III Conference, 21/01 Online.

10/2019 *"Spectral analysis in S82X: Chandra data",* Accretion History of AGN II Conference, 18/10 Miami FL, USA.

06/2019 *"On the cosmic evolution of AGN obscuration and the X-ray luminosity function: XMM-Newton and Chandra spectral analysis of the 31.3 deg2 Stripe 82X",* Supermassive Black holes Environment & Evolution Conference, 21/06 Corfu, Greece.

Poster exhibitions

01/2025 *"A NuSTAR and XMM-Newton View of Highly Obscured, Luminous, and Variable AGN in the BASS survey",* 245th AAS meeting, 12-16/01 National Harbor, MD, USA.

03/2023 *"On the cosmic evolution of AGN obscuration and the X-ray luminosity function: XMM-Newton and Chandra spectral analysis of the 31.3 deg2 Stripe 82X",* 20th HEAD Conference, 26-30/03 Waikoloa, HI, USA.

03/2023 *"AGN-DB: A Spectro-Photometric and Morphological Database of AGN",* 20th HEAD Conference, 26-30/03 Waikoloa, HI, USA.

09/2019 *"X-ray redshifts for obscured AGN: a study case in the J1030 deep field",* X-ray Astronomy 19 Conference, 08-13/09 Bologna, Italy.

10/2018 *"Obscured AGN in the field of J1030",* AGN 13 Conference, 09-12/10, Milan, Italy.

Prizes

04/2023 Outstanding Graduate Research or Scholarship Award 2023-2024, University of Miami.

11/2023 Rodger Doxsey Travel Prize honorable mention for the AAS's 243rd meeting.

Press

- *"Asteroid Bennu may answer long sought questions, some South Florida researchers say"*, 09/25/2023 TV Interview for CBS News Miami, link: https://www.cbsnews.com/miami/news/asteroid-bennu-may-answer-long-sought-questions-some-south-florida-researchers-say/.
- *"The quasar that survives the banquet of the black hole"*, 09/2020 Press Release for Media INAF, link: https://www.media.inaf.it/2020/11/30/quasar-sopravvive-banchetto-buco-nero/.
- *"The astrophysics rookie's big discovery"*, 12/2019 Interview for University of Miami News, link: https://news.miami.edu/as/stories/2019/12/peca-black-hole-research.html.
- *"Black Hole Nurtures Baby Stars a Million Light Years Away"*, 09/2019 NASA Press Release, link: https://chandra.cfa.harvard.edu/press/19_releases/press_112619.html.

Skills

- Languages: English (fluent), Italian (mother tongue), Spanish (beginner)
- Programming: Python (advanced), SQL/ADQL (advanced), Perl (intermediate), Fortran (intermediate), R (intermediate), HTML (intermediate), C/C++ (intermediate).