

Alessandro Peca | Scientific CV

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Current position

Eureka Scientific

Post Doctoral Researcher

Post-doctoral research position to work on supermassive black holes and their evolution.

Advisor: Dr. M. Koss

New Haven, CT, USA

May 2024 - Current

Yale University, Department of Physics

Laboratory Associate

Research position to work on supermassive black holes and their evolution.

Sponsor: Prof. M. Urry

New Haven, CT, USA

June 2024 - Current

Education

Ph.D. in Physics

University of Miami, Department of Physics, Coral Gables, FL, USA

May 10th, 2024

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, USA 08/2023 - 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] λ 3426 emission in comparison with the high-redshift Universe"*, The Astrophysical Journal, **Peca**, Koss, Oh et al., DOI: 10.3847/1538-4357/ade9a.
- 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 deg² 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] λ 3427 Emission Line"*, The Astrophysical Journal, Trakhtenbrot, Ricci, Treister, ..., **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 deg² 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"*, Super-massive 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

- *"Origins of mental illness, fast gas for a black hole"*, 11/2025 Press Release on Yale News, link: <https://news.yale.edu/2025/09/09/origins-mental-illness-fast-gas-black-hole>.

- *"Asteroid Bennu may answer long sought questions, some South Florida researchers say"*, Sept 25th, 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).