Stanford



Steven Allen

Professor of Physics and of Particle Physics and Astrophysics

Bio

BIO

Steve Allen leads the X-ray Astronomy and Observational Cosmology (XOC) group (https://xoc.stanford.edu/) at Stanford, which has interests spanning the astrophysics of galaxies and galaxy clusters, studies of dark matter and dark energy, and the development of advanced detectors for future satellite missions.

ACADEMIC APPOINTMENTS

- Professor, Physics
- Professor, Particle Physics and Astrophysics

ADMINISTRATIVE APPOINTMENTS

- Department Head, LSST Science Department, SLAC National Accelerator Laboratory, (2014- present)
- Department Head, Department of Observational and Experimental Cosmology, SLAC National Accelerator Laboratory, (2005-2014)

HONORS AND AWARDS

- Sophie and Tycho Brahe Visiting Professorship, University of Copenhagen (2012)
- Bruno Rossi Prize, American Astronomical Society (2008)
- Royal Society University Research Fellowship, Royal Society (1999)
- Charles and Katherine Darwin Research Fellowship, Darwin College, Cambridge (1995)
- Postdoctoral Research Fellowship, UK Science and Engineering Research Council (1993)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, Lynx Science and Technology Definition Team (2016 - 2022)
- Member, American Physical Society (2018 - present)
- Member, Athena Wide Field Imager Consortium (2016 - present)
- Chair, LSST Steering Committee, SLAC (2014 - present)
- Member, Athena Science Study Team (2014 - present)
- Member, American Astronomical Society (AAS) (2006 - present)
- Member, Kavli Institute for Particle Astrophysics and Cosmology (2005 - present)
- Member, Institute of Physics (1993 - present)
- Member, Royal College of Science Association (1990 - present)

- DOE Point of Contact, LSST Dark Energy Science Collaboration (2015 - 2019)
- Co-chair, Clusters Working Group, LSST Dark Energy Science Collaboration (2012 - 2017)
- Member, High Energy Astrophysics Division Nomination Committee, NASA (2011 - 2012)
- Co-chair, Astro-H Cosmology Science Working Group (2010 - 2017)
- Member, Science Definition Team, International X-ray Observatory (2008 - 2011)
- Member, Chandra Users' Committee, Chandra X-ray Observatory (2008 - 2011)
- Chair, Constellation-X Large Scale Structure panel, NASA (2007 - 2008)
- Member, KIPAC Executive Committee (2006 - 2014)
- Associate, Dark Cosmology Center, Copenhagen (2005 - 2015)
- Member, Constellation-X Facility Science Team, NASA (2004 - 2008)
- Member, Constellation-X Galaxy Clusters Science panel, NASA (2004 - 2008)
- Member, Governing Body, Darwin College, Cambridge (1996 - 1999)

PROFESSIONAL EDUCATION

- B. Sc., Imperial College, University of London. , Physics (1990)
- Ph.D., University of Cambridge. , Astronomy (1995)

LINKS

- My research group: https://web.stanford.edu/group/xoc/

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Observational astrophysics and cosmology; galaxies, galaxy clusters, dark matter and dark energy; applications of statistical methods; X-ray astronomy; X-ray detector development; optical astronomy; mm-wave astronomy; radio astronomy; gravitational lensing.

Teaching

COURSES

2025-26

- Graduate Observational Astrophysics: PHYSICS 301 (Spr)
- Introduction to Observational Astrophysics: PHYSICS 100 (Spr)

2024-25

- Introduction to Observational Astrophysics: PHYSICS 100 (Spr)

2023-24

- Graduate Observational Astrophysics: PHYSICS 301 (Spr)
- Introduction to Observational Astrophysics: PHYSICS 100 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Marta Nowotka

Postdoctoral Faculty Sponsor

Sanskriti Das, Artem Poliszczuk

Doctoral Dissertation Advisor (AC)

Natascha Barac, Ningyue Fan, Abby Pan, Haley Stueber, Chloe Taylor

Doctoral (Program)

Mahiro Abe, Umang Agarwal, Ben Alexander, Christina Bell, Vincent Caudillo, Marco Cheng, Samuel Condon, Jason Corbin, Eli Gendreau-Distler, Yifan Hu, Jeffrey Kwan, Bo Liu, Yuka Nakato, Dominic Petruzzi, Bahrudin Trbalic, Liangyu Wu, Matthew Yao

Publications

PUBLICATIONS

- **Clusters Hiding under Millimeter Sources (CHUMS). I. Extreme CHUMS** *ASTROPHYSICAL JOURNAL*
  Saxena, H., Mantz, A. B., Sayers, J., Yudovich, D. G., Allen, S. W.
  2026; 1012 (1)
- **X-Ray Flaring and Variability in NGC 1275, the Heart of the Perseus Cluster** *ASTROPHYSICAL JOURNAL LETTERS*
  Ketchum, S., Miller, J. M., Allen, S. W., Byun, D., Hu, T., Mehdipour, M., Tananko, V., Xiang, X., Zhuravleva, I.
  2026; 1008 (1)
- **The Cluster Evolutionary Reference Ensemble at Low-z (CEREAL) Sample of Galaxy Clusters. I. X-Ray Morphological Properties and Demographics** *ASTROPHYSICAL JOURNAL*
  White, L., McDonald, M., Allen, S. W., Bautz, M. W., Calzadilla, M., Garmire, G. P., Hlavacek-Larrondo, J., Kraft, R., Mantz, A. B., Somboonpanyakul, T., Vikhlinin, A.
  2026; 1000 (2)
- **Ruminations Upon the Modeling of X-Ray Foregrounds, Backgrounds, and Faint Sources** *ASTROPHYSICAL JOURNAL*
  Mantz, A. B., Flores, A. M., Somboonpanyakul, T., Allen, S. W., Morris, R., Pan, A. Y., Stueber, H. R.
  2026; 1000 (2)
- **SPT-CL J0417-4748: A Deep Chandra Study of a Relaxed Galaxy Cluster without Central Star Formation** *ASTROPHYSICAL JOURNAL*
  Somboonpanyakul, T., Mantz, A. B., Allen, S. W., Flores, A. M., Morris, R., Stueber, H. R., Bleem, L. E., Floyd, B., Hlavacek-Larrondo, J., Kim, K. J.
  2026; 1000 (1)
- **Multiwavelength Characterization of a Dynamically Relaxed Cool Core Galaxy Cluster at z=1.5** *ASTROPHYSICAL JOURNAL*
  Flores, A. M., Mantz, A. B., Allen, S. W., Morris, R., Pan, A. Y., Somboonpanyakul, T., Stueber, H. R., McDonald, M.
  2026; 1000 (1)
- **Initial investigations of the outskirts of XLSSC 122** *MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY*
  Todd, E. B., Willis, J. P., Canning, R. E. A., Leste, O. K., Alfarsy, R., Allen, S. W., Brammer, G., Burchett, J. N., Mantz, A. B., Stanford, S. A.
  2026; 546 (3)
- **Deep X-Ray Observation of NGC 3221: Everything Everywhere All at Once** *ASTROPHYSICAL JOURNAL*
  Das, S., Mathur, S., Lehmer, B. D., Allen, S. W., Krongold, Y., Gupta, A.
  2026; 997 (2)
- **Deep Chandra Observations of the z=1.16 Relaxed, Cool-core Galaxy Cluster SPT-CL J2215-3537** *ASTROPHYSICAL JOURNAL*
  Stueber, H. R., Mantz, A. B., Allen, S. W., Flores, A. M., Morris, R., Pan, A. Y., Somboonpanyakul, T., Bleem, L. E., Calzadilla, M., Floyd, B., Hlavacek-Larrondo, J., Mcdonald, M., Sarkar, et al
  2026; 997 (2)
- **Active galactic nuclei with massive black holes have closer galactic neighbors k-nearest-neighbor statistics of an unbiased sample at z # 0.03** *ASTRONOMY & ASTROPHYSICS*
  Mhatre, A., Powell, M. C., Yuan, S., Allen, S. W., Caglar, T., Koss, M., del Moral-Castro, I., Oh, K., Peca, A., Ricci, C., Ricci, F., Rojas, A., Signorini, et al
  2025; 701
- **Cold Gas and Star Formation in the Phoenix Cluster with JWST** *ASTROPHYSICAL JOURNAL*
  Reefe, M., Mcdonald, M., Chatzikos, M., Seebeck, J., Mushotzky, R., Veilleux, S., Allen, S. W., Bayliss, M., Calzadilla, M., Canning, R., Donahue, M., Floyd, B., Gaspari, et al

2025; 989 (2)

- **Variable X-Ray Reverberation in the Rapidly Accreting Active Galactic Nucleus Ark 564: The Response of the Soft Excess to the Changing Geometry of the Inner Accretion Flow** *ASTROPHYSICAL JOURNAL*
  Yu, Z., Wilkins, D., Allen, S. W.
  2025; 989 (2)
- **The QPO in RE J1034+396 Originates in the Hot Corona** *ASTROPHYSICAL JOURNAL*
  Taylor, C. S., Wilkins, D. R., Allen, S. W.
  2025; 987 (2)
- **Hubble Space Telescope Observations within the Sphere of Influence of the Powerful Supermassive Black Hole in PKS 0745-191** *ASTROPHYSICAL JOURNAL*
  Hlavacek-Larrondo, J., Choi, H., Guo, M., Richard-Laferriere, A., Rhea, C., Prunier, M., Russell, H., Fabian, A., Walsh, J. L., Gingras, M., Mcnamara, B., Allen, S., Chene, et al
  2025; 980 (2)
- **Directly imaging the cooling flow in the Phoenix cluster.** *Nature*
  Reefe, M., McDonald, M., Chatzikos, M., Seebeck, J., Mushotzky, R., Veilleux, S., Allen, S. W., Bayliss, M., Calzadilla, M., Canning, R., Floyd, B., Gaspari, M., Hlavacek-Larrondo, et al
  2025
- **An Exceptionally Powerful, Radiatively Driven Ultrafast Outflow in the Rapidly Accreting AGN RE J1034+396** *ASTROPHYSICAL JOURNAL*
  Taylor, C. S., Wilkins, D. R., Allen, S. W.
  2025; 979 (2)
- **Using the XMM-Newton small window mode to investigate systematic uncertainties in the particle background of X-ray charge-coupled device detectors** *JOURNAL OF ASTRONOMICAL TELESCOPES INSTRUMENTS AND SYSTEMS*
  Schellenberger, G., Kraft, R., Nulsen, P., Miller, E. D., Bautz, M. W., Grant, C. E., Wilkins, D., Allen, S., Molendi, S., Burrows, D. N., Falcone, A. D., Fioretti, V., Foster, et al
  2025; 11 (1)
- **DESI 2024: reconstructing dark energy using crossing statistics with DESI DR1 BAO data** *JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS*
  Calderon, R., Lodha, K., Shafieloo, A., Linder, E., Sohn, W., de Mattia, A., Cervantes-Cota, J. L., Crittenden, R., Davis, T. M., Ishak, M., Kim, A. G., Matthewson, W., Niz, et al
  2024
- **Searching for the Highest-z Dual Active Galactic Nuclei in the Deepest Chandra Surveys** *ASTROPHYSICAL JOURNAL*
  Sandoval, B., Foord, A., Allen, S. W., Volonteri, M., Chen, N., Di Matteo, T., Stemo, A., Gultekin, K., Habouzit, M., Puerto-Sanchez, C., Hodges-Kluck, E., Dubois, Y.
  2024; 974 (1)
- **Advancing Precision Particle Background Estimation for Future X-Ray Missions: Correlated Variability between the Alpha Magnetic Spectrometer and Chandra/XMM-Newton** *ASTROPHYSICAL JOURNAL*
  Sarkar, A., Grant, C. E., Miller, E. D., Bautz, M., Schneider, B., Foster, R. F., Schellenberger, G., Allen, S., Kraft, R. P., Wilkins, D., Falcone, A., Ptak, A.
  2024; 970 (1)
- **The Evolution of Galaxies and Clusters at High Spatial Resolution with Advanced X-ray Imaging Satellite (AXIS)** *UNIVERSE*
  Russell, H. R., Lopez, L. A., Allen, S. W., Chartas, G., Choudhury, P., Dupke, R. A., Fabian, A. C., Flores, A. M., Garofali, K., Hodges-Kluck, E., Koss, M. J., Lanz, L., Lehmer, et al
  2024; 10 (7)
- **A Generative Model for Realistic Galaxy Cluster X-Ray Morphologies** *ASTROPHYSICAL JOURNAL*
  Benyas, M., Pfeifer, J., Mantz, A. B., Allen, S. W., Darragh-Ford, E.
  2024; 969 (1)
- **Optical Photometric Indicators of Galaxy Cluster Relaxation** *ASTROPHYSICAL JOURNAL*
  Casas, M. C., Putnam, K., Mantz, A. B., Allen, S. W., Somboonpanyakul, T.
  2024; 967 (1)

- **Demonstrating repetitive non-destructive readout with SiSeRO devices** *JOURNAL OF ASTRONOMICAL TELESCOPES INSTRUMENTS AND SYSTEMS*

  Chattopadhyay, T., Herrmann, S., Orel, P., Donlon, K., Prigozhin, G., Morris, G., Cooper, M., LaMarr, B., Malonis, A., Allen, S. W., Bautz, M. W., Leitz, C.

  2024; 10 (1)

- **X-ray speed reading with the MCRC: prototype success and next generation upgrades**

  Orel, P., Pan, A. Y., Herrmann, S. C., Chattopadhyay, T., Morris, G. R., Stueber, H., Allen, S. W., Wilkins, D. R., Prigozhin, G. Y., LaMarr, B. J., Foster, R. F., Malonis, A. C., Bautz, et al

  edited by Holland, A. D., Minoglou, K.

  SPIE-INT SOC OPTICAL ENGINEERING.2024

- **Continued developments in X-ray speed reading: fast, low noise readout for next-generation wide-field imagers**

  Herrmann, S. C., Orel, P., Chattopadhyay, T., Morris, G. R., Prigozhin, G. Y., Stueber, H. R., Allen, S. W., Bautz, M. W., Donlon, K., LaMarr, B. J., Leitz, C. W., Miller, E. D., Pan, et al

  edited by Holland, A. D., Minoglou, K.

  SPIE-INT SOC OPTICAL ENGINEERING.2024

- **Demonstrating sub-electron noise performance in Single electron Sensitive Readout (SiSeRO) devices**

  Chattopadhyay, T., Herrmann, S., Orel, P., Donlon, K., Allen, S. W., Bautz, M. W., Cantrall, B., Cooper, M., LaMarr, B., Leitz, C., Miller, E., Morris, R., Pan, et al

  edited by Holland, A. D., Minoglou, K.

  SPIE-INT SOC OPTICAL ENGINEERING.2024

- **The XOC X-ray Beamline: Probing Colder, Quieter, and Softer**

  Stueber, H. R., Chattopadhyay, T., Herrmann, S. C., Orel, P., Gebre, T., Joshi, A., Allen, S. W., Morris, G. R., Poliszczuk, A.

  edited by Holland, A. D., Minoglou, K.

  SPIE-INT SOC OPTICAL ENGINEERING.2024

- **The VERITAS 2.3 readout ASIC for the ATHENA Wide Field Imager**

  Schweingruber, A., Herrmann, S., Orel, P., Dakshinamurthy, A., Mayra, A., Miiller-Seidlitz, J., Reiffers, J., Albrecht, S., Schnetler, H., Allen, S. W., Morris, G.

  edited by DenHerder, J. W., Nikzad, S., Nakazawa, K.

  SPIE-INT SOC OPTICAL ENGINEERING.2024

- **Towards efficient machine-learning-based reduction of the cosmic-ray induced background in X-ray imaging detectors: increasing context awareness**

  Poliszczuk, A., Wilkins, D., Allen, S. W., Miller, E. D., Chattopadhyay, T., Schneider, B., Darve, J., Bautz, M., Falcone, A., Foster, R., Grant, C. E., Herrmann, S., Kraft, et al

  edited by DenHerder, J. W., Nikzad, S., Nakazawa, K.

  SPIE-INT SOC OPTICAL ENGINEERING.2024

- **Fast, low-noise image sensor technology for strategic X-ray astrophysics missions**

  Bautz, M. W., Miller, E. D., Prigozhin, G. Y., LaMarr, B. J., Malonis, A., Foster, R., Grant, C. E., Schneider, B., Leitz, C., Donlon, K., Prigozhin, I., Lambert, R., Cooper, et al

  edited by DenHerder, J. W., Nikzad, S., Nakazawa, K.

  SPIE-INT SOC OPTICAL ENGINEERING.2024

- **Overview of the Advanced X-ray Imaging Satellite (AXIS)**

  Reynolds, C. S., Miller, E. D., Hodges-Kluck, E., Koss, M. J., Williams, B. J., Kara, E. A., Ptak, A., Mushotzky, R. F., Allen, S. W., Bauer, F. E., Bautz, M., Bodaghee, A., Burdge, et al

  edited by DenHerder, J. W., Nikzad, S., Nakazawa, K.

  SPIE-INT SOC OPTICAL ENGINEERING.2024

- **Improved noise performance from the next-generation buried-channel p-MOSFET SiSeROs** *JOURNAL OF ASTRONOMICAL TELESCOPES INSTRUMENTS AND SYSTEMS*

  Chattopadhyay, T., Herrmann, S., Kaplan, M., Orel, P., Donlon, K., Prigozhin, G., Morris, G., Cooper, M., Malonis, A., Allen, S. W., Bautz, M. W., Leitz, C.

  2023; 9 (2)

- **SPT-CL J2215-3537: A Massive Starburst at the Center of the Most Distant Relaxed Galaxy Cluster** *ASTROPHYSICAL JOURNAL*
  Calzadilla, M. E., Bleem, L., McDonald, M. D., Gladders, M. B., Mantz, A. W., Allen, S. B., Bayliss, M., Eilers, A., Floyd, B., Hlavacek-Larrondo, J., Khullar, G. J., Kim, K., Mahler, et al
  2023; 947 (2)

- **The Concentration-Mass relation of massive, dynamically relaxed galaxy clusters: agreement between observations and ?CDM simulations** *MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY*
  Darragh-Ford, E., Mantz, A. B., Rasia, E., Allen, S. W., Morris, R., Foster, J., Schmidt, R. W., Wenrich, G.
  2023; 521 (1): 790-799

- **The Evolution and Mass Dependence of Galaxy Cluster Pressure Profiles at 0.05 <= z <= 0.60 and 4 x 10(14) M (circle dot) <= M (500) <= 30 x 10(14) M (circle dot)** *ASTROPHYSICAL JOURNAL*
  Sayers, J., Mantz, A. B., Rasia, E., Allen, S. W., Cui, W., Golwala, S. R., Morris, R., Wan, J. T.
  2023; 944 (2)

- **Chandra measurements of gas homogeneity and turbulence a intermediate radii in the Perseus Cluster** *MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY*
  de Vries, M., Mantz, A. B., Allen, S. W., Morris, R., Zhuravleva, I., Canning, R. E. A., Ehlert, S. R., Ogorzalek, A., Simionescu, A., Werner, N.
  2023; 518 (2): 2954-2970

- **Reduction of cosmic-ray induced background in astronomical X-ray imaging detectors via image segmentation methods**
  Poliszczuk, A., Wilkins, D., Allen, S. W., Miller, E., Chattopadhyay, T., Bautz, M., Darve, J., Foster, R., Grant, C. E., Herrmann, S., Kraft, R., Morris, R., Orel, et al
  edited by Zelinski, M. E., Taha, T. M., Narayanan, B. N.
  SPIE-INT SOC OPTICAL ENGINEERING.2023

- **BASS. XXXVI. Constraining the Local Supermassive Black Hole-Halo Connection with BASS DR2 AGNs** *ASTROPHYSICAL JOURNAL*
  Powell, M. C., Allen, S. W., Caglar, T., Cappelluti, N., Harrison, F., Irving, B. E., Koss, M. J., Mantz, A. B., Oh, K., Ricci, C., Shaper, R. J., Stern, D., Trakhtenbrot, et al
  2022; 938 (1)

- **A deep, multi-epoch Chandra HETG study of the ionized outflow from NGC 4051** *MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY*
  Ogorzalek, A., King, A. L., Allen, S. W., Raymond, J. C., Wilkins, D. R.
  2022; 516 (4): 5027-5051

- **X-ray morphology of cluster-mass haloes in self-interacting dark matter** *MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY*
  Shen, X., Brinckmann, T., Rapetti, D., Vogelsberger, M., Mantz, A., Zavala, J., Allen, S. W.
  2022; 516 (1): 1302-1319

- **CMB-S4: Forecasting Constraints on Primordial Gravitational Waves** *ASTROPHYSICAL JOURNAL*
  Abazajian, K., Addison, G. E., Adshead, P., Ahmed, Z., Akerib, D., Ali, A., Allen, S. W., Alonso, D., Alvarez, M., Amin, M. A., Anderson, A., Arnold, K. S., Ashton, et al
  2022; 926 (1)

- **Cosmological constraints from gas mass fractions of massive, relaxed galaxy clusters** *MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY*
  Mantz, A. B., Morris, R., Allen, S. W., Canning, R. E. A., Baumont, L., Benson, B., Bleem, L. E., Ehlert, S. R., Floyd, B., Herbonnet, R., Kelly, P. L., Liang, S., von Der Linden, et al
  2022; 510 (1): 131-145

- **Very Large Array Radio Study of a Sample of Nearby X-Ray and Optically Bright Early-type Galaxies** *ASTROPHYSICAL JOURNAL SUPPLEMENT SERIES*
  Grossova, R., Werner, N., Massaro, F., Lakhchaura, K., Plsek, T., Gabanyi, K., Rajpurohit, K., Canning, R. E. A., Nulsen, P., O'Sullivan, E., Allen, S. W., Fabian, A.
  2022; 258 (2)

- **Towards precision particle background estimation for future X-ray missions: correlated variability between Chandra ACIS and AMS**
  Grant, C. E., Miller, E. D., Bautz, M. W., Foster, R., Kraft, R. P., Allen, S., Burrows, D. N.
  edited by DenHerder, J. W., Nikzad, S., Nakazawa, K.
  SPIE-INT SOC OPTICAL ENGINEERING.2022

- **Development and characterization of a fast and low noise readout for the next generation x-ray charge-coupled devices** *Journal of Astronomical Telescopes, Instruments, and Systems*
  Chattopadhyay, T., et al
  2022; 8 (2): 12

- **First results on SiSeRO devices: a new x-ray detector for scientific instrumentation** *Journal of Astronomical Telescopes, Instruments, and Systems*
  Chattopadhyay, T., et al
  2022; 8 (2): 12

- **Single electron Sensitive Readout (SiSeRO) X-ray detectors: Technological progress and characterization**
  Chattopadhyay, T., Herrmann, S., Orel, P., Morris, R. G., Wilkins, D. R., Allen, S. W., Prigozhin, G., LaMarr, B., Malonis, A., Foster, R., Bautz, M. W., Donlon, K., Cooper, et al
  edited by Holland, A. D., Beletic, J.
  SPIE-INT SOC OPTICAL ENGINEERING.2022

- **X-ray speed reading with the MCRC: a low noise CCD readout ASIC enabling readout speeds of 5 Mpixel/s/channel**
  Orel, P., Herrmann, S., Chattopadhyay, T., Morris, G., Allen, S. W., Prigozhin, G. Y., Foster, R., Malonis, A., Bautz, M. W., Cooper, M. J., Donlon, K.
  edited by Holland, A. D., Beletic, J.
  SPIE-INT SOC OPTICAL ENGINEERING.2022

- **Mitigating the effects of particle background on the Athena Wide Field Imager** *JOURNAL OF ASTRONOMICAL TELESCOPES INSTRUMENTS AND SYSTEMS*
  Miller, E. D., Grant, C. E., Bautz, M. W., Molendi, S., Kraft, R., Nulsen, P., Bulbul, E., Allen, S., Burrows, D. N., Eraerds, T., Fioretti, V., Gastaldello, F., Hall, et al
  2022; 8 (1)

- **Mitigating the effects of particle background on the Athena Wide Field Imager** *JOURNAL OF ASTRONOMICAL TELESCOPES INSTRUMENTS AND SYSTEMS*
  Miller, E. D., Grant, C. E., Bautz, M. W., Molendi, S., Kraft, R., Nulsen, P., Bulbul, E., Allen, S., Burrows, D. N., Eraerds, T., Fioretti, V., Gastaldello, F., Hall, et al
  2022; 8 (1)

- **The history of metal enrichment traced by X-ray observations of high-redshift galaxy clusters** *MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY*
  Flores, A. M., Mantz, A. B., Allen, S. W., Morris, R., Canning, R. E. A., Bleem, L. E., Calzadilla, M. S., Floyd, B. T., McDonald, M., Ruppin, F.
  2021; 507 (4): 5195-5204

- **Quiescent galaxies in a virialized cluster at redshift 2: evidence for accelerated size growth** *MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY*
  Noordeh, E., Canning, R. A., Willis, J. P., Allen, S. W., Mantz, A., Stanford, S. A., Brammer, G.
  2021; 507 (4): 5272-5280

- **Stability of Cool Cores during Galaxy Cluster Growth: A Joint Chandra/SPT Analysis of 67 Galaxy Clusters along a Common Evolutionary Track Spanning 9 Gyr** *ASTROPHYSICAL JOURNAL*
  Ruppin, F., McDonald, M., Bleem, L. E., Allen, S. W., Benson, B. A., Calzadilla, M., Khullar, G., Floyd, B.
  2021; 918 (2)

- **A shock near the virial radius of the Perseus Cluster** *ASTRONOMY & ASTROPHYSICS*
  Zhu, Z., Simionescu, A., Akamatsu, H., Zhang, X., Kaastra, J. S., de Plaa, J., Urban, O., Allen, S. W., Werner, N.
  2021; 652

- **Spectroscopic quantification of projection effects in the SDSS redMaPPer galaxy cluster catalogue** *MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY*
  Myles, J., Gruen, D., Mantz, A. B., Allen, S. W., Morris, R. G., Rykoff, E., Costanzi, M., To, C., DeRose, J., Wechsler, R. H., Rozo, E., Jeltema, T., Carrasco, et al
  2021; 505 (1): 33-44

- **Measuring H-0 using X-ray and SZ effect observations of dynamically relaxed galaxy clusters** *MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY*
  Wan, J. T., Mantz, A. B., Sayers, J., Allen, S. W., Morris, R., Golwala, S. R.

2021; 504 (1): 1062-1076

- **Reducing the Athena WFI charged particle background: Results from Geant4 simulations**
  Grant, C. E., Miller, E. D., Bautz, M. W., Eraerds, T., Molendi, S., Keelan, J., Hall, D., Holland, A. D., Kraft, R., Bulbul, E., Nulsen, P., Allen, S.
  edited by DenHerder, J. W., Nikzad, S., Nakazawa, K.
  SPIE-INT SOC OPTICAL ENGINEERING.2021

- **Identifying charged particle background events in X-ray imaging detectors with novel machine learning algorithms**
  Wilkins, D. R., Allen, S. W., Miller, E. D., Bautz, M., Chattopadhyay, T., Fort, S., Grant, C. E., Herrmann, S., Kraft, R., Morris, R. G., Nulsen, P.
  edited by DenHerder, J. W., Nikzad, S., Nakazawa, K.
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- **Progress toward fast, low-noise, low-power digital CCDs for Lynx and other high-energy astrophysics missions**
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