

# Cristian Saez

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## EDUCATION

Aug 2010      Ph.D., Astronomy and Astrophysics, Penn State University.  
Jul 2002      B.S., Astronomy and Astrophysics, Universidad de Chile.  
Dec 1997      B.S., Geophysics, Universidad de Chile.

## RESEARCH AND WORK EXPERIENCE

2020-Now      Research Associate at Universidad de Chile.  
2018-2020      Lecturer at Universidad de los Andes.  
2016-2017      Postdoctoral scholar at KASI institute.  
2014-2016      Postdoctoral fellow at University of Maryland.  
2012-2014      Postdoctoral fellow at Universidad Católica de Chile.  
2010-2012      Postdoctoral scholar at Penn State.  
2005-2010      Research Assistant at Penn State. Advisor: George Chartas.  
Summer 2004      Research Assistant at Penn State. Advisor: Pablo Laguna.  
2002-2003      Research Assistant at Univ. de Chile. Advisor: Luis Campusano.  
Summer 2002      REU in Astrophysics at Institut d'Astrophysique de Paris. Advisor: Bernard Fort.  
1997-1998      Research in Geophysics at Servicio Nacional de Geología y Minería (Chile).

## AWARDS-PROPOSALS

2014      Constraining the Wind-Shield Scenario of PG 2112+059 (Chandra Cycle 16).  
2014      Constraining the Wind-Shield Scenario of PG 2112+059 (HST Cycle 22).  
2013      Becas Chile “Chilean government fellowship, for two years of independent research at UMD”.  
2013      Multi-Sightline Spectroscopy Of Outflowing Winds In Quasar SDSS J1029+2623 (UVES-VLT).  
2011      Fondecyt-Conicyt Postdoctoral fellowship.  
2009      US National Science Foundation supplemental funds to attend “Cosmology at the Beach”.  
2009      An Archival Study of the X-Ray Spectral Evolution of AGNs (Chandra Cycle 11; CoPI).  
2007-2009      Zaccheus Daniel Supplemental Scholarship, Penn State.  
2002      Ecos-Sud Supplemental funds to visit Institut d'Astrophysique de Paris.

## TEACHING AND MENTORING

2019-2020 Primary Advisor for Graduate Student Research: Victor Navarro, Univ. de Chile.  
2018-2019 Lecturer for various undergraduate engineering courses at Univ. de los Andes.  
2017-2018 Substitute lecturer for “Cosmology introduction” at Univ. de Chile.  
2003-2005 Teaching assistant for Astro011 “Elementary Astronomy Laboratory” at Penn State.  
2002-2003 Teaching assistant for “Extragalactic Astronomy” at Univ. de Chile.

## PROFESSIONAL SERVICES AND OUTREACH

2011-Present Referee for MNRAS.  
2003-2011 Regular participant in Penn State Outreach activities (Astrofest and Open Houses).

## SOFTWARE SKILLS

Programming: C, C++, IDL, Python, MATLAB, FORTRAN, BASIC, Mathematica, Tcl/Tk, Perl, Korn Shell.  
Operating Systems: UNIX, Linux, Mac OS X, DOS, and MS Windows.  
Software Packages: XSPEC, Cloudy, VLT VIMOS MOS and UVES pipeline, Chandra Interactive Analysis of Observations (CIAO software), IRAF, Astronomical Image Processing System (AIPS), XMM-Newton Science Analysis Software (SAS), HEASoft tools.

## MEMBERSHIPS

2012-2020 Science team member of NuSTAR.  
2015-2017 Science team member of MASK<sup>a</sup> at KASI.  
2008-2015 American Astronomical Society (AAS).  
2007-2011 Institute for gravitation and the cosmos (Penn State).

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<sup>a</sup>Multi-frequency AGN Survey with Korean VLBI Network (KVN)

## RESEARCH TALKS

1. Seminar, Universidad de Chile, “Two totally unrelated gravitational lensing studies”, Santiago, Chile, Nov. 17, 2016.
2. Seminar, Universidad de Valparaiso, “Two totally unrelated gravitational lensing studies”, Valparaiso, Chile, Nov. 15, 2016.
3. Colloquium, KASI, “Multiwavelength studies of quasar winds”, Daejeon, Republic of Korea, May. 18, 2016.
4. Contributed talk, Korean Astronomy Society (KAS) Spring Meeting, “Constraining the shielded wind scenario in PG 2112+059”, Busan, Republic of Korea, Apr. 15, 2016.
5. Seminar, Universidad de Chile, “Strong Lensing in the Inner Haloes of Galaxy Clusters”, Santiago, Chile, Aug. 18, 2015.
6. Contributed talk, The Extremes of Black Hole Accretion, “Constraining The Wind-Shield Scenario Of PG 2112+059”, Madrid, Spain, Jun. 10, 2015.

7. Seminar, Universidad Concepción, “Lurking the SSA22 Field with Multi-Slit Spectroscopy”, Concepción, Chile, Jan. 7, 2015.
8. Seminar, Universidad Católica, “Studying the SSA22 Field with Multi-Slit Spectroscopy”, Santiago, Chile, Dec. 12, 2014.
9. Contributed talk, Anillo meeting, “Observing BAL quasars with NuSTAR”, Santa Cruz, Chile, Nov. 15, 2013.
10. Contributed talk, SOCHIAS meeting, “In the hunt of quasar winds X-ray signatures”, Valparaíso, Chile, Oct. 11, 2012.
11. Theory lunch seminar, University of Maryland, “In the hunt of quasar winds X-ray signatures”, College Park, MD, Jun. 25, 2012.
12. Oral Session presentation, AAS 220th 2012, “The Long-term X-ray Variability Of Broad Absorption Line Quasars”, Anchorage, AK, June 12, 2012.
13. Contributed talk, The X-ray Universe 2011, “The X-ray properties of typical high-redshift radio-loud quasars”, Berlin, Germany, Jun. 30, 2011.
14. Lunch talk, Swift MOC “The X-ray properties of typical high-redshift radio-loud quasars”, State College, PA, Jun. 20, 2011.
15. Dissertation talk, 215th AAS meeting, “Evolution of Inflows and Outflows in AGNs”, Washington, DC, Jan. 6, 2010.
16. Lunch seminar, Space Telescope Institute, “Inflows and outflows in AGNs”, Baltimore, MD, Jul. 17, 2009.
17. Seminar, Universidad de Chile, “Inflows and outflows in AGNs”, Santiago, Chile, Jul. 3, 2009.
18. Lunch Talk, Penn State Univ, “Suzaku Observations of Outflows in APM 08279+5255”, State College, PA, Apr. 14, 2009.
19. Lunch Talk, Penn State Univ, “A Study of AGN X-ray Spectral Evolution”, State College, PA, Apr. 3, 2007.

## CONFERENCE POSTERS

1. **Saez, C.**, Campusano, L. E., Cypriano, E. S., Sodr  L., & Kneib, J. P. “Strong Lensing In The Inner Halo Of Galaxy Clusters”. The 6th Subaru International Conference, Hiroshima, Japan 2016.
2. **Saez, C.**, Campusano, L. E., Cypriano, E. S., Sodr  L., & Kneib, J. P. “Strong Lensing In The Inner Halo Of Galaxy Clusters”. The 7th KIAS Workshop on Cosmology and structure formation, Seoul, Korea 2016.
3. **Saez, C.**, Brandt, W. N., Bauer, F. E. , Misawa, T., Hamann, F., Chartas, G., & Gallagher, S. C. “Constraining the shielded wind scenario in PG 2112+059”. East-Asia Meeting on Astronomy (EAMA), Seoul, Korea 2016.
4. **Saez, C.**, Brandt, W. N., Bauer, F. E. , Misawa, T., Hamann, F., Chartas, G., & Gallagher, S. C. “Constraining the shielded wind scenario in PG 2112+059”. East Asia AGN meeting, Seoul, Korea 2016.

5. **Saez, C.**, Lehmer, B., Bauer, F. E., Stern, D., Gonzales, A., & Harrison, F. “A Extragalactic Spectral Survey Of The SSA22 Field”. American Astronomical Society, AAS meeting, National Harbor, MD 2014.
6. **Saez, C.**, Campusano, L. E., Cypriano, E. S., Sodré L. & Kneib, J.-P. “Constraining the Inner Halo Mass Distribution Through the Strong Lensing Statistics of Low-Redshift Galaxy Clusters”. *Astrophysics winter school*, Tenerife, Spain, 2012.
7. **Saez, C.**, & Chartas, G. “A Study of the X-ray Outflow of APM 08279+5255”. *AGN winds in Charleston*, Charleston, SC, 2011.
8. **Saez, C.**, Chartas, G., Brandt, W. N., Giustini, M., & Garmire, G. “X-ray observations of near-relativistic outflows in the BAL Quasar APM 08279+5255”. *Chandra’s First Decade of Discovery symposium*, Boston, MA, 2009.
9. **Saez, C.**, Campusano, L. E., Cypriano, E. S., Sodré L. & Kneib, J.-P. “Semi-Analytical Study of Strong-Lensing in Galaxy Clusters”. *Cosmology at the Beach*, Los Cabos, Mexico, 2009.
10. **Saez, C.**, Chartas, G. & Brandt, W. N. “Suzaku observations of near-relativistic outflows in the BAL Quasar APM 08279+5255”. *American Astronomical Society, AAS meeting*, Long Beach, CA, 2009.
11. **Saez, C.**, Chartas, G., Brandt, W. N., Lehmer, B. D., Bauer, F. E., Dai, X. & Garmire, G. P. “Confirmation of a Correlation Between the X-ray Luminosity and Spectral Slope of AGNs in the Chandra Deep Fields”. *American Astronomical Society, HEAD meeting*, Los Angeles, CA, 2008.
12. Chartas, G., **Saez, C.**, Brandt, W.N. & Garmire, G.P. “Feedback from Broad Absorption Line Quasars”. *American Astronomical Society, HEAD meeting*, Los Angeles, CA, 2008.
13. **Saez, C.**, Chartas, G., Brandt, W.N., Lehmer, B.D., Bauer, F.E., Dai, X. & Garmire, G.P. “Confirmation of a Correlation Between the X-ray Luminosity and Spectral Slope of AGNs in the Chandra Deep Fields”. *Eight Years of Science with Chandra*, Huntsville, AL, 2007.
14. **Saez, C.**, Chartas, G., Brandt, W.N., Lehmer, B.D., Bauer, F.E., Dai, X. & Garmire, G.P. “A Study of AGN X-ray Spectral Evolution”. *Extragalactic Surveys a Chandra Science Workshop*, Cambridge, MA, 2006.
15. Campusano, L.E., Kneib, J.-P., Sodre, L., Cypriano, E.S. & **Saez, C.** “Weak Lensing Mass Distribution for a Sample of X-ray Abell Clusters with  $z < 0.3$ ”. *21st IAP Colloquium: Mass Profiles and Shapes of Cosmological Structures*, Paris, France, 2005.

## PUBLICATIONS

h-index=18; citations=864 (NASA ADS, February 2, 2021)

1. **Saez, C.**, Brandt, W. N., Bauer, F. E., Chartas, G., Misawa, T., Hamann, F., Gallagher, S. C., 2021, *MNRAS submitted*, “The X-Rays Wind Connection In PG 2112+059”.
2. Monson, E. B., Lehmer, B. D., Doore, K., ..., **Saez, C.**, et al. 2021, *in prep*, “On the Nature of AGN and Star Formation Enhancement in the  $z = 3.1$  SSA22 Protocluster: The HST WFC3 IR View”.
3. Masini, A., Civano, F., Comastri, A., Fornasini, F., Ballantyne, D. R., Lansbury, G. B., Treister, E., Alexander, D. M., Boorman, P. G., Brandt, W. N., Farrah, D., Gandhi, P., Harrison, F. A., Hickox, R. C., Kocevski, D. D., Lanz, L., Marchesi, S., Puccetti, S., Ricci,

- C., **Saez, C.**, Stern, D., Zappacosta, L., 2018, *ApJS*, 235, 17, “The NuSTAR Extragalactic Surveys: source catalog and the Compton-thick fraction in the UDS field”.
4. Del Moro, A., Alexander, D. M., Aird, J. A., Bauer, F. E., Civano, F., Mullaney, J. R., Ballantyne, D. R., Brandt, W. N., Comastri, A., Gandhi, P., Harrison, F. A., Lansbury, G. B., Lanz, L., Luo, B., Marchesi, S., Puccetti, S., Ricci, C., **Saez, C.**, Stern, D., Treister, E., Zappacosta, L., 2017, *ApJ*, 849, 57, “The NuSTAR Extragalactic Survey: Average broadband X-ray spectral properties of the NuSTAR detected AGN”.
  5. Lansbury, G. B., Alexander, D. M., Aird, J., Gandhi, P., Stern, D., Koss, M., Lamperti, I., Ajello, M., Annuar, A., Assef, R. J., Ballantyne, D. R., Balokovic, M., Bauer, F. E., Brandt, N., Brightman, M., Chen, C.-T. J., Civano, F., Comastri, A., Moro, A. D., Fuentes, C., Harrison, F. A., Marchesi, S., Masini, A., Mullaney, J. R., Ricci, C., **Saez, C.**, Tomsick, J. A., Treister, E., Walton, & D. J., Zappacosta, L., 2017, *ApJ*, 846, 20, “The NuSTAR Serendipitous Survey: Hunting for The Most Extreme Obscured AGN at  $>10$  keV”.
  6. **Saez, C.**, Campusano, L. E., Cypriano, E. S., Sodré L., & Kneib, J. P., 2016, *MNRAS*, 460, 4453. “Strong Lensing In The Inner Halo Of Galaxy Clusters”.
  7. Misawa, T., **Saez, C.**, Charlton, J. C., Eracleous, M., Chartas, G., Bauer, F. E.; Inada, N., & Uchiyama, H., 2016, *ApJ*, 825, 25. “Multi-Sightline Observation of Narrow Absorption Lines in Lensed Quasar SDSS J1029+2623”.
  8. Lanzuisi, G., Perna, M., Comastri, A., Cappi, M., Dadina, M., Marinucci, A., Masini, A., Matt, G., Vagnetti, F., Vignali, C., Ballantyne, D. R., Bauer, F. E., Boggs, S. E., Brandt, W. N., Brusa, M., Christensen, F. E., Craig, W. W., Fabian, A. C., Farrah, D., Hailey, C. J., Harrison, F. A., Luo, B., Piconcelli, E., Puccetti, S., Ricci, C., **Saez, C.**, Stern, D., Walton, D. J., Zhang, W. W., 2016, *A&A*, 590, 77. “NuSTAR reveals the extreme properties of the super-Eddington accreting supermassive black hole in PG 1247+267”.
  9. **Saez, C.**, Brandt, W. N., Bauer, F. E., Hamann, F., Chartas, G., Gallagher, S. C., 2016, *AN*, 337, 541. “Constraining the shielded wind scenario in PG 2112+059”.
  10. Aird, J., Alexander, D. M., Ballantyne, D. R., Civano, F., Del-Moro, A., Hickox, R. C., Lansbury, G. B., Mullaney, J. R., Bauer, F. E., Brandt, W. N., Comastri, A., Fabian, A. C., Gandhi, P., Harrison, F. A., Luo, B., Stern, D., Treister, E., Zappacosta, L., Ajello, M., Assef, R., Baloković, M., Boggs, S. E., Brightman, M., Christensen, F. E., Craig, W. W., Elvis, M., Forster, K., Grefenstette, B. W., Hailey, C. J., Koss, M., LaMassa, S. M., Madsen, K. K., Puccetti, S., **Saez, C.**, Urry, C. M., Wik, D. R., Zhang, W., 2015, *ApJ*, 815, 66. “The NuSTAR Extragalactic Survey: First Direct Measurements of the  $\gtrsim 10$  KeV X-Ray Luminosity Function for Active Galactic Nuclei at  $z > 0.1$ ”.
  11. Reynolds, C. S., Lohfink, A. M., Ogle, P. M., Harrison, F. A., Madsen, K. K., Fabian, A. C., Wik, D. R., Madejski, G., Ballantyne, D. R., Boggs, S. E., Christensen, F. E., Craig, W. W., Fuerst, F., Hailey, C. J., Lanz, L., Miller, J. M., **Saez, C.**, Stern, D., Walton, D. J., Zhang, W., 2015, *ApJ*, 808, 154. “NuSTAR Observations of the Powerful Radio Galaxy Cygnus A”.
  12. Mullaney, J. R., Del-Moro, A., Aird, J., Alexander, D. M., Civano, F. M., Hickox, R. C., Lansbury, G. B., Ajello, M., Assef, R., Ballantyne, D. R., Baloković, M., Bauer, F. E., Brandt, W. N., Boggs, S. E., Brightman, M., Christensen, F. E., Comastri, A., Craig, W. W., Elvis, M., Forster, K., Gandhi, P., Grefenstette, B. W., Hailey, C. J., Harrison, F. A., Koss, M., LaMassa, S. M., Luo, B., Madsen, K. K., Puccetti, S., **Saez, C.**, Stern, D., Treister, E., Urry, C. M., Wik, D. R., Zappacosta, L., Zhang, W., 2015, *ApJ*, 808, 184. “The NuSTAR

Extragalactic Surveys: Initial Results and Catalog from the Extended Chandra Deep Field South”.

13. Civano, F., Hickox, R. C., Puccetti, S., Comastri, A., Mullaney, J. R., Zappacosta, L., LaMassa, S. M., Aird, J., Alexander, D. M., Ballantyne, D. R., Bauer, F. E., Brandt, W. N., Boggs, S. E., Christensen, F. E., Craig, W. W., Del-Moro, A., Elvis, M., Forster, K., Gandhi, P., Grefenstette, B. W., Hailey, C. J., Harrison, F. A., Lansbury, G. B., Luo, B., Madsen, K., **Saez, C.**, Stern, D., Treister, E., Urry, M. C., Wik, D. R., Zhang, W., 2015, ApJ, 808, 185, “The Nustar Extragalactic Surveys: Overview and Catalog from the COSMOS Field”.
14. Bauer, F. E., Arévalo, P., Walton, D. J., Koss, M. J., Puccetti, S., Gandhi, P., Stern, D., Alexander, D. M., Baloković, M., Boggs, S. E., Brandt, W. N., Brightman, M., Christensen, F. E., Comastri, A., Craig, W. W., Del Moro, A., Hailey, C. J., Harrison, F. A., Hickox, R., Luo, B., Markwardt, C. B., Marinucci, A., Matt, G., Rigby, J. R., Rivers, E., **Saez, C.**, Treister, E., Urry, C. M., Zhang, W. W, 2015, ApJ, 812,116. “NuSTAR Spectroscopy of Multi-component X-Ray Reflection from NGC 1068”.
15. **Saez, C.**, Lehmer, B. D., Bauer, F. E., Stern, D., Gonzales, A., Rreza, I., D. M. Alexander, D. M., Matsuda, Y., Geach, J. E., Harrison, F. A., & Hayashino, T., 2015, MNRAS, 450, 2615. “An Extragalactic Spectroscopic Survey of the SSA22 Field”.
16. Luo, B., Brandt, W. N., Alexander, D. M., Stern, D., Teng, S. H., Arévalo, P., Bauer, F. E., Boggs, S. E., Christensen, F. E., Comastri, A., Craig, W. W., Farrah, D., Gandhi, P., Hailey, C. J., Harrison, F. A., Koss, M., Ogle, P., Puccetti, S., **Saez, C.**, Scott, A. E., Walton, D. J., Zhang, W. W. 2014, ApJ, 794, 70. “Weak Hard X-Ray Emission from Broad Absorption Line Quasars: Evidence for Intrinsic X-Ray Weakness”.
17. Arévalo, P., Bauer, F. E., Puccetti, S., Walton, D. J., Koss, M., Boggs, S. E., Brandt, W. N., Brightman, M., Christensen, F. E., Comastri, A., Craig, W. W., Fuerst, F., Gandhi, P., Grefenstette, B. W., Hailey, C. J., Harrison, F. A., Luo, B., Madejski, G., Madsen, K. K., Marinucci, A., Matt, G., **Saez, C.**, Stern, D., Stuhlinger, M., Treister, E., Urry, C. M., Zhang, W. W. 2014, ApJ, 791, 81. “The 2-79 keV X-Ray Spectrum of the Circinus Galaxy with NuSTAR, XMM-Newton, and Chandra: A Fully Compton-thick Active Galactic Nucleus”.
18. Teng, S. H., Brandt, W. N., Harrison, F. A., Luo, B., Alexander, D. M., Bauer, F. E., Boggs, S. E., Christensen, F. E., Comastri, A., Craig, W. W., Fabian, A. C., Farrah, D., Fiore, F., Gandhi, P., Grefenstette, B. W., Hailey, C. J., Hickox, R. C., Madsen, K. K., Ptak, A. F., Rigby, J. R., Risaliti, G., **Saez, C.**, Stern, D., Veilleux, S., Walton, D. J., Wik, D. R., Zhang, W. W. 2014, ApJ, 785, 19. “NuSTAR Reveals an Intrinsically X-Ray Weak Broad Absorption Line Quasar in the Ultraluminous Infrared Galaxy Markarian 231”.
19. Alexander, D. M., Stern, D., del Moro, A., Lansbury, G. B., Assef, R. J., Aird, J., Ajello, M., Ballantyne, D. R., Bauer, F. E., Boggs, S. E., Brandt, W. N., Christensen, F. E., Civano, F., Comastri, A., Craig, W. W., Elvis, M., Grefenstette, B. W., Hailey, C. J., Harrison, F. A., Hickox, R. C., Luo, B., Madsen, K. K., Mullaney, J. R., Perri, M., Puccetti, S., **Saez, C.**, Treister, E., Urry, C. M., Zhang, W. W., Bridge, C. R., Eisenhardt, P. R. M., Gonzalez, A. H., Miller, S. H., & Tsai, C. W. 2013, ApJ, 773, 125. “The Nustar Extragalactic Survey: a First Sensitive Look at the High-Energy Cosmic X-Ray Background Population”.
20. Luo, B., Brandt, W. N., Alexander, D. M., Harrison, F. A., Stern, D., Bauer, F. E., Boggs, S. E., Christensen, F. E., Comastri, A., Craig, W. W., Fabian, A. C., Farrah, D., Fiore, F., Fuerst, F., Grefenstette, B. W., Hailey, J., Hickox, R., Madsen, K. K., Matt, G., Ogle, P., Risaliti, G., **Saez, C.**, Teng, S., Walton, D. J. & Zhang, W. W. 2013, ApJ, 772, 153. “Weak

Hard X-ray Emission from two Broad Absorption Line Quasars Observed with nuSTAR: Compton-Thick Absorption or Intrinsic X-ray Weakness?”.

21. **Saez, C.**, Brandt, W. N., Gallagher, S. C., Bauer, F. & Garmire, G. P. 2012, ApJ, 759, 42, “The Long-Term X-Ray Variability of Broad Absorption Line Quasars”.
22. **Saez, C.**, & Chartas, G. 2012, ASPC, 460, 39, “A Study of the X-ray Outflow of APM 08279+5255”.
23. **Saez, C.**, Brandt, W. N., Shemmer, O., Chomiuk, L., Lopez, L. A., Miller, B. P., & Vignali, C. 2011, ApJ, 738, 53, “The X-ray properties of typical high-redshift radio-loud quasars”.
24. **Saez, C.**, & Chartas, G. 2011, ApJ, 737, 91, “An study of the X-rayed outflow of APM 08279+5255 through photoionization codes”.
25. Chartas, G., **Saez, C.**, Brandt, W. N., Giustini, M. , & Garmire, G. 2009, ApJ, 706, 644. “Variable Energy Injection by a Near-Relativistic Outflow in APM 08279+5255”.
26. **Saez, C.**, Chartas, G., & Brandt, W. N. 2009, ApJ, 697, 194. “Suzaku Observations of Near-Relativistic Outflows in the BAL Quasar APM 08279+5255”.
27. **Saez, C.**, Chartas, G., Brandt, W. N., Lehmer, B. D., Bauer, F. E., Dai, X., & Garmire, G. P. 2008, AJ, 135, 1505. “Confirmation of a Correlation Between the X-Ray Luminosity and Spectral Slope of Active Galactic Nuclei in the Chandra Deep Fields”.

## PROFESSIONAL REFERENCES

George Chartas  
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Dept. of physics and astronomy  
College of Charleston  
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Miguel Carrasco  
*Teaching Supervisor (2018-2019)*  
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