

# Gunther Witzel

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## Contact Information

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## Current position

**Staff Scientist at the Max Planck Institute for Radio Astronomy** in the research group of Prof. A. Zensus (August 2018 - present)

## Previous positions

**Assistant Researcher at the University of California Los Angeles (UCLA)** in the research group of Prof. A. Ghez (2015-July 2018)

**Postdoctoral researcher at the University of California Los Angeles (UCLA)** in the research group of Prof. A. Ghez (2012-2015)

**Research Assistant at the University of Cologne** in the research group of Prof. Andreas Eckart (2008 to 2012)

## Education

### University of Cologne (2007 to 2012)

**PhD** (Dr. rer. nat., 2008 to 2012, graduated with Summa cum Laude)  
Thesis Title: *Intrinsic Near-Infrared Properties of the Variable Source Sagittarius A\**  
Supervisor: Prof. Andreas Eckart

**Diploma** in Physics (June 2008)  
Thesis Title: *Mechanical Facilities for the Fringe and Flexure Tracking System of LINC-NIRVANA and Investigations of the Flare Activity of Sgr A\**  
Supervisor: Prof. Andreas Eckart

### University of Bonn (2002-2007)

Prediploma in Physics (2004)  
Study of Physics, Mathematics and Astronomy

### High School: Vinzenz-Pallotti-Kolleg (1992-2001)

Abitur (2001)

## Research Interests/ Expertise

Galaxy evolution, the center of the Milky Way, nuclear stellar clusters, black holes and black hole accretion, General Relativity, high angular resolution imaging, radio interferometry, adaptive optics, astrometric and photometric data post-processing, time-domain astronomy, time-series analysis, polarimetry, machine learning algorithms

## Academic Experience

### University of Cologne and University of California, Los Angeles

Supervision of undergraduate and graduate research projects (2013 - present)

Teaching Assistant:

Mathematical introduction for scientists (2009)

Lab Course Assistant:

Thermodynamics (2008 to 2012)

### Talks and other professional activities:

COSPAR-18-E1.11: ACTIVITY OF THE SUPER-MASSIVE BLACK HOLE AND OTHER ENERGETIC PROCESSES AT THE GALACTIC CENTER: *Recent results from observations of Sgr A\* variability with the Spitzer & Chandra Space Telescopes*, solicited talk 2018

UC CfAO Retreat, Lake Arrowhead: *The AIROPA software package - Testing general relativity in the strong gravity regime with AO*, 2017

ESO Headquarters, Informal Discussion: *"The variable Galactic Center objects G1, G2, and Sgr A\* in the near infrared"*, 2017

Keck Science Meeting Caltech, Pasadena: *AIROPA (Anisoplanatic and Instrumental Reconstruction of Off-axis PSFs for AO)*, 2016

SPIE Astronomical Telescopes and Instrumentation, Edinburgh, Conference 9909, Adaptive Optics Systems V: *The AIROPA software package: milestones for testing general relativity in the strong gravity regime with adaptive optics*, 2016

Jerusalem Tidal Disruption Events Workshop, The Institute for Advanced Studies, Jerusalem: *Infrared excess sources at the Galactic Center and their impact on Sagittarius A\**, 2015

Aspen Winter Conference 2015, Black Holes in Dense Stellar Clusters, Aspen: *Detection of Galactic Center Source G2 at 3.8 microns during Periapse Passage*, 2015

225th Meeting of the AAS, Seattle: *G2's closest approach to the Galactic Center black hole*, 2015

UC CfAO Retreat, Lake Arrowhead: *Detection of Galactic Center Source at G2 At 3.8 Microns during Periapse Passage*, 2014

Keck Science Meeting Caltech, Pasadena: *Detection of Galactic Center Source G2 at 3.8 microns during Periapse Passage*, 2014

223th Meeting of the AAS, Washington D.C.: *The NIR variability of Sgr A\**, 2014

Joint COST conference MP0905 with MP1104 2013, Granada, Spain: *The NIR variability of SgrA\**, 2013

IAU Symposium303, The Galactic Center: Feeding and Feedback in a Normal Galactic Nucleus, Santa Fe: Solicited talk, *The NIR Variability of Sgr A\**, 2013

UC CfAO Retreat, Lake Arrowhead: *Modeling Atmospheric Anisoplanatism and Instrumental Aberrations for NIRC2 at the Keck Telescope*, 2012

Special Colloquium at the Max-Planck-Institute for Radio Astronomy, Bonn, Germany: *The NIR variability of SgrA\* - What can we learn from time series analysis?*, 2012

Colloquium at the Astronomical Institute of the Academy of Sciences, Prague, Czech Republic: *Intrinsic variability properties of the near-infrared source SgrA\**, 2012

AHAR 2011, Bad Honnef, Germany: *Time series of near-infrared flux densities of Sagittarius A\**, 2011

COST 2011, Bologna, Italy: *Sgr A\* and its intrinsic polarization*, 2011

GRAVITY Science Meeting, Meudon, France: *Polarimetric calibration of Nasmyth focus instruments*, 2011

Deutsche Astronomische Gesellschaft, Herbsttagung, Bonn, Germany: *The instrumental polarization of NACO- Implications for time resolved polarimetric measurements of Sgr A\**, 2010

Seminar at the MPIA, Heidelberg, Germany: *The instrumental polarization of NACO*, 2010

Seminar at ESO institute, Vitacura, Santiago di Chile, Chile: *The NIR/sub-mm flare emission from Sgr A\**, 2009

**Posters:**

AHAR 2011, Bad Honnef, Germany & Probing strong gravity near black holes, Prague, Czech Republic: *Polarimetric measurements of Sagittarius A\**, 2010 & 2011

SPIE conference, Marseille, France, Prospects for observing the Galactic Center: combining LBT LINC-NIRVANA observations in the near-infrared with observations in the mm/sub-mm wavelength domain, 2008

**Outreach:**

Explore Your Universe (EYU), UCLA, 2017, 2016

Talk at *All Space Considered*, Griffith Observatory, Black hole learns there is no free lunch, December 2014

BBC Horizon - *Seeing Stars* (2011) [<http://www.imdb.com/title/tt2031471/>]

**Computer skills**

IDL, Python, HTML, C++, Unix shell scripting, Git version control, StarFinder, AIROPA, SQLite, PyStan, MPI, DPUSER, DS9, Latex, large scale cluster computations, CASA

**Languages**

German: native  
English: fluent

# Publications

My three most important science papers are highlighted with red index numbers below. (12) is a first demonstration how Nasmyth Focus Adaptive Optics instruments (in our case NACO/VLT) can be calibrated to become high precision polarimeters; (28) is the use of high fidelity PSF modeling to disentangle the putative gas cloud G2 from Sgr A\* and other sources in the surrounding, showing its compactness and constant brightness despite its tidal interaction with the black hole; (42) is a statistical investigation of most of the available NIR light curves, including Keck, VLT, and Spitzer data. Based on machine learning techniques it became possible to combine data taken at different wavelengths, derived a precision power spectrum, and determine the possible states of the variable spectral energy distribution of Sgr A\*. These results again were based on PSF modeling, including the first application of the new AIROPA software package to provide high S/N photometry on a crucial NIRC2/Keck dataset.

## Published work (in chronological order)

- 1 Meyer, L., T. Do, A. Ghez, M. R. Morris, **G. Witzel**, A. Eckart, G. Bélanger, & R. Schödel 2008, **A 600 Minute Near-Infrared Light Curve of Sagittarius A\***, The Astrophysical Journal, 688, L17, 4 pp. Refereed Journal
- 2 Eckart, A., R. Schödel, M. García-Marín, **G. Witzel**, A. Weiss, F. K. Baganoff, M. R. Morris, T. Bertram, M. Dovčiak, W. J. Duschl, V. Karas, S. König, T. P. Krichbaum, M. Krips, D. Kunneriath, R.-S. Lu, S. Markoff, J. Mauerhan, L. Meyer, J. Moutaka, K. Mužić, F. Najarro, J.-U. Pott, K. F. Schuster, L. O. Sjouwerman, C. Straubmeier, C. Thum, S. N. Vogel, H. Wiesemeyer, M. Zamaninasab, & J. A. Zensus 2008, **Simultaneous NIR/sub-mm observation of flare emission from Sagittarius A\***, Astronomy and Astrophysics, 492, pp.337-344 Refereed Journal
- 3 Zamaninasab, M., A. Eckart, D. Kunneriath, **G. Witzel**, R. Schödel, L. Meyer, M. Dovciak, V. Karas, S. König, T. Krichbaum, R. S. Lu, C. Straubmeier, & J. A. Zensus 2008, **Flares of Sgr A\*: from X-ray to mm.**, Memorie della Societa Astronomica Italiana, 79, 1054, 4 pp. Research Article
- 4 Eckart, A., R. Schödel, M. García-Marín, **G. Witzel**, A. Weiss, F. Baganoff, M. R. Morris, T. Bertram, M. Dovčiak, D. Downes, W. Duschl, V. Karas, S. König, T. Krichbaum, M. Krips, D. Kunneriath, R.-S. Lu, S. Markoff, J. Mauerhan, L. Meyer, J. Moutaka, K. Mužić, F. Najarro, J.-U. Pott, K. Schuster, L. Sjouwerman, C. Straubmeier, C. Thum, S. Vogel, H. Wiesemeyer, M. Zamaninasab, & A. Zensus 2008, **Probing Sagittarius A\* and its Environment at the Galactic Centre: VLT and APEX Working in Synergy**, The Messenger, 133, p. 26-30 Research Article  
OA
- 5 Eckart, A., F. K. Baganoff, M. R. Morris, D. Kunneriath, M. Zamaninasab, **G. Witzel**, R. Schödel, M. García- Marín, L. Meyer, G. C. Bower, D. Marrone, M. W. Bautz, W. N. Brandt, G. P. Garmire, G. R. Ricker, C. Straubmeier, D. A. Roberts, K. Muzic, J. Mauerhan, & A. Zensus 2009, **Modeling mm- to X-ray flare emission from Sagittarius A\***, Astronomy and Astrophysics, 500, pp.935-946 Refereed Journal
- 6 **Witzel, G.**, A. Eckart, R. Lenzen, & C. Straubmeier 2010, **On the Instrumental Polarisation of NAOS-CONICA**, The Messenger, 142, p. 5-7 Research Article
- 7 Zamaninasab, M., A. Eckart, **G. Witzel**, M. Dovciak, V. Karas, R. Schödel, R. Gießübel, M. Bremer, M. García- Marín, D. Kunneriath, K. Mužić, S. Nishiyama, N. Sabha, C. Straubmeier, & A. Zensus 2010, **Near infrared flares of Sagittarius A\*. Importance of near infrared polarimetry**, Astronomy and Astrophysics, 510, AA3, 25 pp. Refereed Journal

- 8 Sabha, N., **G. Witzel**, A. Eckart, R. M. Buchholz, M. Bremer, R. Gießübel, M. García-Marín, D. Kunneriath, K. Muzic, R. Schödel, C. Straubmeier, M. Zamaninasab, & A. Zernickel 2010, **The extreme luminosity states of Sagittarius A\***, *Astronomy and Astrophysics*, 512, AA2, 17 pp. Refereed Journal
- 9 Kunneriath, D., **G. Witzel**, A. Eckart, M. Zamaninasab, R. Gießübel, R. Schödel, F. K. Baganoff, M. R. Morris, M. Dovčiak, W. J. Duschl, M. García-Marín, V. Karas, S. König, T. P. Krichbaum, M. Krips, R.-S. Lu, J. Mauerhan, J. Moutaka, K. Mužić, N. Sabha, F. Najarro, J.-U. Pott, K. F. Schuster, L. O. Sjouwerman, C. Straubmeier, C. Thum, S. N. Vogel, P. Teuben, A. Weiss, H. Wiesemeyer, & J. A. Zensus 2010, **Coordinated NIR/mm observations of flare emission from Sagittarius A\***, *Astronomy and Astrophysics*, 517, AA46, 14 pp. Refereed Journal
- 10 Mužić, K., A. Eckart, R. Schödel, R. Buchholz, M. Zamaninasab, & **G. Witzel** 2010, **Comet-shaped sources at the Galactic center. Evidence of a wind from the central 0.2 pc**, *Astronomy and Astrophysics*, 521, AA13, 9 pp. Refereed Journal
- 11 Lu, R.-S., T. P. Krichbaum, A. Eckart, S. König, D. Kunneriath, **G. Witzel**, A. Witzel, & J. A. Zensus 2011, **Multi-wavelength VLBI observations of Sagittarius A\***, *Astronomy and Astrophysics*, 525, AA76, 14 pp. Refereed Journal
- 12 **Witzel, G.**, A. Eckart, R. M. Buchholz, M. Zamaninasab, R. Lenzen, R. Schödel, C. Araujo, N. Sabha, M. Bremer, V. Karas, C. Straubmeier, & K. Muzic 2011, **The instrumental polarization of the Nasmyth focus polarimetric differential imager NAOS/CONICA (NACO) at the VLT. Implications for time-resolved polarimetric measurements of Sagittarius A\***, *Astronomy and Astrophysics*, 525, AA130, 15 pp. Refereed Journal
- 13 Zamaninasab, M., A. Eckart, M. Dovčiak, V. Karas, R. Schödel, **G. Witzel**, N. Sabha, M. García-Marín, D. Kunneriath, K. Mužić, C. Straubmeier, M. Valencia-S., & J. A. Zensus 2011, **Near-infrared polarimetry as a tool for testing properties of accreting supermassive black holes**, *Monthly Notices of the Royal Astronomical Society*, 413, pp. 322-332 Refereed Journal
- 14 Bremer, M., **G. Witzel**, A. Eckart, M. Zamaninasab, R. M. Buchholz, R. Schödel, C. Straubmeier, M. García-Marín, & W. Duschl 2011, **The near-infrared spectral index of Sagittarius A\* derived from Ks- and H-band flare statistics**, *Astronomy and Astrophysics*, 532, AA26, 43 pp. Refereed Journal
- 15 García-Marín, M., A. Eckart, A. Weiss, **G. Witzel**, M. Bremer, M. Zamaninasab, M. R. Morris, R. Schödel, D. Kunneriath, S. Nishiyama, F. Baganoff, M. Dovčiak, N. Sabha, W. J. Duschl, J. Moutaka, V. Karas, F. Najarro, K. Mužić, C. Straubmeier, S. N. Vogel, M. Krips, & H. Wiesemeyer 2011, **Extended Submillimeter Emission of the Galactic Center and Near-infrared/submillimeter Variability of Its Supermassive Black Hole**, *The Astrophysical Journal*, 738, 158, 19 pp. Refereed Journal
- 16 Buchholz, R. M., **G. Witzel**, R. Schödel, A. Eckart, M. Bremer, & K. Mužić 2011, **Adaptive-optics assisted near-infrared polarization measurements of sources in the Galactic center**, *Astronomy and Astrophysics*, 534, AA117, 26 pp. Refereed Journal
- 17 Kunneriath, D., A. Eckart, M. Zamaninasab, **G. Witzel**, M. Valencia-S., N. Sabha, & M. García-Marín 2011, **Flare emission from Sagittarius A\***, *Memorie della Societa Astronomica Italiana*, 82, 91, 4 pp. Research Article
- 18 Eckart, A., M. García-Marín, S. N. Vogel, P. Teuben, M. R. Morris, F. Baganoff, J. Dexter, R. Schödel, **G. Witzel**, M. Valencia-S., V. Karas, D. Kunneriath, C. Straubmeier, L. Moser, N. Sabha, R. Buchholz, M. Zamaninasab, K. Mužić, J. Moutaka, & J. A. Zensus 2012, **Millimeter to X-ray flares from Sagittarius A\***, *Astronomy and Astrophysics*, 537, AA52, 18 pp. Refereed Journal

- 19 Sabha, N., A. Eckart, D. Merritt, M. Zamaninasab, **G. Witzel**, M. García-Marín, B. Jalali, M. Valencia-S., S. Yazici, R. Buchholz, B. Shahzamanian, C. Rauch, M. Horrobin, & C. Straubmeier 2012, **The S-star cluster at the center of the Milky Way. On the nature of diffuse NIR emission in the inner tenth of a parsec**, *Astronomy and Astrophysics*, 545, AA70, 12 pp. Refereed Journal
- 20 **Witzel, G.**, A. Eckart, M. Bremer, M. Zamaninasab, B. Shahzamanian, M. Valencia-S., R. Schödel, V. Karas, R. Lenzen, N. Marchili, N. Sabha, M. Garcia-Marin, R. M. Buchholz, D. Kunneriath, & C. Straubmeier 2012, **Source-intrinsic Near-infrared Properties of Sgr A\*: Total Intensity Measurements**, *The Astrophysical Journal Supplement Series*, 203, 18, 36 pp. Refereed Journal
- 21 Eckart, A., K. Mužić, S. Yazici, N. Sabha, B. Shahzamanian, **G. Witzel**, L. Moser, M. Garcia-Marin, M. Valencia-S., B. Jalali, M. Bremer, C. Straubmeier, C. Rauch, R. Buchholz, D. Kunneriath, & J. Moultaqa 2013, **Near-infrared proper motions and spectroscopy of infrared excess sources at the Galactic center**, *Astronomy and Astrophysics*, 551, AA18, 31 pp. Refereed Journal
- 22 Phifer, K., T. Do, L. Meyer, A. M. Ghez, **G. Witzel**, S. Yelda, A. Boehle, J. R. Lu, M. R. Morris, E. E. Becklin, & K. Matthews 2013, **Keck Observations of the Galactic Center Source G2: Gas Cloud or Star?**, *The Astrophysical Journal*, 773, LL13, 6 pp. Refereed Journal
- 23 Buchholz, R. M., **G. Witzel**, R. Schödel, & A. Eckart 2013, **Ks- and Lp-band polarimetry on stellar and bow-shock sources in the Galactic center**, *Astronomy and Astrophysics*, 557, AA82, 19 pp. Refereed Journal
- 24 Eckart, A., K. Mužić, S. Yazici, N. Sabha, B. Shahzamanian, **G. Witzel**, L. Moser, M. Garcia-Marin, M. Valencia-S., B. Jalali, M. Bremer, C. Straubmeier, C. Rauch, R. Buchholz, D. Kunneriath, & J. Moultaqa 2013, **The broad band spectral properties of Sgr A\* . The fate of the dusty object approaching the center**, *Memorie della Societa Astronomica Italiana*, 84, 618, 4 pp. Research Article
- 25 Bower, G. C., S. Markoff, A. Brunthaler, C. Law, H. Falcke, D. Maitra, M. Clavel, A. Goldwurm, M. R. Morris, **G. Witzel**, L. Meyer, & A. M. Ghez 2014, **The Intrinsic Two-dimensional Size of Sagittarius A\***, *The Astrophysical Journal*, 790, 1, 10 pp. Refereed Journal
- 26 Meyer, L., **G. Witzel**, F. A. Longstaff, & A. M. Ghez 2014, **A Formal Method for Identifying Distinct States of Variability in Time-varying Sources: Sgr A\* as an Example**, *The Astrophysical Journal*, 791, 24, 9 pp. Refereed Journal
- 27 Hora, J. L., **G. Witzel**, M. L. N. Ashby, E. E. Becklin, S. Carey, G. G. Fazio, A. Ghez, J. Ingalls, L. Meyer, M. R. Morris, H. A. Smith, & S. P. Willner 2014, **Spitzer/IRAC Observations of the Variability of Sgr A\* and the Object G2 at 4.5  $\mu\text{m}$** , *The Astrophysical Journal*, 793, 120, 10 pp. Refereed Journal
- 28 **Witzel, G.**, A. M. Ghez, M. R. Morris, B. N. Sitarski, A. Boehle, S. Naoz, R. Campbell, E. E. Becklin, G. Canalizo, S. Chappell, T. Do, J. R. Lu, K. Matthews, L. Meyer, A. Stockton, P. Wizinowich, & S. Yelda 2014, **Detection of Galactic Center Source G2 at 3.8  $\mu\text{m}$  during Periapse Passage**, *The Astrophysical Journal*, 796, LL8, 6 pp. Refereed Journal
- 29 Neilsen, J., S. Markoff, M. A. Nowak, J. Dexter, **G. Witzel**, N. Barrière, Y. Li, F. K. Baganoff, N. Degenaar, P. C. Fragile, C. Gammie, A. Goldwurm, N. Grosso, & D. Haggard 2015, **The X-Ray Flux Distribution of Sagittarius A\* as Seen by Chandra**, *The Astrophysical Journal*, 799, 199, 11 pp. Refereed Journal

- 30 Shahzamanian, B., A. Eckart, M. Valencia-S., **G. Witzel**, M. Zamaninasab, N. Sabha, M. García-Marín, V. Karas, G. D. Karssen, A. Borkar, M. Dovčiak, D. Kunneriath, M. Bursa, R. Buchholz, J. Moulataka, & C. Straubmeier 2015, **Polarized light from Sagittarius A\* in the near-infrared K<sub>s</sub>-band**, *Astronomy and Astrophysics*, 576, AA20, 18 pp. Refereed Journal
- 31 Shahzamanian, B.; Eckart, A.; Valencia-S., M.; **Witzel, G.**; Zamaninasab, M.; Zajaček, M.; Sabha, N.; García-Marín, M.; Karas, V.; Peissker, F.; Karssen, G. D.; Parsa, M.; Grosso, N.; Mossoux, E.; Porquet, D.; Jalali, B.; Horrobin, M.; Buchholz, R.; Dovčiak, M.; Kunneriath, D.; Bursa, M.; Zensus, A.; Schödel, R.; Moulataka, J.; Straubmeier, C. 2015, **Variable and Polarised Near-infrared Emission from the Galactic Centre**, *The Messenger*, vol. 159, p. 41-45 Research Article OA
- 32 Stephan, Alexander P.; Naoz, Smadar; Ghez, Andrea M.; **Witzel, Gunther**; Sitarski, Breann N.; Do, Tuan; Kocsis, Bence 2016, **Merging binaries in the Galactic Center: the eccentric Kozai-Lidov mechanism with stellar evolution**, *Monthly Notices of the Royal Astronomical Society*, Volume 460, Issue 4, p.3494-3504 Refereed Journal
- 33 Dibi, S.; Markoff, S.; Belmont, R.; Malzac, J.; Neilsen, J.; **Witzel, G.** 2016, **Using infrared/X-ray flare statistics to probe the emission regions near the event horizon of Sgr A\***, *Monthly Notices of the Royal Astronomical Society*, Volume 461, Issue 1, p.552-559 Refereed Journal
- 34 Boehle, A.; Ghez, A. M.; Schödel, R.; Meyer, L.; Yelda, S.; Albers, S.; Martinez, G. D.; Becklin, E. E.; Do, T.; Lu, J. R.; Matthews, K.; Morris, M. R.; Sitarski, B.; **Witzel, G.** 2016, **An Improved Distance and Mass Estimate for Sgr A\* from a Multistar Orbit Analysis**, *The Astrophysical Journal*, Volume 830, Issue 1, article id. 17, 23 pp. Refereed Journal
- 35 Subroweit, M.; García-Marín, M.; Eckart, A.; Borkar, A.; Valencia-S., M.; **Witzel, G.**; Shahzamanian, B.; Straubmeier, C. 2017, **Submillimeter and radio variability of Sagittarius A\*. A statistical analysis**, *Astronomy & Astrophysics*, Volume 601, id.A80, 13 pp. Refereed Journal
- 36 Hees, A.; Do, T.; Ghez, A. M.; Martinez, G. D.; Naoz, S.; Becklin, E. E.; Boehle, A.; Chappell, S.; Chu, D.; Dehghanfar, A.; Kosmo, K.; Lu, J. R.; Matthews, K.; Morris, M. R.; Sakai, S.; Schödel, R.; **Witzel, G.** 2017, **Testing General Relativity with Stellar Orbits around the Supermassive Black Hole in Our Galactic Center**, *Physical Review Letters*, Volume 118, Issue 21, id.211101, 9 pp. Refereed Journal
- 37 **Witzel, G.**; Sitarski, B. N.; Ghez, A. M.; Morris, M. R.; Hees, A.; Do, T.; Lu, J. R.; Naoz, S.; Boehle, A.; Martinez, G.; Chappell, S.; Schödel, R.; Meyer, L.; Yelda, S.; Becklin, E. E.; Matthews, K. 2017, **The Post-periapsis Evolution of Galactic Center Source G1: The Second Case of a Resolved Tidal Interaction with a Supermassive Black Hole**, *The Astrophysical Journal*, Volume 847, Issue 1, article id. 80, 17 pp. Refereed Journal
- 38 Naoz, Smadar; Ghez, Andrea M.; Hees, Aurelien; Do, Tuan; **Witzel, Gunther**; Lu, Jessica R. 2018, **Confusing Binaries: The Role Of Stellar Binaries In Biasing Disk Properties In The Galactic Center**, *The Astrophysical Journal Letters*, Volume 853, Issue 2, Article Id. L24, 8 Pp. Refereed Journal
- 39 Chu, Devin S.; Do, Tuan; Hees, Aurelien; Ghez, Andrea; Naoz, Smadar; **Witzel, Gunther**; Sakai, Shoko; Chappell, Samantha; Gautam, Abhimat K.; Lu, Jessica R.; Matthews, Keith 2018, **Investigating the Binarity of S0-2: Implications for Its Origins and Robustness as a Probe of the Laws of Gravity around a Supermassive Black Hole**, *The Astrophysical Journal*, Volume 854, Issue 1, article id. 12, 10 pp. Refereed Journal



- 40 S. Britzen, C. Fendt, **G. Witzel**, S.-J. Qian, I.N. Pashchenko, O. Kurtanidze, M. Zajacek, G. Martinez, V. Karas, M. Aller, H. Aller, A. Eckart, K. Nilsson, P. Arevalo, J. Cuadra, M. Subroweit, and A. Witzel, **OJ287: Deciphering the “Rosetta stone of blazars”**, Monthly Notices of the Royal Astronomical Society, Volume 478, Issue 3, p.3199-3219 Refereed Journal
- 41 O. Beltramo-Martin, C.M. Correia, Etsuko Mieda, Benoit Neichel, Thierry Fusco, **Gunther Witzel**, Jessica Lu, Jean-Pierre Veran, **Off-axis point spread function characterisation in laser-guide star adaptive optics systems**, Monthly Notices of the Royal Astronomical Society, Volume 478, Issue 4, p.4642-4656 Refereed Journal
- 42 **G. Witzel**, G. Martinez, J. Hora, S. Willner, M.R. Morris, C. Gammie, E.E. Becklin, et al., **Variability Timescale and Spectral Index of Sgr A\* in the Near Infrared: Approximate Bayesian Computation Analysis of the Variability of the Closest Supermassive Black Hole** Refereed Journal
- 43 G. G. Fazio, J. L. Hora, **G. Witzel**, S. P. Willner, M. L. N. Ashby, F. Baganoff, E. Becklin, S. Carey, D. Haggard, C. Gammie, A. Ghez, M. A. Gurwell, J. Ingalls, M. R. Morris, H. A. Smith, **Multiwavelength Light Curves Of Two Remarkable Sagittarius A\* Flares** Refereed Journal

## Work in progress

- 1 **Gunther Witzel**, Mark Morris, Andrea Ghez, Leo Meyer, Francis Longstaff, Eric Becklin, Keith Matthews, Jessica R. Lu, Tuan Do & Randy Campbell, **Precision Measurements Of The Spectral Index Of Sagittarius A\* In The Near-Infrared** in preparation for a refereed journal
- 2 **Witzel, Gunther**; Lu, Jessica R.; Ghez, Andrea M.; Martinez, Gregory D.; Fitzgerald, Michael P.; Britton, Matthew; Sitarski, Breann N.; Do, Tuan; Campbell, Randall D.; Service, Maxwell; Matthews, Keith; Morris, Mark R.; Becklin, E. E.; Wizinowich, Peter L.; Ragland, Sam; Doppmann, Greg; Neyman, Chris; Lyke, James; Kassis, Marc; Rizzi, Luca; Lilley, Scott; Rampy, Rachel, **The AIROPA software package: Astrometry with spatially variable PSFs** in preparation for a refereed journal
- 3 Abhimat Krishna Gautam, Tuan Do, Andrea M. Ghez, Mark R. Morris, Jessica R. Lu, Shoko Sakai, **Gunther Witzel**, Siyao Jia, Eric E. Becklin, and Keith Matthews, **An Adaptive Optics Study Of Stellar Variability In The Extreme Environment Of The Galactic Center** Submitted to refereed journal
- 4 K. Kosmo O’Neil et al., **Improving Estimates Of Orbital Parameters For Incomplete Orbits With A New Approach To Priors – With Applications From Black Holes To Planets** Submitted refereed journal
- 5 A. Dehghanfar et al., **Methodology for Modeling the Systematic Biases Due to Source Confusion at the Galactic Center** in preparation for a refereed journal

## Proceedings

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