

# KE FANG

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## APPOINTMENT

- Assistant Professor, **University of Wisconsin-Madison** Since Jan 2021
- NASA Einstein Fellow, **Stanford University** Sep 2018 - Dec 2020
- JSI Fellow, **University of Maryland & NASA Goddard** Sep 2015 - Aug 2018

## EDUCATION

- Ph.D., Astrophysics, **University of Chicago** 2010-2015  
*Advisor:* Angela V. Olinto  
*Thesis:* Newborn Pulsars as Highest Energy Cosmic Accelerators
- M.S., Astrophysics, **Iowa State University** 2008-2010  
*Advisor:* Martin Pohl  
*Thesis:* Cascades of Very-High Energy Gamma Rays from Distant Blazars
- B.S., Physics, **University of Science and Technology of China** 2004-2008

## EXPERIMENTAL COLLABORATIONS

- Member, *All-sky Medium Energy  $\gamma$ -ray Observatory eXplorer (AMEGO-X)* Since 2020
- Member, *Probe Of Extreme Multi-Messenger Astrophysics (POEMMA)* Since 2020
- Member, *Southern Wide field-of-view Gamma-ray Observatory (SWG0)* Since 2019
- Member, *Fermi Gamma-ray Space Telescope (Fermi-LAT)* Since 2018
- Member, *High-Altitude Water Cherenkov Gamma-ray Observatory (HAWC)* Since 2017
- Member, *Giant Radio Array for Neutrino Detection (GRAND)* Since 2014
- Student Member, *Pierre Auger Observatory* 2011 - 2015

## AWARDS

- PI, NASA Fermi Guest Investigator Program Cycle 13 2021  
“A Joint Analysis of *Fermi*-LAT and HAWC Observations of Gamma-ray Halos Around Middle-aged Pulsars” (\$70k)
- Co-I, OPTICON ToO time allocation at the Nordic Optical Telescope 2019-2020

“Broadband optical polarimetry of a  $\gamma$ -ray flare accompanied by a neutrino event in TXS 0506+056 (or other visible blazar) during the Oct 1-March 31, 2020 observing period”

- Co-I, Fermi Guest Investigator Program Cycle 11 2019  
“High-Energy Emission as Probes of the Connection between Short Gamma-Ray Bursts and Neutron Star Mergers” (\$55k)
- NASA Hubble Fellowship Program Einstein Fellowship 2018-2021
- PI on a 1M CPU-hour Allocation at State of Maryland Research Computing Center 2016
- Co-I on a 0.5M CPU-hour Allocation at UChicago Research Computing Center 2016
- Excellent Teaching Award, Iowa State University 2009-2010
- Outstanding Student Scholarship, Univ. of Science and Technology of China 2005-2007

## ACADEMIC SERVICE

- US Snowmass 2021 Topical Group Convener, Cosmic Frontier CF7 2020 - present
- KIPAC-LSST Early Science Group Organizer 2019 - present
- KIPAC Graduate Student Admission Committee 2018, 2019
- Reviewer for NASA Astrophysics Theory Program (ATP) 2019
- Reviewer for NASA *Fermi* Guest Investigator Program (Cycle 12) 2019
- Reviewer for NASA Earth and Space Science Fellowship (NESSF) 2017
- Organizer of CTC Lunch Seminars at UMD, *College Park, MD* 2016 - 2018
- Referee for *Nature*, *Nature Astronomy*, *The Astrophysical Journal Letters*, *MNRAS*, *Physical Review D*, *Astroparticle Physics* 2014 - present

## OUTREACH

- KIPAC Public Lecture “Energetic Bullets Sent from Outer Space” Aug, 2020
- “College Insider” Podcast with the Women in STEM Organization Aug, 2020
- Volunteer on SLAC Community Day, *Menlo Park, CA* Oct 2019
- KIPAC research highlight blog, *Stanford, CA* May 2019
- Guest speaker at UMD Observatory, *College Park, MD* 2016
- Volunteer on the Maryland Day, *College Park, MD* Apr 2016
- Hosting scientist of Space Visualization Lab, Adler Planetarium, *Chicago, IL* 2012-2014

## TALKS AT CONFERENCES AND SEMINARS

- [59] Astrophysics colloquium, *University of Wisconsin-Madison*, virtual Dec 2020
- [58] Invited talk, *YITP workshop at Kyoto University*, virtual Dec 2020
- [57] Invited talk, *Princeton Cosmic Accelerator Workshop*, virtual Oct 2020

- [56] Colloquium, *Clemson University*, virtual Oct 2020
- [55] Colloquia, *University of Colorado, Boulder*, virtual Sep 2020
- [54] KICP Seminar *University of Chicago*, virtual May 2020
- [53] Astrophysics Colloquium *Stanford University*, virtual Apr 2020
- [52] Invited talk, *TMEX-2020 Conference*, Vietnam Jan 2020
- [51] Colloquium, *University of Illinois, Urbana-Champaign, IL* Oct 2019
- [50] Highlight talk, *2019 International Cosmic Ray Conference*, Madison, WI Jul 2019
- [49] *Fermi-VERITAS-HAWC workshop*, Houghton, MI May 2019
- [48] Invitation only, *2019 Rising Stars in Physics Workshop*, Stanford, CA Apr 2019
- [47] Invited talk, *Columbia University Workshop*, New York, NY Nov 2018
- [46] Invited talk, *Ultrahigh Energy Cosmic Ray Conference 2018*, Paris, France Oct 2018
- [45] Invited seminar, *Los Alamos National Lab*, Los Alamos, NM Jul 2018
- [44] Invited talk, *20th ISVHECRI*, Nagoya, Japan May 2018
- [43] Invited seminar, *IPMU*, Tokyo, Japan Jan 2018
- [42] Invited talk, *LHASSO Yearly Meeting*, Shanghai, China Dec 2017
- [41] Colloquium, *University of Maryland, College Park, MD* Oct 2017
- [40] Invited seminar, *Johns Hopkins University*, Baltimore, MD Oct 2017
- [39] **Organizer**, *KIAA Workshop on Astroparticle Phys-II*, Beijing, China Aug 2017
- [38] **Convener**, Invited talk, *TeV Particle Astrophysics 2017*, Columbus, OH Aug 2017
- [37] *Contributed talk on behalf of the GRAND Coll., 35<sup>th</sup> ICRC*, South Korea Jul 2017
- [36] Invited talk, *GRAND Workshop*, Paris, France May 2017
- [35] *IceCube Particle Astrophysics Symposium*, Madison, WI May 2017
- [34] Invited seminar, *University of Maryland, College Park, MD* Mar 2017
- [33] Invited seminar, *Shanghai Astronomical Observatory*, Shanghai, China Dec 2016
- [32] Invited talk, *International Conference on UHECRs*, Kyoto, Japan Oct 2016
- [31] Invited seminar, *RIKEN*, Tokyo, Japan Oct 2016
- [30] Invited talk, *Multi-messenger Approach to Cosmic Rays Workshop*, PA Jun 2016
- [29] Invited seminar, *NASA Goddard Space Flight Center*, Greenbelt, MD May 2016
- [28] *2nd Anisotropic Universe workshop*, Amsterdam, the Netherlands Apr 2016
- [27] Invited seminar, *The Pennsylvania State University*, State College, PA Mar 2016
- [26] **Organizer**, *Next-generation Techniques for UHE Astroparticle*, Chicago, IL Feb 2016
- [25] Invited Plenary talk, *227<sup>th</sup> AAS Meeting*, Orlando, FL Jan 2016
- [24] *TeV Particle Astrophysics 2015*, Kashiwa, Japan Oct 2015
- [23] *JSI Workshop*, Annapolis, MD Oct 2015
- [22] **Organizer**, *KIAA Workshop on Astroparticle Phys-I*, Beijing, China Sep 2015
- [21] *34<sup>th</sup> International Cosmic Ray Conference*, Hague, the Netherlands Jul 2015

- [20] *IceCube Particle Astrophysics Symposium*, Madison, WA May 2015
- [19] Invited seminar, *Center of Neutrino Physics, Virginia Tech*, Blacksburg, VA Apr 2015
- [18] Invited seminar, *GRAPPA, University of Amsterdam*, the Netherlands Jan 2015
- [17] Invited talk, *International Conference on UHECRs*, Springdale, UT Oct 2014
- [16] Invited talk, *High-Energy Messengers Workshop*, Chicago, IL Jun 2014
- [15] *APS April Meeting*, Savannah, AT Apr 2014
- [14] Invited talk, *Multi-messenger Workshop*, Columbus, OH Feb 2014
- [13] Invited seminar, *University of Wisconsin*, Madison, WI Dec 2013
- [12] ITC seminar, *Harvard-Smithsonian Center for Astrophysics*, Boston, MA Nov 2013
- [11] Astroplasma seminar, *Princeton University, Princeton, NJ* Oct 2013
- [10] Invited Lunch talk, *CCAPP, Ohio State University*, Columbus, OH Oct 2013
- [9] Invited talk, *Cosmic Ray Anisotropy Workshop*, Madison, WI Sep 2013
- [8] *KIPAC@10 Workshop*, Menlo Park, CA Sep 2013
- [7] 33<sup>rd</sup> *International Cosmic Ray Conference*, Brazil Jul 2013
- [6] Colloquium, *DESY, Zeuthen, Germany* Jun 2013
- [5] *APS April Meeting*, Denver, CO Apr 2013
- [4] *Texas Symposium on Relativistic Astrophysics*, Brazil Dec 2012
- [3] *JSI Workshop, Nature's Particle Accelerators*, Annapolis, MD Oct 2012
- [2] *18th International School of Cosmic Ray Astrophysics*, Italy Jul 2012
- [1] *APS April Meeting*, Atlanta, GA Apr 2012

## PRESS

*Neutrinos could reveal how fast radio bursts are launched*

By Lisa Grossman, *New Scientist*, Sep 2020

*A star shredded by a black hole may have spit out an extremely energetic neutrino*

By Emily Conover, *ScienceNews*, May 2020

*Very-high-energy particle acceleration powered by the jets of the microquasar SS 433*

in 21 news stories, in the top 5% of all research outputs scored by Altmetric, Oct 2018

*A 4 Billion Light-Year Journey Ends At The South Pole*

NPR News, Jul 2018

*Linking high-energy cosmic particles by black-hole jets embedded in large-scale structures*

in 23 news stories, in the top 5% of all research outputs scored by Altmetric, Jan 2018

*Case weakens for antimatter sign of dark matter*

by Edwin Cartlidge, *Science*, Mar 2017

*The Particle That Broke a Cosmic Speed Limit*  
by Natalie Wolchover, Quanta Magazine, Jun 2015

*Baby pulsars spawn universe's most energetic particles*  
by Maggie McKee, New Scientist, Mar 2012

## JOURNAL ARTICLES (stars indicate works by students)

- [32] HAWC Collaboration, **K. Fang** as a main author, HAWC Observations of the Acceleration of Very-high-energy Cosmic Rays in the Cygnus Cocoon, accepted to *Nature Astronomy*
- [31] B. D. Metzger, **K. Fang**, B. Margalit Neutrino Counterparts of Fast Radio Bursts, *Astrophys.J. Lett.* (2020)
- [30] **K. Fang**, B. D. Metzger, I. Vurm, E. Aydi, L. Chomiuk High-Energy Neutrinos and Gamma-Rays from Non-Relativistic Shock-Powered Transients, *Astrophys.J.* (2020)
- [29] **K. Fang**, A. Banerjee, E. Charles, Y. Omori Cross-Correlation Study of High-energy Neutrinos and Tracers of Large-Scale Structure, *Astrophys.J.* 894 (2020)
- [28] **K. Fang**, E. Charles, R. D. Blandford GeV-TeV Counterparts of SS 433/W50 from *Fermi*-LAT and HAWC Observations, *Astrophys.J. Lett.* 889 (2020)
- [27] S. Kimura, K. Murase, K. Ioka, S. Kisaka, **K. Fang**, P. Mészáros Upscattered Cocoon Emission in Short Gamma-ray Bursts as High-energy Gamma-ray Counterparts to Gravitational Waves, *arXiv 1910.13277*
- [26\*] V. Decoene, C. Guépin, **Ke Fang**, K. Kotera, B. D. Metzger High-energy neutrinos from fallback accretion of binary neutron star merger remnants, *arXiv 1910.06578*
- [25] H. Zhang, **K. Fang**, H. Li, D. Giannios, M. Bottcher, S. Buson Probing the Emission Mechanism and Magnetic Field of Neutrino Blazars with Multi-Wavelength Polarization Signatures, *Astrophys. J.* 876 (2019) 2
- [24] R. Alves Batista, J. Biteau, M. Bustanmante, et. al, F. Oikonomou, **K. Fang** as a correspondent author, Open Questions in Cosmic-Ray Research at Ultrahigh Energies, *Frontiers in Astronomy and Space Science*, special issue, “Multi-Messenger Astrophysics: New Windows to the Universe”, Mar 2019
- [23] **K. Fang**, B. D. Metzger, K. Murase, I. Bartos, K. Kotera, Multimessenger Implications of AT2018cow: High-Energy Cosmic Ray and Neutrino Emissions from Magnetar-Powered Super-Luminous Transients, *Astrophys. J.* 878 (2019) 34
- [22] HAWC Collaboration, **K. Fang** as a main author, Very high energy particle acceleration powered by the jets of the microquasar SS 433, *Nature* 562 (2018), 82-85
- [21] **K. Fang**, & K. Murase, Linking High-Energy Cosmic Particles by Black Hole Jet Embedded in Large-Scale Structures, *Nature Physics* (2018)  
Highlighted by Julia Becker Tjus, “Cosmic-ray tracing”, *Nature Physics*, News & Views, 22 January 2018

- [20] Y. Zhao, **K. Fang**, M. Su, M. C. Miller, A Strong Test of the Dark Matter Origin of the 1.4 TeV DAMPE Signal Using IceCube Neutrinos, *J. Cosmol. Astropart. Phys.* 06 (2018) 030
- [19\*] C. Guépin, K. Kotera, E. Barausse, **K. Fang**, K. Murase, Ultra-High Energy Cosmic Rays and Neutrinos from Tidal Disruptions by Massive Black Holes, *A&A* 616, A179 (2018)
- [18] K. Murase, M. W. Toomey, **K. Fang**, F. Oikonomou, S. S. Kimura, K. Hotokezaka, K. Kashiyama, K. Ioka, P. Meázaños, Double Neutron Star Mergers and Short Gamma-ray Bursts: Long-lasting High-energy Signatures and Remnant Dichotomy, *Astrophys. J.* 854 (2018) 60
- [17] **K. Fang** & B. D. Metzger, High-Energy Neutrinos from Millisecond Magnetars formed from the Merger of Binary Neutron Stars, *Astrophys. J.* 849 (2017) 2  
Model used as a template in “Search for High-energy Neutrinos from Binary Neutron Star Merger GW170817 with ANTARES, IceCube, and the Pierre Auger Observatory”, *Astrophys. J. Lett.* 850 (2017) 2
- [16] **K. Fang**, M. Su, T. Linden, & K. Murase, IceCube and HAWC Constraints on Very-high-energy Emission from the Fermi Bubbles, *Phys. Rev. D* 96, 123007 (2017)
- [15] T. Linden, K. Auchettl, J. Bramante, I. Cholis, **K. Fang**, D. Hooper, T. Karwal, W. Li, Using HAWC to Discover Invisible Pulsars , *Phys. Rev. D* 96, 103016 (2017)
- [14] D. Hooper, I. Cholis, T. Linden, **K. Fang**, HAWC Observations Strongly Favor Pulsar Interpretations of the Cosmic-Ray Positron Excess, *Phys. Rev. D* 96, 103013 (2017)
- [13] L. Dai & **K. Fang**, Can tidal disruption events produce the IceCube neutrinos? , *Mon. Not. Roy. Astron. Soc.* 469, 2 (2017)
- [12] **K. Fang** & K. Kotera, The Highest-Energy Cosmic Rays Cannot be Dominantly Protons from Steady Sources, *Astrophys. J. Lett.* 832 (2016) 1
- [11] **K. Fang**, K. Kotera, M. C. Miller, K. Murase, F. Oikonomou, Identifying Ultrahigh-Energy Neutrino Sources with Future Detectors, *J. Cosmol. Astropart. Phys.* 12 (2016) 017
- [10] **K. Fang** & A. V. Olinto, High-energy neutrinos from sources in clusters of galaxies, *Astrophys. J.* 828, (2016) 1
- [9] **K. Fang** & M. C. Miller, A New Method for Finding Point Sources in High-energy Neutrino Data, *Astrophys. J.*, 826 (2016) 2
- [8] **K. Fang**, K. Kotera, K. Murase, A. V. Olinto, IceCube Constraints on Fast-Spinning Pulsars as High-Energy Neutrino Sources, *J. Cosmol. Astropart. Phys.* 04 (2016) 010
- [7] **K. Fang** & T. Linden, Cluster Mergers and the Origin of the ARCADE-2 Excess, *J. Cosmol. Astropart. Phys.* 10 (2016) 004
- [6] **K. Fang** & T. Linden, The Anisotropy of the Extragalactic Radio Background from Dark Matter Annihilation, *Phys. Rev. D* 91, 083501(2015)

- [5] **K. Fang**, High-energy Neutrino Signatures of Newborn Pulsars in the Local Universe, *J. Cosmol. Astropart. Phys.* 06 (2015) 004
- [4] **K. Fang**, T. Fujii, T. Linden & A. V. Olinto, Is the Ultra-high Energy Cosmic-Ray Excess Observed by the Telescope Array Correlated with IceCube Neutrinos? *Astrophys.J.* 794, 126 (2014)
- [3] **K. Fang**, K. Kotera, K. Murase & A. V. Olinto, Testing the Newborn Pulsar Origin of Ultrahigh Energy Cosmic Rays with EeV Neutrinos, *Phys. Rev. D* 90, 103005 (2014)
- [2] **K. Fang**, K. Kotera & A. V. Olinto, Ultrahigh Energy Cosmic Ray Nuclei from Extragalactic Pulsars and the effect of their Galactic counterparts, *J. Cosmol. Astropart. Phys.* 1303 (2013) 010
- [1] **K. Fang**, K. Kotera & A. V. Olinto, Newly-born Pulsars As Sources of Ultrahigh Energy Cosmic Rays, *Astrophys.J.* 750, 118 (2012)

## PROCEEDINGS

- K. Fang**, “Cosmic Ray Nuclei from Extragalactic and Galactic Pulsars”, Proceedings of the Centenary Symposium 2012: Discovery of Cosmic Rays, *AIP Conf.Proc,1516 (2012) 224-228*
- K. Kotera, **K. Fang**, A. Olinto, S. Phinney, “Pulsars, supernovae, and ultrahigh energy cosmic rays”, Proceedings of the Annual meeting of the French Society of Astronomy and Astrophysics, *SF2A-2012, pp.583-586*

## Selected Papers - HAWC Collaboration

- HAWC Collaboration, “3HWC: The Third HAWC Catalog of Very-High-Energy Gamma-ray Sources”, *Astrophys.J.* 905 (2020) 76
- HAWC Collaboration, “HAWC J2227+610 and its association with G106.3+2.7, a new potential Galactic PeVatron”, *Astrophys.J. Lett.* 896 (2020) L29

## Selected Papers - GRAND Collaboration

- GRAND Collaboration, “The Giant Radio Array for Neutrino Detection (GRAND): Science and Design”, Whitepaper, *arXiv:1810.09994*
- K. Fang** for the GRAND Collaboration, “The Giant Radio Array for Neutrino Detection (GRAND): Present and Perspectives”, *PoS(ICRC2017)*

## Selected Papers - Auger Collaboration

- Pierre Auger Collaboration, “Contributions to the 34th International Cosmic Ray Conference (ICRC 2015) ”, *PoS(ICRC2015)*
- Pierre Auger Collaboration, “An improved limit to the diffuse flux of ultra-high energy neutrinos from the Pierre Auger Observatory”, *Phys. Rev. D* 91, 092008 (2015)

Pierre Auger Collaboration, “Constraints on the origin of cosmic rays above  $10^{18}$  eV from large scale anisotropy searches in data of the Pierre Auger Observatory ”, *Astrophys. J.* 762 (2012) L13

## Others

**K. Fang**, “An extended Crab at TeV energies”, *Nature Astronomy News & Views* (2019)