

Hsiang-Yi Karen Yang

CONTACT INFORMATION	R504 General Building II No. 101, Section 2, Kuang-Fu Road Hsinchu 300044, Taiwan (R.O.C)	<i>Phone:</i> +886-3-5742953 <i>Fax:</i> +886-3-5723052 <i>E-mail:</i> hyang@phys.nthu.edu.tw
RESEARCH INTERESTS	Feedback processes in galaxies and galaxy clusters Active galactic nuclei; galactic winds; cluster cosmology Magnetohydrodynamic simulations including cosmic-ray and plasma effects High performance computing, scientific visualization, numerical algorithms	
ACADEMIC APPOINTMENTS	◇ Assistant Professor, 2020-present National Tsing Hua University (NTHU), Institute of Astronomy (IoA) ◇ (Visiting) Assistant Research Scientist, 2018-2020 University of Maryland (UMD), Department of Astronomy and Joint Space-Science Institute (JSI) ◇ NASA Einstein Fellow, 2015-2017 Department of Astronomy, UMD ◇ Postdoctoral Research Fellow, 2011-2014 Department of Astronomy, University of Michigan (UMich)	
EDUCATION	◇ Ph.D. in Astronomy, 2011 University of Illinois at Urbana Champaign (UIUC), IL, USA ◇ M.S. in Physics, 2004 National Taiwan University (NTU), Taipei, Taiwan ◇ B.S. in Physics, 2003 National Taiwan University, Taipei, Taiwan	
AWARDS AND HONORS	◇ NTHU New Faculty Research Award, 2023 ◇ NSTC Ta-You Wu Memorial Award, 2023 ◇ TPS (Physical Society of Taiwan) Outstanding Young Physicist Award, 2022 ◇ NCTS (National Center for Theoretical Sciences) Young Theoretical Scholar Award, 2022 ◇ Yushan Young Scholar Fellowship of Ministry of Education, 2020-2025 ◇ NASA Einstein Fellowship, 2014-2017 ◇ CITA National Fellowship, 2011 (declined) ◇ KITP Graduate Fellowship, Spring 2011 ◇ NASA Earth and Space Science Fellowship, 2008-2011	

GRANT AND
ALLOCATION
AWARDS

- ◇ NSTC 2030 Cross-Generation Young Scholars Program, 2023-2026
Effects of Cosmic-ray Feedback on the Evolution of Galaxies and Galaxy Clusters
\$5,910,000 NTD in total
PI: H.-Y. K. Yang
- ◇ MOST Grant Proposal for Junior Researcher, 2020-2023
The Microphysics of Stellar and Black Hole Feedback Processes in the Universe
\$5,250,000 NTD in total
PI: H.-Y. K. Yang
- ◇ Fermi Cycle 13 Guest Investigator Program, 2020-2021 (NNH19ZDA001N)
Cosmic Ray Shock Acceleration and the Formation of the Fermi Bubbles
\$70,000 USD in total
PI: M. Ruszkowski, Co-I: H.-Y. K. Yang
- ◇ NASA Astrophysics Theory Program, 2017-2020 (NNX17AK70G)
Beyond Hydrodynamic Modeling of AGN Heating in Galaxy Clusters
\$450,000 USD in total
PI: H.-Y. K. Yang
- ◇ NSF Astronomy and Astrophysics Research Grants, 2017-2020 (1713722)
Collaborative Research: Exploring the Impacts of Cosmic Ray Feedback on Galaxy Evolution
>\$650,000 USD in total, \$102,000 USD via UMD
PI: M. Ruszkowski, UMD PI: H.-Y. K. Yang
- ◇ NASA High End Computing allocation, 2017-2020 (SMD-17-1029)
Beyond Hydrodynamic Modeling of AGN Heating in Galaxy Clusters
600,000 SBUs on Pleiades at NAS
PI: H.-Y. K. Yang
- ◇ NASA High End Computing allocation, 2013-2017 (SMD-13-4283)
Unveiling the Nature of the Fermi Bubbles
491,520 processor-hours on Discover at NCCS and 491,520 processor-hours on Pleiades at NAS
PI: H.-Y. K. Yang
- ◇ Fermi Cycle 6 Guest Investigator Program, 2013-2014 (NNH12ZDA001N)
Unveiling the Nature of the Fermi Bubbles – MHD Simulations of Cosmic Rays in the Galaxy
\$82,833 USD in total
PI: H.-Y. K. Yang
- ◇ XSEDE research allocation, 2012-2013 (TG-AST120065)
The Fermi Bubbles – Simulating Cosmic Rays in the Galaxy
1,986,542 SUs on TACC Ranger
PI: H.-Y. K. Yang

- ◇ XSEDE startup allocation, 2012 (TG-AST120054)
The Fermi Bubbles – Simulating Cosmic Rays in the Galaxy
PI: H.-Y. K. Yang
- ACADEMIC SERVICES
- ◇ Reviewer, *Nature, Nature Astronomy, Nature Communications, ApJ, ApJL, MNRAS, MNRAS Letters*
 - ◇ Invited panelist, *NASA Theoretical and Computational Astrophysics Networks*
 - ◇ Invited panelist, *NASA Postdoctoral Program*
 - ◇ Invited panelist, *NASA Astrophysics Theory Program* (3 cycles)
 - ◇ Invited panelist, *NSF Astronomy and Astrophysics Research Grants*
 - ◇ Invited panelist, *NASA Earth and Space Science Fellowship Program*
 - ◇ Organizer, *NCTS-TCA Summer Student Program*, 2021, 2022, 2023
 - ◇ Member, *Admission Committee*, NTHU, IoA, 2020-2022
 - ◇ Member, *Scholarship Committee*, NTHU, IoA, 2020-2022
 - ◇ Member, *Computing Committee*, NTHU, IoA, 2020-present
 - ◇ Doctorate Thesis Committee of *Li-Hsin Su*, NTHU IoA, 2021
 - ◇ Master Thesis Committee of *Yen-Hsing Lin, SiNan Long, Peiya Wang, Yi-Fan Liu*, NTHU IoA, 2023
 - ◇ Master Thesis Committee of *Daryl Santos, Shiau-Jie Rau, Li-Ting Ma*, NTHU IoA, 2021
 - ◇ Master Thesis Committee of *Shiang-Chih Wang, Simon Ho, Hui-Hsuan Chuang*, NTHU IoA, 2020
 - ◇ Member, *Postdoc and Professional Track Faculty Mentoring Committee* UMD astronomy, 2017-2019
 - ◇ Dissertation Committee (external) of *Francisco Holguin* University of Michigan, 2018-Present
- TEACHING
- ◇ PHYS480 “Introduction to Black Hole Astrophysics”, Spring of 2021-2023, NTHU
 - ◇ ASTR660 “Computational Astrophysics”, 2022 Fall, NTHU

- ◇ ASTR635 “High Energy Astrophysics”, 2021 Fall, NTHU
 - ◇ ASTR592 “Colloquium (II)”, 2021 Spring, NTHU
 - ◇ ASTR591 “Colloquium (I)”, 2020 Fall, NTHU
 - ◇ Special lecture series “Black Hole Astrophysics”, 2020, NTHU
 - ◇ Faculty Launch Program, 2018-2020, UMD
Professional development activities to advance teaching for UMD faculty
 - ◇ University Teaching & Learning Program, 2015-2018, UMD
Associate level, UMD teacher training course
- MENTORING
- ◇ Advising M.S. students *Pei-Ya Wang, Jyun-Han Shih, Yi-Fan Liu, Jia-Lun Li*, 2021-Present, NTHU IoA
 - ◇ Advising undergraduate students *Yung-Hsuan Tseng, Zheng-Xian Hsu, Ming-Hsueh Hsieh*, 2021-Present, NTHU Physics
 - ◇ Advising M.S. student *Yen-Hsing Lin*, 2020-Present, NTHU IoA
 - ◇ Advising M.S. student *Lu-Chen Hsieh*, 2020-2022, NTHU Physics
- OUTREACH AND DIVERSITY ACTIVITIES
- ◇ 2023 NTHU StarKids Camp, July 2023, NTHU
Fatal Attraction in the Universe – Black Holes
 - ◇ Public Lecture for the *NYCU Astronomy Club*, March 2023, NYCU
The Mysterious Black Holes
 - ◇ Public Lecture for the *NTHU Astronomy Club*, December 2022, NTHU
Galactic Center Black Hole and the Fermi Bubbles
 - ◇ High School Astronomy Camp at Taipei Astronomical Museum, Oct 2022, Taipei, Taiwan
Galactic Center Black Hole and the Fermi Bubbles
 - ◇ Cosmic Ripples Public Lecture Series, August 2022, NTHU
The Journey of Discovering Supermassive Black Holes
 - ◇ NTHU High School Student Training Program, May 2022, NTHU
Galactic Center Black Hole and the Fermi Bubbles

- ◇ Invited Lecture, General Course, Yuan-Zhi University, December 2021, Tao-Yuan, Taiwan
Fatal Attraction in the Universe – Black Holes
- ◇ NTHU High School Student Training Program, July 2021, NTHU
The Universe’s Fatal Attraction – Black Holes
- ◇ Invited Lecture, General Course, Yuan-Zhi University, April 2021, Tao-Yuan, Taiwan
The Mysterious Black Holes
- ◇ Public Lecture on 2020 Nobel Prize in Physics, November 2020, NTHU
Who Discovered Black Holes?
- ◇ Public Lecture for the *NTHU Astronomy Club*, November 2020, NTHU
The Ultimate Attractor in the Universe: Black Holes
- ◇ Invited Lecture, General Course, Yuan-Zhi University, April 2020, Tao-Yuan, Taiwan
The Mysterious Black Holes
- ◇ GRAD-MAP Mini Lecture, 2018, UMD
Supermassive Black Hole Jets
- ◇ GRAD-MAP Diversity Training Session, 2017, UMD
Training session with the Office of Diversity and Inclusion at UMD
- ◇ Public Lecture for the *AstroTerps*, 2018, UMD
Fermi Bubbles: Are They Inflated by the Supermassive Black Hole in Our Galaxy?
- ◇ Regular interviewee for the TV show *The Greater Universe*, 2017-Present, Macau, China
- ◇ Public Lecture for the *Starry Night* series, 2017, Macau Science Center, Macau, China
The Mysterious Black Holes
- ◇ Public Lecture for the *National Capital Astronomers*, 2017, UMD
- ◇ Public Lecture for the *Observatory Open House*, 2016, UMD
- ◇ Invited talk at the Taiwan Theoretical Astrophysics Workshop, November 2022, *AGN Feedback from Jets of Different Composition*, Taipei, Taiwan
- ◇ Invited talk at the 10th International Fermi Symposium, October 2022, *Fermi/eRosita Bubbles as Relics of the Past Activity of Sgr A**, Johannesburg, South Africa
- ◇ 6th ICM Theory and Computation Workshop, August 2022, *AGN Feedback from Jets of Different Composition*, Copenhagen, Denmark

INVITED
CONFERENCE
TALKS

- ◇ Highlight talk at the 27th European Cosmic Ray Symposium, July 2022, *Unveiling the Origin of the Fermi/eRosita Bubbles*, Nijmegen, Netherlands
- ◇ Sesto Workshop “Multiphase AGN Feeding & Feedback II”, June 2022, *The Fermi/eRosita Bubbles – AGN Feedback in Galaxies*, Sesto, Italy
- ◇ East Asia AGN Workshop (virtual), October 2021, *The Macro- and Micro-physics of AGN Feedback in Galaxy Clusters*, East Asia
- ◇ NCTS-TCA Summer Student Program 2021 (virtual), lecture on *Black Holes*, July 2021
- ◇ Galaxy Evolution Workshop 2020 (virtual), February 2021, *The Macro- and Micro-physics of AGN Feedback in Galaxy Clusters*, East Asia
- ◇ Three Lectures in NCTS Winter School 2021: High Energy Astrophysics, January 2021, Hsinchu, Taiwan
- ◇ NCTS Workshop “Multiscale Feedback on Galaxy Evolution: From Stellar Explosions to Active Galactic Nuclei”, October 2020, *AGN Feedback on Galaxy Evolution – Theoretical Perspective*, Hsinchu, Taiwan
- ◇ KITP Conference “Connecting Micro and Macro Scales: Acceleration, Reconnection, and Dissipation in Astrophysical Plasmas”, September 2019, *Critical Impacts of Microphysics on Galactic and Cluster Feedback*, Santa Barbara, CA
- ◇ Review talk at the 15th Potsdam Thinkshop “The Role of Feedback in Galaxy Formation: From Small-scale Winds to Large-scale Outflows”, September 2018, *Cosmic-ray Feedback in Galaxies and Clusters*, Potsdam, Germany
- ◇ Plenary session at conference “TeVPA 2018”, August 2018, *Recent Results on the Fermi bubbles*, Berlin, Germany
- ◇ Sesto Workshop “Multiphase AGN Feeding & Feedback”, July 2018, *Macro- and Micro-physics of AGN Feedback in Cluster Cores*, Sesto, Italy
- ◇ Galaxy Cluster Workshop at CCA of Flatiron Institute, May 2018, *Modeling AGN Feedback Beyond Hydrodynamics*, New York, NY
- ◇ Workshop on the Three Elephants in the Gamma-ray Sky, October 2017, *Overview: Theoretical Modeling of the Fermi Bubbles*, Garmisch-Partenkirchen, Germany
- ◇ Fellows at the Frontiers 2016, August 2016, *How AGN Jets Heat the Intracluster Medium*, Evanston, IL
- ◇ 4th ICM Theory and Computation Workshop, August 2016, *How AGN Jets Heat the Intracluster Medium – Insights from Simulations*, Minneapolis, MN
- ◇ 227th Meeting of the AAS (Special Session), January 2016, *What is the Origin of the Fermi Bubbles*, Kissimmee, FL

INVITED
SEMINARS AND
COLLOQUIA

- ◇ Fermi Bubble Workshop, April 2013, *MHD Simulations of the Bubble and Haze Emission from Leptonic AGN Jets*, Menlo Park, CA
- ◇ 2nd ICM Theory and Computation Workshop, August 2012, *Fermi Bubbles as AGN Laboratories: Supersonic Jets with Anisotropic Cosmic Ray Diffusion*, Ann Arbor, MI
- ◇ Physics Colloquium at National Chung Hsing University, May 2023, *The Galactic Center Black Hole and Fermi Bubbles*
- ◇ ASIAA/CCMS/IAMS/LeCosPA/NTNU-Physics/NTU-Physics Joint Colloquium, October 2022, *Are the Fermi/eRosita Bubbles Generated by Past Activity of the Galactic Center Black Hole?*
- ◇ Colloquium at ASIAA, September 2022, *Unveiling the Origin of the Fermi/eRosita Bubbles*
- ◇ WIPAC-Astro Seminar at University of Wisconsin-Madison (virtual), April 2022, *Origin of the Fermi and eRosita Bubbles*
- ◇ Physics Colloquium at National Kaohsiung Normal University (virtual), January 2022, *The Galactic Center Black Hole and Fermi Bubbles*
- ◇ Astronomy Colloquium at University of Illinois at Urbana Champaign (virtual), December 2021, *Cosmic-ray Feedback in the Universe*
- ◇ Physics Colloquium at University of Athens in Greece (virtual), May 2021, *Cosmic-ray Feedback in the Universe*
- ◇ NRAO/GBO/UVa Joint Colloquium (virtual), April 2021, *Cosmic-ray Feedback in the Universe*
- ◇ HEP Seminar at Academia Sinica Institute of Physics, January 2021, *Are the Fermi Bubbles Generated by Past Activity of the Galactic Center Black Holes*, Taipei, Taiwan
- ◇ Physics Colloquium at NTNU, December 2020, *The Galactic Center Black Hole and the Fermi Bubbles*, Taipei, Taiwan
- ◇ Physics Colloquium at Tunghai University, December 2020, *The Galactic Center Black Hole and the Fermi Bubbles*, Taichung, Taiwan
- ◇ Colloquium at NCU Institute of Astronomy, November 2020, *Cosmic-ray Driven Galactic Outflows*, Taoyuan, Taiwan
- ◇ Colloquium at NCKU ISAPS, November 2020, *Plasma Physics in Black-Hole Jet Feedback*, Tainan, Taiwan
- ◇ Colloquium at ASIAA, June 2020, *Cosmic-Ray Feedback in the Universe*, Taipei, Taiwan
- ◇ Physics Colloquium at National Tsing Hua University, May 2020, *The Macro- and Microphysics of AGN Feedback*, Hsinchu, Taiwan

- ◇ Physics Colloquium at National Central University, May 2020, *The Macro- and Microphysics of AGN Feedback*, Hsinchu, Taiwan
- ◇ Colloquium at National Taiwan University, February 2019, *The Microphysics of AGN Feedback*, Taipei, Taiwan
- ◇ Colloquium at National Central University, February 2019, *The Microphysics of AGN Feedback*, Taipei, Taiwan
- ◇ Colloquium at ASIAA, February 2019, *The Microphysics of AGN Feedback*, Taipei, Taiwan
- ◇ Colloquium at National Tsing Hua University, February 2019, *The Microphysics of AGN Feedback*, Hsinchu, Taiwan
- ◇ Physics Seminar at National Cheng Kung University, February 2019, *The Microphysics of AGN Feedback*, Tainan, Taiwan
- ◇ Colloquium at University of Colorado at Boulder, February 2019, *The Microphysics of AGN Feedback*, Boulder, CO
- ◇ Colloquium at University of Alabama in Huntsville, February 2019, *The Microphysics of AGN Feedback*, Huntsville, AL
- ◇ Astrophysics Seminar at Clemson University, January 2019, *The Microphysics of Feedback Processes in the Universe*, Clemson, NC
- ◇ Physics Colloquium at Clemson University, January 2019, *The Microphysics of AGN Feedback*, Clemson, NC
- ◇ Physics Seminar at National Cheng Kung University, January 2019, *The Microphysics of AGN Feedback*, Tainan, Taiwan
- ◇ Space and Cosmic Ray Physics Seminar at UMD Physics Department, November 2018, *What is the Physical Origin of the Fermi bubbles?*, College Park, MD
- ◇ Physics Seminar at University of Alabama, April 2018, *The Microphysics of AGN Feedback*, Huntsville, AL
- ◇ Astronomy Colloquium at University of Wisconsin-Madison, February 2018, *The Microphysics of AGN Feedback*, Madison, MI
- ◇ Astronomy Colloquium at UMD, March 2017, *The Microphysics of AGN Feedback*, College Park, MD
- ◇ Colloquium at National Taiwan University, March 2017, *The Microphysics of AGN Feedback*, Taipei, Taiwan
- ◇ Colloquium at National Tsing-Hua University, February 2017, *The Microphysics of AGN Feedback*, Hsin-Chu, Taiwan
- ◇ Colloquium at Academia Sinica, Institute of Astronomy and Astrophysics, April 2016, *Solving the Cooling Flow Problem of Galaxy Clusters*, Taipei, Taiwan

- ◇ CAS Wine and Cheese at Johns Hopkins University, December 2014, *The Fermi Bubbles: Possible Nearby Laboratory for AGN Jet Activity*, Baltimore, MD
 - ◇ Astronomy Colloquium at University of Wisconsin-Madison, April 2014, *The Fermi Bubbles: Possible Nearby Laboratory for AGN Jet Activity*, Madison, WI
 - ◇ Astrophysics Seminar at Northwestern University, November 2013, *The Fermi Bubbles: Possible Nearby Laboratory for AGN Jet Activity*, Evanston, IL
 - ◇ UCSB Friday Astro Lunch, January 2010, *The Origin of Intrinsic Scatter in the Galaxy Cluster $M - T_X$ Relation*, Santa Barbara, CA
 - ◇ Lunch Talk at UIUC Cosmology Group Meeting, September 2008, *Influence of Concentration and Dynamical State on Scatter in the Galaxy Cluster $M - T_X$ Relation*, Urbana, IL
- CONFERENCE TALKS
- ◇ JSI Workshop, November 2017, *What is the Origin of the Fermi Bubbles*, Annapolis, MD
 - ◇ Einstein Fellow Symposium, October 2017, *What is the Origin of the Fermi Bubbles*, Cambridge, MA
 - ◇ HEAD 16th Meeting, August 2017, *The Spatially Uniform Spectrum of the Fermi Bubbles: the Leptonic AGN Jet Scenario*, Sun Valley, ID
 - ◇ Einstein Fellow Symposium, October 2016, *How AGN Jets Heat the Intra-cluster Medium*, Cambridge, MA
 - ◇ Einstein Fellow Symposium, October 2015, *Interplay among Cooling, AGN Feedback, and Anisotropic Conduction in the Cool Cores of Galaxy Clusters*, Cambridge, MA
 - ◇ JSI Workshop, November 2014, *The Fermi Bubbles: Possible Nearby Laboratory for AGN Jet Activity*, Annapolis, MD
 - ◇ Einstein Fellow Symposium, October 2014, *The Fermi Bubbles: Possible Nearby Laboratory for AGN Jet Activity*, Cambridge, MA
 - ◇ HEAD 13th Meeting, April 2013, *The Fermi Bubbles: Possible Nearby Laboratory for AGN Jet Activity*, Monterey, CA
 - ◇ Great Lake Cosmology Workshop 10, June 2010, *Impact of Cluster Structure and Dynamical State on Scatter in the SZ Flux-Mass Relation*, Chicago, IL
 - ◇ SF09 Cosmology Summer Workshop, July 2009, *Influence of AGN Feedback on Scatter in Cluster Mass-Observable Relations*, Santa Fe, NM
- SEMINARS AND COLLOQUIA
- ◇ University of Michigan Physics Department Galaxy Cluster Seminar, June 2013, *Fermi Bubbles – Possible Milky-Way Analog of Cluster Radio Bubbles*, Ann Arbor, MI

- ◇ University of Michigan Physics Department Galaxy Cluster Seminar, February 2012, *Theoretical Uncertainties of AGN Subgrid Models in Predictions of Galaxy Cluster Observable Properties*, Ann Arbor, MI
- ◇ University of Michigan Astronomy Department Colloquium, September 2011, *The Physical Origin of Scatter in Galaxy Cluster Mass-Observable Relations*, Ann Arbor, MI
- ◇ UIUC Astronomy Department Student Seminar, September 2010, *Turbulence in Galaxy Cluster Cores: A Key to Cluster Bimodality?*, Urbana, IL
- ◇ UIUC Astronomy Department Student Seminar, March 2009, *Influence of Concentration and AGN Feedback on Cluster Observables*, Urbana, IL
- ◇ UIUC Physics Department Student Seminar, October 2007, *Sources of Scatter in Cluster Mass-Observable Relations*, Urbana, IL
- ◇ UIUC Astronomy Department Student Seminar, October 2007, *Sources of Scatter in Cluster Mass-Observable Relations*, Urbana, IL
- ◇ Snowcluster 2015 Conference, March 2015, *The Interplay among Cooling, Thermal Conduction and AGN Feedback in Galaxy Clusters*, Salt Lake City, UT
- ◇ Snowcluster 2010 Conference, March 2010, *Impact of Dynamical State, Structure and AGN Feedback on the Intrinsic Scatter in the X-ray and SZ Scaling Relations*, Salt Lake City, UT
- ◇ SF09 Cosmology Summer Workshop, July 2009, *Influence of Concentration and Dynamical State on Scatter in the Galaxy Cluster $M - T_X$ Relation*, Santa Fe, NM
- ◇ AAS 212th Meeting, June 2008, *Influence of Dynamical State on Scatter in Mass-Observable Relations of Galaxy Clusters*, St. Louis, MO

CONFERENCE
POSTERS

REFERENCES

- ◇ Dr. You-Hua Chu
Distinguished Research Fellow, Academia Sinica Institute of Astronomy and Astrophysics
11F of AS/NTU Astronomy-Mathematical Building, No.1, Sec. 4, Roosevelt Rd., Taipei 10617, Taiwan
yhchu@asiaa.sinica.edu.tw
- ◇ Dr. Christopher S. Reynolds
Plumian Professor, Institute of Astronomy, University of Cambridge
Madingley Road, Cambridge CB3 0HA, UK
csr12@ast.cam.ac.uk
- ◇ Dr. Mateusz Ruszkowski
Associate Professor, Department of Astronomy, University of Michigan
1085 S. University, Ann Arbor, MI 48109, USA
mateuszr@umich.edu

- ◇ Dr. Ellen Zweibel
W. L. Kraushaar Professor, Department of Astronomy, University of Wisconsin-Madison
475 N. Charter St., Madison, WI 53706, USA
zweibel@astro.wisc.edu
- ◇ Dr. Paul M. Ricker
Professor, Department of Astronomy, UIUC
1002 W. Green St., Urbana, IL 61801, USA
pmricker@illinois.edu