

Curriculum Vitae - Q. Daniel Wang

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Summary

Q. Daniel Wang is a professor in the Astronomy Department at University of Massachusetts Amherst. He received his Ph.D. in astronomy in 1990 from Columbia University and was awarded the 1992 ASP Robert J. Trumpler Award for Outstanding North American Ph.D. Dissertation Research in Astronomy. He was then a NASA Edwin P. Hubble Postdoctoral Fellow at University of Colorado and later a Lindheimer Fellow at Northwestern University. He was also a member of the Institute for Advanced Study at Princeton and a Raymond and Beverley Sackler Distinguished Visiting Astronomer at University of Cambridge. He was honored first as the Siyuan Visiting Professor and later as the Yixing Visiting Chair Professor in the School of Astronomy and Space Science at Nanjing University, recently as a US Fulbright Scholar and a visiting professor at Pontificia Universidad Católica de Chile, and currently as a visiting professor at Tsung-Dao Lee Institute and Shanghai Jiao Tong University. He was a Frontier Science Panel member for the US 2010 Decadal Survey on Astronomy and Astrophysics and served on the executive committee of the High Energy Division of the American Astronomical Society.

His research is primarily on high energy astrophysics. He is recognized for his pioneering work on X-ray mapping and spectroscopy of diffuse hot plasma

in and around galaxies and for leading several major surveys of the Milky Way Galaxy center, using state-of-the-art telescopes. He was the principle investigator of many national and international research projects (with multi-million US dollar funding), including several large observing projects with the Hubble Space Telescope, Chandra X-ray Observatory, and XMM-Newton X-ray Observatory. He has (co-)authored 210+ research papers published in refereed journals (including four in *Nature* and one in *Science* as the lead author and one single author review paper in Proceedings of the National Academy of Sciences). His publication covers a broad range of topics: compact stars, supernova remnants, superbubbles, and hot circumgalactic and intergalactic media, as well as galactic nuclei and their environments. His current research focuses on the feedback and ecosystem of galaxies and galactic nuclear regions. He mainly uses radio, infrared, ultraviolet, and X-ray observations to conduct these studies. He also carries out theoretical and computational studies with his students and collaborators. He has mentored numerous students and postdocs, who are well-received by the community. His research was press-released by NASA in multiple occasions and was often covered by news media, nationally and internationally.

Professional Experience

2008 - present	Full Professor, University of Massachusetts, Amherst
2002 - 2008	Associate Professor, University of Massachusetts, Amherst
1999 - 2002	Assistant Professor, University of Massachusetts, Amherst
1994 - 1999	Research Assistant Professor, Northwestern University, Evanston
1993 - 1994	Research Scientist at University of Colorado, Boulder
1990 - 1993	Hubble Fellow, Joint Institute for Laboratory Astrophysics, Boulder

Professional Recognition

2018 - present	Visiting Professorship, Tsung-Dao Lee Institute and Shanghai Jiao Tong University
2018	Visiting Professorship, Pontificia Universidad Católica de Chile
2018	U.S. Fulbright Scholar
2017 - 2018	Fellow of the Chinese Academy of Sciences President's International Fellowship Initiative
2013 - 2016	Yixing Visiting Chair Professorship, Nanjing University
2013	Raymond and Beverley Sackler Distinguished Visiting Astronomer, University of Cambridge
2006 - 2009	Siyuan Visiting Chair Professorship, Nanjing University
2005	Distinguished Visitor Fellowship, Institute for Advanced Study, Princeton
1997	First-Class Award for the Science and Technology Advance from the National Education Committee of China

1994	Lindheimer Fellowship, Northwestern University
1992	Robert J. Trumpler Award for Outstanding North American Ph.D Dissertation Research in Astronomy from the Astronomical Society of Pacific
1990 - 1993	Hubble Postdoctoral Fellowship
1990	Harvard-Smithsonian Center for Astrophysics Fellowship (declined)
1990	Canadian Institute for Theoretical Astrophysics Fellowship (declined)
1985	Nanjing University "New Star" Award

Professional Advisory Boards

2018 - 2019	Member of the NASA Great Observatory Science Analysis Group
2017 - present	Science working group member on the IGM and CGM for Hot Universe Baryon Surveyor, (Concept study; PI: Wei Cui, Hsinghua University)
2017 - present	Science working group member on Census of WHIM, Accretion and Feedback Explorer, (Concept study; PI: Li Ji, Purple Mountain Astronomical Observatory)
2016 - 2017	Overseas Expert for Chinese Academy of Sciences
2015 - present	Academic Board of the Key Laboratory for Research in Galaxies and Cosmology, Chinese Academy of Sciences
2014 - 2017	Executive Committee Member of the High Energy Astrophysics Division of the American Astronomical Society
2009	Frontier Science Panel Member of US Astro 2010 - the Decadal Survey on Astronomy and Astrophysics

Professional Associations

NASA approved Athena X-ray mission team member
 American Astronomical Society
 International Astronomical Union
 International Committee on Space Research
 International Astrostatistics Association

Major Current Research Projects

Galactic Center:

Systematic X-ray Study of the Galactic Supermassive Black Hole Sgr A* and its Immediate Environment
 Multi-band Infrared Mapping of the Galactic Nuclear Region
 (Sub)millimeter Survey of the Galactic Central Molecular Zone
 Chandra Mapping of the Galactic Center-Bulge Interface

Feedback and Ecosystem of Galaxies:

X-ray Study of the 30 Dorado Nebula
 Multi-wavelength Study of M31 Nucleus and Bulge
 Multi-wavelength study of edge-on galaxies, including CHANG-ES (Continuum HALos in Nearby Galaxies – an EVLA Survey), as well as Chandra/XMM-Newton Surveys
 Multi-wavelength study of outer circumgalactic and circumcluster media
 Multi-wavelength study of the Brightest Galaxies in the Universe: Gravitationally Lensed Submm Galaxies at High Redshifts

Current UMass Students that I am working with

Andrew Wright, Leo Drake, and Shamus Flynn

Former Postdoctoral Associates/Visiting Scholars and Students

Postdoctoral Associates/Visiting Scholars:

Stefan Immler 3/2000-8/2002 (Program Scientist in the Astrophysics Division at NASA Headquarters)
Cornelia Lang 2000-2002 (professor at U. of Iowa)
Fangjun Lu 2001-2002 (professor at Institute for High-Energy Physics, China)
Rosa Williams 2001-2003 (Professor at Columbus State University, Georgia)
Yu Gao 2002-2003 (professor at Purple Mountain Observatory, China)
Yang Chen, 2002-2003 (professor at Nanjing U., China)
Donald Honer, 2003-2004 (staff at GSFC)
David Smith 2003-2004 (returned to England; lost contact)
Yangsen Yao, 2003-2005 (postdoc at MIT and U. of Colorado)
Jiren Liu, 2008-2010 (2008-2010; astrophysicist at National Astronomical Observatory of China)
Shiyin Shen 2011 (professor, Shanghai Astronomical Observatory, China)
Qiang Yuan 2014-2016 (astrophysicist at Purple Mountain Observatory, China)
Shuinai Zhang 2017-2018 (astrophysicist at Purple Mountain Observatory, China)
Renyi Ma 2017-2018 (associate Professor at Xiamen University, China)
Xiaojie Xu, 2019 (research scientist at Nanjing U., China)

Ph.D. Students:

Li Ji 2006 Ph.D. (postdoc at MIT; currently on faculty of Purple Mountain Observatory, China)
Zhiyuan Li 2008 (postdoc at CfA, UCLA, professor of Nanjing University (NJU))
Shikui Tang 2009 (postdoc at Mass. General, residency at U. Penn; now a medical physicist)
Bing Jiang 2009 (jointly supervised with Yang Chen at NJU; currently on faculty of NJU)
Jiangtao Li 2010 (jointly supervised with Yang Chen at NJU; currently a postdoc at U. of Michigan)
Hui Dong 2011 (postdoc at National Optical Astronomical Observatory and now at Instituto de Astrofísica de Andaluca - CSIC, Granada, Spain)
Chong Ge 2015 (jointly supervised with Qiusheng Gu at NJU; now postdoc at U. of Alabama)
Shawn Roberts (2016; data scientist at U.S. Census Bureau)
Yuping Tang (2019, jointly supervised with Grant Wilson; now postdoc at U. de Chile)
Jun Li, 2018-2020 (jointly supervised with Biwei Jiang at Beijing Normal U., China)

Graduate students who did other research projects with me:

Aimee D'Onofrio (2000-2001; 2nd-year project; MIT Lincoln Lab)
Chow-Choong Ngeow (2000-2001; 1st-year project; National Central University, Taiwan)
Tara Chevas (2001-2002, visiting student from Queen's University, Canada)
Shikui Tang (2003-2004; 1st-year project)
Zhiyuan Li (2004-2005; 2nd-year project)
Hui Dong (2005-2006; 1st-year project)
Bing Jiang (2006-2008; visiting graduate student from NJU)
Zhaoyu Zuo (2007-2008; visiting graduate student from NJU)
Seth Johnson (2007-2008; 1st-year project)
Roger Ledgister (2008-2009; 1st-year project)
David Welch (2008-2009; 1st-year project)
Zhankui Lu (2009-2010; 1st-year project)
Xiaojie Xu (2010-2012; visiting student from NJU)
Shuinai Zhang (2011; visiting student from NJU)
Michael Petersen (2010-2011; 1st-year project)
Frank Ripple (2011-2012; 2nd-year project)
Seunghwan Lim (2013-2014; 1st-year project)

Yaping Li (visiting student from Xiamen University; 2014)

Patrick Kamieneski (2015-2016; 1st-year project)

Zhiyuan Ji (2017-2018; 2nd-year project)

Luan Luan (2018-2019; 1st-year project)

Yingjie Cheng (2019-2020; 1st-year project)

Undergraduates (who conducted research under my supervision):

Ted Markowsky (2003; Fox Broadcasting)

Wakako Fukui (Mt. Holyoke College; 2003)

Ben Farley (2004, graduate student at American University)

Kate Whitaker (2004; Yale University graduate student, NASA postdoc, Hubble fellow), winner of the Mary Dailey Irvine Prize and the College Outstanding Undergraduate Student Award for Academic Excellence

Chris Duston (2003-2005, Penn State University graduate student, Florida State Univ), winner of the David J. Van Blerkom Research Scholarship in Astronomy

Pat Dragon (2005)

Mike Okrochkov (2007)

Jake McCoy (2010-2011; U.of Iowa graduate student; NASA Space Technology Research Fellow at Penn State University), winner of the David J. Van Blerkom Research Scholarship in Astronomy

Aaron Dunbrack (2014-2015; Stony Brook University physics graduate student), 2015 Goldwater Scholar

Dylan Pare (2015-2017, University of Iowa graduate student)

Kendall Sullivan (2015-2016, University of Texas at Austin graduate student)

Yuxuan (Mark) Zeng (2017-2020)

Manesh Mishra (2019)

Rafi Rubenstein (Brandeis University; 2020 summer research)

High-School Students Whom I Mentored:

Dan Hussain (Richland Senior High School in Johnstown; Siemens Westinghouse National Science Award, MIT undergraduate; now an inventor, entrepreneur and patent agent)

Sam Cabot (Berkshire School, Sheffield; Princeton U. undergraduate; Cambridge and Yale graduate students)

Highlights of Research Achievements

The Universe is hot and energetic, as revealed by high-energy astrophysics – the main field of my research. Collaborating with astronomers around the globe, we have researched a broad range of topics, via theoretical/computational studies, as well as observations across the electromagnetic spectrum, using best available facilities. The following highlights a few research areas where I have made most significant contributions.

1) High-energy astrophysical phenomena and processes:

My research career started with the first calculation of quark matter viscosity and its application to the damping process of quark star vibration (Wang & Lu 1984, *Physics Letters B*; Wang et al. 1989, *Nature*). My interest in extreme astrophysics continued with my participation in the discovery and follow-up study of the fastest rotating young pulsar and its uniquely regular star quake pattern (e.g., Marshall et al. 1998, Wang et al. 1998, Middleditch et al. 2006, all in *ApJ*), as well as the pulsar in the supernova remnant G54.1+0.3 – a close cousin of the Crab Nebula (Camilo et al., Lu et al. 2002 *ApJ*). Later, as the lead author of a landmark paper, I presented the first evidence for the substantial mass loss from the accretion flow onto our Galaxy’s central massive black hole, known as Sgr A* (Wang et al. 2013, *Science*). This work represents a major breakthrough in understanding the silent majority of galactic nuclei. Recently, we have extended the work on the accretion flow to include numeric hydrodynamic simulations, which has led to the first estimations of both the flow’s angular momentum (Roberts et al. 2017, *MNRAS*) and the quiescent X-ray emission from the immediate vicinity of the black hole (Ma et al. 2018). I was also part of the international team that detected the radio to sub-millimeter emission from the nearest tidal disruption event – the disruption of a Jupiter-sized planet by the central massive black hole – in the Virgo cluster galaxy NGC 4845 (Irwin et al. 2015, Yuan et al. 2016, *MNRAS*). This, together with our follow-up observations with VLBA, ALMA, and SWIFT, has provided a so far unique opportunity to conduct a spatially resolved study of evolving jets from such an event (Perlman et al. 2017, 2019, *ApJ*). Recently, we have been developing a multi-wavelength statistical approach to study the luminosity

and mass distributions of accreting white dwarfs in compact stellar binaries, based on multi-wavelength surveys. This project is aimed to quantify both their contribution to the Galactic X-ray background (e.g., Xu, Wang, & Li 2016, ApJ) and their evolutionary role that may lead to Type Ia supernovae.

2) Galactic circumnuclear environment:

Lines of evidence show that galactic nuclear regions play a central role in galaxy evolution, so it is important to know how such regions work. I led several large observational campaigns to explore the nuclear region of our own Galaxy. We were the first to use the Chandra X-ray Observatory to survey the central molecular zone of our Galaxy, and also actively participated in subsequent deeper surveys, providing an unprecedented high-resolution view of numerous discrete energetic objects and diffuse hot plasma, as well as Sgr A* (Wang, Gotthelf, & Lang 2002, Nature; Muno et al. 2006, ApJ; Wang et al. 2013, Science). I also organized an ambitious multi-institution effort to map the near-infrared emission from ionized gas in the central zone, using the Hubble Space Telescope (Wang et al. 2010, MNRAS). I oversaw the challenging data analysis for that project, which has resulted in numerous publications and established an invaluable legacy data set that will continue to be of enormous value to future researchers. Results from the project itself include the discovery of many evolved massive stars, a large fraction of which are unexpectedly located outside known stellar clusters, and the detailed mapping of diffuse photo-ionized gas, providing a glimpse of various star formation modes. Recently, I formed a team to complete a large-scale, high-resolution survey of millimeter emission from the zone with the Large Millimeter Telescope (Wang et al. 2019). Combined with complementary far-infrared data from the Herschel Space Observatory, this survey allows us to map the projected dust mass distribution (Tang et al. 2019). A joint analysis of the dust emission and extinction data is further enabling us to construct the first 3-D global distributions of stars and gas in the nuclear region of our Galaxy. Most recently, our study starts to incorporate existing observations made with the Atacama Large Millimeter/submillimeter Array and to propose for new ones, which helps us to explore the dynamics and chemistry of the gas. These surveys offer important insights into the interplay among various components of the region, as well as a glimpse of what may occur in distant galaxies under similar extreme conditions.

3) Stellar feedback and galactic ecosystem:

In galaxies, feedback from stars, plus occasional active galactic nuclei, is manifested by the presence of chemically enriched hot galactic coronae. They can dominate the energetics of the interstellar medium, drive outflows into galactic halos, and regulate galaxy evolution (Tang et al. 2009, MNRAS; Tang & Wang 2010, MNRAS). My research has played a pioneering and leading role in the study of galactic coronae. As a graduate student, I conducted the first systematic X-ray study of diffuse hot plasma in the nearby Large Magellanic Cloud galaxy. Later I made the first detection of the corona around a spiral galaxy (Wang et al. 1995, 2001, ApJL) and then initiated a systematic X-ray survey of galactic coronae around large samples of disk galaxies, using Chandra and XMM-Newton observations (e.g., Li & Wang 2013; Li, Crain, & Wang 2014; Wang et al. 2016, MNRAS; Li et al. 2018, ApJL; Jiang et al. 2019, ApJ). This later survey, for example, provides critical tests for theories of galaxy evolution by showing that 1) the coronae trace the stellar feedback, 2) the X-ray efficiency of a corona decreases with increasing surface star formation rate, 3) substantial discrepancies exist between observations and simulations, 4) the coronae of galaxies are insufficient to explain their “missing baryons”, and 5) the interplay between hot and cool gases may play an important role in the X-ray emission at the galactic disk/halo interface. I further led a systematic X-ray absorption line survey of the diffuse hot plasma in our Galaxy (e.g., Wang et al. 2005, ApJ; Yao & Wang 2005, ApJ). For this survey, we developed state-of-the-art tools for the joint analysis of X-ray absorption and emission lines and provided the first global characterization of the spatial extent, chemical abundances, kinematics, and thermal state of the X-ray-emitting/absorbing gas in and around our Galaxy (e.g., Wang 2010, PNAS).

4) X-ray spectroscopy of diffuse hot plasma:

Despite these advances, the interpretation of X-ray emission can be complicated, even for galaxies with no bright active galactic nuclei. In a series of spectroscopic studies that I initiated, we demonstrate that a considerable fraction of diffuse soft X-ray emission observed in such galaxies cannot simply arise from collisional processes in optically thin thermal gas, as has been commonly assumed (Liu et al. 2010, 2011, MNRAS; Zhang et al. 2014, 2019 ApJ; Yang et al. 2018, ApJ). This is important for understanding the nature of the emission and for correctly inferring the thermal and chemical properties of the hot plasma. We show that in active star-forming galaxies such as M82, part of the soft X-ray emission most likely originates in charge exchange between ions and neutral atoms at the interface between hot and cool gases (Zhang et al. 2014). We have directly confirmed such charge exchange induced emission at the shock front of a supernova remnant (Roberts & Wang 2015, MNRAS). In a relatively quiescent circumstance such as the stellar bulge of our neighboring Andromeda galaxy, the hot plasma can be optically thick for strong resonance lines. We show that photon scattering could play a major role in shaping the observed X-ray spectrum and spatial distribution (Yang et al. 2018). We have further demonstrated that modeling the effects of these processes can yield key information about the velocity structure of the hot plasma or its interface area with cool gas, which could hardly be measured otherwise (Zhang et al. 2014; Yang et al. 2018). Furthermore, we show X-ray spectroscopic evidence for the over-ionization of the plasma, most likely due to the presence of an AGN about

half a million years ago at the center of the galaxy (Zhang et al. 2019). This work points out a way to explore relics of AGN, based on their effects on X-ray spectroscopic properties of diffuse hot plasma in and around galaxies, which has long recombination timescale. With these pioneering studies, we are well positioned to take advantage of future X-ray observing facilities with their greatly improved spectroscopic capabilities to further our investigations.

5) Evolution of galaxies in intergalactic environments:

Galactic ecosystems are not completely isolated and can be strongly affected by their intergalactic environments. I initiated multiple innovative projects to provide the first lines of observational evidence for galaxy transformation and destruction during galaxy cluster formation (Wang et al. 2004, ApJ), for diffuse hot plasma spanning the deep intergalactic space between clusters and groups of galaxies (Wang, Connelly, & Brunner 1997, ApJL; Wang et al. 2004, ApJ), and for the dearth of UV-absorbing cool gas in and around clusters and their embedded galaxies (Burchett et al. 2018, MNRAS). More recently, we have developed an all-sky fitting method to statistically characterize the intrinsic radial profile of the diffuse X-ray intensity in outskirts of galaxy clusters. This method uses known optically identified halos as a prior to separate the contributions from merging and projected halos. We find that the derived profile is substantially steeper than that obtained without this separation and that the physical state of diffuse hot plasma in merging halos changes systematically with clustercentric radius. These results place fundamental constraints on theories on the environmental dependence of galaxy and cluster evolution.

Rcent Publications in Referred Journals (since 2013)

[Mentees whose co-authorship took place under my direct supervision are marked: postdocs (*), graduate (**), undergraduate (***), and high-school (****) students]

212. Cheng, Y.J.** , **Wang, Q.D.**, & Lim, S.H. “X-ray spectroscopy of the starburst feedback in 30 Doradus”, 2021, MNRAS, 504, 1627
211. **Wang, Q.D.**, “Chandra large-scale mapping of the Galactic center: Probing high-energy structures around the central molecular zone”, 2021, MNRAS, 504, 1609
210. Heald, G. et al. “CHANG-ES XXIII: Influence of a cosmic ray-driven wind in NGC 5775”, 2021, MNRAS, submitted
209. Tang, Y.P.** , **Wang, Q.D.**, Wilson, G.W., Heyer, M.H., Gutermuth, R.A. et al. “AzTEC Survey of the Central Molecular Zone: Data Reduction, Analysis and Preliminary Results”, 2021, MNRAS, 505, 2392
208. Tang, Y.P.** , **Wang, Q.D.**, & Wilson, G.W. “AzTEC Survey of the Central Molecular Zone: Increasing Spectral Index of Dust with Density”, 2021, MNRAS, 505, 2377
207. Harrington, K.C., et al. “Turbulent Gas in Lensed Planck-selected Starbursts at $z = 1-3.5$ ”, 2021, MNRAS, 508, 95
206. Cui, W., et al. “HUBS: a dedicated hot circumgalactic medium explorer”, 2020, Proceedings of the SPIE, 114442S
205. Stein, Y. et al. “CHANG-ES XXI: Transport processes and the X-shaped magnetic field of NGC 4217: off-centered superbubble structures”, 2020 , A&A, 639, 111
204. Corrales, L., Baganoff, F. K., **Wang, Q. D.**, Nowak, M., Neilsen, J., Markoff, S., Haggard, D., Davis, J., Houck, J., & Principe, D. “The Chandra High-resolution X-Ray Spectrum of Quiescent Emission from Sgr A*”, 2020, ApJ, 891, 71
203. **Wang, Q.D.**, Li, J.** , Russell, C. M. P., & Cuadra, J. “Colliding winds in and around the stellar group IRS 13E at the galactic centre”, MNRAS, 2020, 492, 248
202. Jiang, X.-C., Li, J.-T., Fang, T.-T., & **Wang, Q.D.**, “Chandra survey of nearby highly inclined disk galaxies – V: emission structure and origin of galactic coronae”, ApJ, 2019, 885, 38
201. Harrington, K.C., et al. “The ‘Red Radio Ring’: ionized and molecular gas in a starburst/active galactic nucleus at $z = 2.55$ ”, MNRAS, 2019, 488, 1489
200. Zhang, S. N.* , **Wang, Q.D.**, Foster, A.R., Sun, W., Li, Z.-Y., & Ji, L. “XMM-NEWTON RGS Spectroscopy of the M31 Bulge. I: Evidences for a past AGN half a million years ago”, MNRAS, 2019, 885, 157
199. Nakashima, S., Koyama, K., **Wang, Q.D.**, & Enokiya, R. “X-ray Observation of a Magnetized Hot Gas Outflow in the Galactic Center Region”, ApJ, 2019, 875, 32
198. Ge, M.Y., Lu, F. J., Yan, L. L., Weng, S. S., Zhang, S. N., **Wang, Q. D.**, Li, Z. J., & Zhang, W. “The brightening of the pulsar wind nebula of PSR B0540-69 after its pulse rate transition”, Nature Astronomy, 2019, 3, 1122
197. Irwin, J. et al. “CHANG-ES XX. High Resolution Radio Continuum Images of Nearby Edge-on Galaxies and their AGNs: Data Release 3”, MNRAS, 2019, 158, 21

196. Ma, R.-Y.* , Roberts, S.R.** , Li, Y.-P., & **Wang, Q.D.**, “Spectral Energy Distribution of the Inner Accretion Flow Around Sgr A* – Clue for a weak outflow in the innermost region”, *MNRAS*, 2019, 483, 5614
195. Miskolczi, A. V. Heesen, V., Bomans, D.-J., Dettmar, R.-J., Blex, S., Nikiel-Wroczyński, B., Chyży, K.T., Heald, G., Horellou, C., Beck, R., Stein, Y., Irwin, J. A., & **Wang, Q.D.** “CHANG-ES XII: A LOFAR and VLA view of the edge-on star-forming galaxy NGC 3556”, *A&A*, 2019, 622, 9
194. Ge, C.** , **Wang, Q.D.**, Tripp, T.M., Burchett, J.N.** , Sun, M., Li, Z., Gu, Q., & Ji, L. “Probing the dynamical state, baryon content, and multiphase nature of galaxy clusters with bright background QSOs”, *MNRAS*, 481, 2018, 4111
193. Chen Y., **Wang Q.D.**, Zhang G., Zhang S.* , & Ji L. “Resonant scattering effects on the soft X-ray line emission from the hot interstellar medium: I. galactic bulges”, *ApJ*, 861, 2018, 138
192. Irwin, J.A., Henriksen, R.N., Wezgowie, M., Damas-Segovia, A., **Wang, Q.D.**, et al. “CHANG-ES XI: Circular Polarization in the Cores of Nearby Galaxies”, *MNRAS*, 476, 2018, 5057
191. Vargas C.J., Partiarroyo, S.C.M., Schmidt, P., Rand, R.J., Stein, Y., Walterbos, R.A.M., **Wang, Q.D.**, et al. “CHANG-ES X: Spatially-Resolved Separation of Thermal Contribution from Radio Continuum Emission in Edge-on Galaxies”, *MNRAS*, 853, 2018, 128
190. Li, J.-T., Bregman, J.N., **Wang, Q.D.**, Crain, R.A., & Anderson, M.E. “Baryon Budget of the Hot Circum-Galactic Medium around the Most Massive Spiral Galaxies”, *ApJL*, 855, 2018, 24
189. Burchett, J.N., Tripp, T.M., **Wang, Q.D.**, Willmer, C.N.A., Bowen, D.V., & Jenkins, E.B., “Warm-hot Gas in X-ray Bright Galaxy Clusters and the H I-deficient Circumgalactic Medium in Dense Environments”, *MNRAS*, 475, 2018, 2067
188. Yuan, Q.* , **Wang, Q.D.**, Liu, S., & Wu, K.-W. “A Systematic Chandra study of Sgr A*: II. X-ray flare statistics”, *MNRAS*, 473, 2018, 306
187. Li, J.-T., Bregman, J.N., **Wang, Q.D.**, Crain, R.A., & Anderson, M.E. “The Circum-Galactic Medium of Massive Spirals. II. Probing the Nature of Hot Gaseous Halo around the Most Massive Isolated Spiral Galaxies”, *ApJ*, 233, 2017, 20
186. Dong, H., Schödel, R., Williams, B.F. Nogueras-Lara, F., Gallego-Cano, E., Gallego-Calvente, T., **Wang, Q.D.**, Rich, R.M., Morris, M., Do, T., Ghez, A., & Li, Z.-Y. “Near-Infrared Variability Study of the Central $2.3' \times 2.3'$ of the Galactic Centre II. Identification of RR Lyrae Stars in the Milky Way Nuclear Star Cluster”, *MNRAS*, 471, 2017, 361
185. Dong, H., Schödel, R., Williams, B.F. Nogueras-Lara, F., Gallego-Cano, E., Gallego-Calvente, T., **Wang, Q.D.**, Rich, R.M., Morris, M., Do, T. & Ghez, A. “Near-Infrared Variability Study of the Central $2.3' \times 2.3'$ of the Galactic Centre I. Catalog of Variable Sources”, *MNRAS*, 470, 2017, 3427
184. Perlman, E.S., Meyer, E.T., **Wang, Q.D.**, Yuan, Q.* , Henriksen, R., Irwin, J., Krause, M., Wiegert, T., Murphy, E.J., Heald, G., & Dettmar, R.-J. “Compact Resolved Ejecta in the Nearest Tidal Disruption Event”, *ApJ*, 842, 2017, 126
183. Dong, H., Lacy, J.H., Schödel, R., Mauerhan, J., **Wang, Q.D.**, Cotera, A. & Gallego-Cano, E. “IRTF/TEXES Observations of the H II Regions H1 and H2 in the Galactic Centre”, *MNRAS*, 470, 2017, 561
182. Liu, T., et al. “X-ray Spectral Analysis of AGN from the 7MS Chandra Deep Field South Survey: the Distribution and Evolution of AGN’s obscuration”, *ApJS*, 232, 2017, 8
181. Li, Y.-P., Yuan, F., & **Wang, Q.D.** “A Magneto-hydrodynamic Model for Multi-wavelength Flares from Sgr A*. I. Method, the Near-infrared and X-ray Properties”, *MNRAS*, 468, 2017, 2552
180. Irwin, J.A., et al. “CHANG-ES VIII: Uncovering Hidden AGN Activity in Radio Polarization”, *MNRAS*, 464, 2017, 1333
179. Roberts, S.R.** , Jiang, Y.-F., **Wang, Q.D.**, & Ostriker, J. “Towards Self-Consistent Modeling of the Sgr A* Accretion Flow: Linking Theory and Observation”, *MNRAS*, 466, 2017, 1477
178. Russell, C.M.P., **Wang, Q.D.**, & Cuadra, J. “Modeling the Thermal X-ray Emission around the Galactic Centre from Colliding Wolf-Rayet Winds”, *MNRAS*, 464, 2017, 4958
177. Li, J.-T., Bregman, J.N., **Wang, Q.D.**, Crain, R.A., & Anderson, M.E. “The Circum-Galactic Medium of MASSive Spirals. I. An Overview and a Case Study of NGC 5908”, *ApJ*, 830, 2016, 134
176. Damas-Segovia, A. et al., “CHANG-ES VII: Magnetic Outflows from the Virgo Cluster Galaxy NGC 4388”, *ApJ*, 824, 2016, 30
175. Yuan, Q.* , **Wang, Q.D.**, Lei, W.-H., Gao, H., & Zhang, B. “Catching Jetted Tidal Disruption Events Early in Millimetre”, *MNRAS*, 461, 2016, 3375
174. Dong, H., Li, Z., **Wang, Q.D.**, Lauer, T.R., Olsen, K.A.G., Saha, A., Dalcanton, J.J., & Groves, B.A. “High-Resolution Mapping of Dust via Extinction in the M31 Bulge”, *MNRAS*, 459, 2016, 2262

173. Xu, X.-J., **Wang, Q.D.**, & Li, X.-D. "Fe Line Diagnostics of Cataclysmic Variables and Galactic Ridge X-Ray Emission", *ApJ*, 818, 2016, 136
172. Yuan, Q.* & **Wang, Q.D.**, "A Systematic Chandra Study of Sgr A*: I. X-ray Flare Detection", *MNRAS*, 456, 2016, 1438
171. Li, J.-T., et al. "CHANG-ES VI: Probing Supernova Energy Deposition in Spiral Galaxies Through Multi-Wavelength Relationships", *MNRAS*, 456, 2016, 1723
170. Ge, C.** & **Wang, Q.D.**, Tripp, T. M., Li, Z., & Gu, Q. "Multiphase Medium and Dynamic State of Galaxy Clusters: A1095 and A1926", *MNRAS*, 459, 2016, 366
169. Lei, W.-H., Yuan, Q.* & **Wang, Q.D.** "IGR J12580+0134: The First Tidal Disruption Event with an Off-beam Relativistic Jet", *ApJ*, 816, 2016, 20
168. **Wang, Q.D.**, Li, J.-T., Jiang, X., & Fang, T.T. "Chandra Survey of Nearby Highly Inclined Disk Galaxies – IV: New Insights into the Working of Stellar Feedback", *MNRAS*, 457, 2016, 1385
167. Li, Y.-P.** & Yuan, F., Yuan, Q.* & **Wang, Q.D.**, Chen, P. F., Neilsen, J., Fang, T., Zhang, S., Dexter, J., "Statistics of X-ray Flares of Sagittarius A*: Evidence for Solar-like Self-organized Criticality Phenomena", *ApJ*, 810, 2015, 19
166. Ge, C.** & Li, Z., Xu, X., Gu, Q., **Wang, Q.D.**, Roberts, S., Kraft, R.P., Jones, C., Forman, W.R. "X-ray Emissivity of Old Stellar Populations: A Local Group Census", *ApJ*, 812, 2015, 130
165. Dong, H., Li, Z., **Wang, Q.D.**, Lauer, T. R., Olsen, K. A. G., Saha, A., Dalcanton, J.J., Williams, B. F. "Photometric Evidence of an Intermediate-age Stellar Population in the Inner Bulge of M31", *MNRAS*, 451, 2015, 4126
164. Irwin, J.A., Henriksen, R.N., Krause, M., **Wang, Q.D.**, Wiegert, T., Murphy, E.J., Heald, G., Perlman, E. "CHANG-ES V: Nuclear Radio Outflow in a Virgo Cluster Spiral after a Tidal", *ApJ*, 809, 2015, 172
163. Wiegert, T., et al. "CHANG-ES IV: Radio Continuum emission of 35 Edge-on Galaxies Observed with the Karl G. Jansky Very Large Array in D-configuration - Data Release 1", *AJ*, 150, 2015, 81
162. Yang, Y., Li, Z., Sjouwerman, L.O., **Wang, Q.D.**, Gu, Q., Kraft, R.P., & Yuan, F. "Detection of a Compact Nuclear Radio Source in the Local Group Elliptical Galaxy M32", *ApJ*, 807, 2015, 19
161. Roberts, S.** & **Wang, Q.D.** "X-ray Emission from Charge Exchange in the Cygnus Loop SNR", *MNRAS*, 449, 2015, 1340
160. Cuadra, J., Nayakshin, S. & **Wang, Q.D.** "The Role of Feedback in Accretion on Low Luminosity AGN: Sgr A* Case Study", *MNRAS*, 450, 2015, 277
159. Li, Y.-P., Yuan, F., & **Wang, Q.D.** "Does the Faraday Rotation Measure of Sgr A* Rule Out Its Jet Model?", *ApJ*, 798, 2015, 22
158. Dong, H., Mauerhan, J., Morris, M.R., **Wang, Q.D.**, & Cotera, A. "Origins of Massive Field Stars in the Galactic Center: a Spectroscopic Study", *MNRAS*, 446, 2015, 842
157. Zhang, S.* & **Wang, Q.D.**, Ji, L., Smith, R.K., Foster, A.R. & Zhou, X. "Spectral Modeling of the Charge Exchange X-Ray Emission from M82", *ApJ*, 794, 2014, 61
156. Naze, Y., **Wang, Q.D.**, Chu, Y.-H., Gruendl, R., & Oskinova, L. "A Deep Chandra Observation of the Giant H II Region N11. I. X-Ray Sources in the Field", *ApJS*, 213, 2014, 23
155. Sakai, K., Yao, Y., Mitsuda, K., Yamasaki, N.Y., **Wang, Q.D.**, Takei, Y., & McCammon, D. "Structural Study of Galactic Hot Gas toward Markarian 421 from X-ray Absorption and Emission Lines", *PASJ*, 66, 2014, 83
154. Dong, H., Li, Z., **Wang, Q.D.**, Lauer, T.R., Olsen, K.A.G., Saha, A., Dalcanton, J.J., Gordon, K., Fouesneau, M., Bell, E., & Bianchi, L. "The Panchromatic Hubble Andromeda Treasury. VII. The Steep Mid-ultraviolet to Near-infrared Extinction Curve in the Central 200 pc of the M31 Bulge", *ApJ*, 785, 2014, 136
153. **Wang, Q.D.**, & Walker, S. "X-ray Mapping of Galaxy Clusters to the Virial Radii at $z=0.23$ and 0.45 ", *MNRAS*, 439, 2014, 1796
152. Li, J.-T.* & Crain, R., & **Wang, Q.D.** "Chandra Survey of Nearby Highly-inclined Disk Galaxies III: Comparison with Simulations", *MNRAS*, 440, 2014, 859
151. Wang, L., Yang, X., Shen, S., Mo, H. J., van den Bosch, Luo, W., Wang, Y., Lau, E. T., **Wang, Q.D.**, Kang, X., & Li, R. "Cross Identification between X-ray and Optical Clusters of Galaxies in the SDSS DR7 Field", *ApJ*, 439, 2014, 611
150. **Wang, Q.D.**, Nowak, M.A., Markoff, S.B., Baganoff, F.K., Nayakshin, S., Yuan, F., Cuadra, J., Davis, J., Dexter, J., Fabian, A.C., Grosso, N., Haggard, D., Houck, J., Ji, L., Li, Z., Neilsen, J., Porquet, D., Ripple, F., & Shcherbakov, R.V. "Dissecting X-ray-emitting Gas around the Center of our Galaxy", *Science*, 341, 2013, 981

149. Neilsen, J., Nowak, M.A., Gammie, C., Dexter, J., Markoff, S., Haggard, D., Nayakshin, S., **Wang, Q.D.**, et al. "A Chandra/HETG Census of X-Ray Variability from Sgr A* during 2012", *ApJ*, 774, 2013, 42
148. Johnson, S.P., Wilson, G.W., **Wang, Q.D.**, Williams, C., Scott, K., Yun, M., Pope, A., & Lowenthal, J., "X-ray Detections of Sub-millimeter Galaxies: AGN Versus Starburst Contribution", *MNRAS*, 431, 2013, 662
147. Cabot, S. H. C.***, **Wang, Q.D.**, & Yao, Y. "XMM-Newton/Reflection Grating Spectrometer Detection of the Missing Interstellar O VII $K\alpha$ Absorption Line in the Spectrum of Cyg X-2", *MNRAS*, 431, 2013, 511
146. Li, J.-T.** , & **Wang, Q.D.** "Chandra Survey of Nearby Highly-inclined Disk Galaxies II: Correlation Analysis of Galactic Coronal Properties", *MNRAS*, 435, 2013, 3071
145. Li, J.-T.** , & **Wang, Q.D.** "Chandra Survey of Nearby Highly-inclined Disk Galaxies I: X-ray Measurements of Galactic Coronae", *MNRAS*, 428, 2013, 2085