JIELAI ZHANG

Address: Institute of Biomedical Engineering, University of Oxford,
Old Road Campus Research Building, Oxford OX3 7DQ, United Kingdom
Email: jzhang@schmidtsciencefellows.org
Phone: +44 7835296079

Education

2018	**Institution**:	University of Toronto, Canada
	Degree:	PHD (Direct Entry) Astronomy and Astrophysics
2012	**Institution**:	University of Sydney, Australia
	Degrees:	Bachelor of Advanced Science (Physics, Mathematics) Bachelor of Aeronautical Space Engineering (Honors)
	Class:	First Class Honors
2011	**Institution**:	Imperial College London, United Kingdom
	Qualification:	Imperial College International Diploma in Mechanical Engineering
	Class:	Second Class Honors (Upper Class)

Awards, Grants and Fellowships

2019	**Dimitris N Chorafas Prize**	$US 5,000
	Recognizes outstanding work with high potential for significant aftermath	
	Governor General's Gold Medal (Canada)	N/A
	Recognizes highest academic standing at the graduate level	
2018-2019	**Schmidt Science Fellows in Partnership with the Rhodes Trust**	$US 100,000
	Post-Doctoral Fellowship for Interdisciplinary Research	
2016-2018	**Michael S. Fieldus Memorial Award**	$CA 1,000
	Doctoral Completion Award	$CA 4,000
	Ontario Graduate Scholarship	$CA 15,000
	Shirley Jones Fellowship	$CA 4,000
	University of Toronto Fellowship	$CA 13,600
	Graduate Expansion Fund	$CA 1,500
	Dunlap Student Travel Grant	$CA 3,500
	Dunlap Student Travel Grant	$CA 500
2015-2016	**Ontario Graduate Scholarship**	$CA 15,000
	University of Toronto Fellowship	$CA 15,600
	Graduate Expansion Fund	$CA 1,000
2014-2015	**University of Toronto Fellowship**	$CA 5,300
	Graduate Expansion Fund	$CA 1,000
	Mary and Ron Martin Graduate Fellowship in Astrophysics	$CA 4,600
	Carl Reinhardt Fellowship in Astronomy	$CA 12,700
2013-2014	**Ontario Graduate Scholarship**	$CA 15,000
	Delta Kappa Gamma World Fellowship Recipient	$US 4,000
	Mary and Ron Martin Graduate Fellowship in Astrophysics	$CA 3,000

2012-2013	**Carl Reinhardt Fellowship in Astronomy**	**$**CA 12,700
	Dunlap Institute for Astronomy and Astrophysics Scholarship	$CA 10,000
2011-2012	**Research thesis grant QANTAS Airlines**	$AU 13,000
2007-2010	**Anglo Australian Observatory Student Fellowship**	$AU 8,000
	University of Sydney Physics Vacation Scholarship	$AU 7,200
2006	**Order of Australia Commendation Award**	N/A

Publications

In refereed journals

1. (re-submitted 2019) *Spectroscopic Constraints on the Build-up of the Intracluster Light in the Coma Cluster;* Gu, M. et al (including **Zhang, Jielai**), submitted to The Astrophysical Journal, 2018

2. *The Outer Halos of Galaxies: how Radial Merger Mass Deposition, Shells and Streams depend on Infall-Orbig* Configurations; Karademir, G.S. et al (including, **Zhang, Jielai**), accepted to Monthly Notices of the Royal Astronomical Society, April 2019

3. (2018) *The Dragonfly Nearby Galaxies Survey. IV. A Giant Stellar Disk in NGC 2841*
Zhang, Jielai, et al; The Astrophysical Journal, Volume 855, Number 2

4. (2018) *A Revised Velocity for the Globular Cluster GC-98 in the Ultra Diffuse Galaxy NGC 1052-DF2;* Van Dokkum, Pieter, et al (including **Zhang, Jielai**), Research Notes of the AAS, Volume 2, Number 2

5. (2018) *The Maybe Stream: A Possible Cold Stellar Stream in the Ultra-diffuse Galaxy NGC 1052-DF2;* Abraham, Roberto, et al (including **Zhang, Jielai**), Research Notes of the AAS, Volume 2, Number 2

6. (2018) *The Dragonfly Nearby Galaxies Survey. V. HST/ACS Observations of 23 Low Surface Brightness Objects in the Fields of NGC 1052, NGC 1084, M96, and NGC 4258*
Cohen, Yotam, et al (including **Zhang, Jielai**), The Astrophysical Journal, Volume 868, Number 2

7. (2018) *Low Metallicities and Old Ages for Three Ultra-Diffuse Galaxies in The Coma Cluster*
Gu, Meng, et al (including **Zhang, Jielai**), The Astrophysical Journal, Volume 859, Number 1

8. (2018) *An Enigmatic Population of Luminous Globular Clusters in a Galaxy Lacking Dark Matter*
van Dokkum, Pieter, et al (including **Zhang, Jielai**), The Astrophysical Journal Letters, Volume 856, Number 2

9. (2018) *A galaxy lacking dark matter*
van Dokkum, Pieter, et al (including **Zhang, Jielai**), Nature, Volume 555

10. (2017) *Extensive globular cluster systems associated with ultra-diffuse galaxies in the Coma Cluster*; van Dokkum, Pieter, et al (including **Zhang, Jielai**), The Astrophysical Journal Letters, Volume 844, L11

11. (2017) *The Dragonfly Nearby Galaxies Survey. III. The Luminosity Function of the M101 Group*
Danieli, Shany; van Dokkum, Pieter; Merritt, Allison; Abraham, Roberto; **Zhang, Jielai**; Karachentsev, I. D.; Makarova, L. N. The Astrophysical Journal, Volume 837, Number 2

12. (2016) *The Dragonfly Nearby Galaxies Survey. II. Ultra-diffuse galaxies near the elliptical galaxy NGC 5485*; Merritt, Allison; van Dokkum, Pieter; Danieli, Shany; Abraham, Roberto; **Zhang, Jielai**; Karachentsev, I. D.; Makarova, L. N., The Astrophysical Journal, Volume 833, Number 2

13. (2016) *The Dragonfly Nearby Galaxies Survey. I. Substantial variation in the diffuse stellar halos around spiral galaxies*; Merritt, Allison; van Dokkum, Pieter; Abraham, Roberto; **Zhang, Jielai**; The Astrophysical Journal, Volume 830, Number 2

14. (2016) *A High Stellar Velocity Dispersion and ~100 Globular Clusters for the Ultra-Diffuse Galaxy Dragonfly 44;* van Dokkum, Pieter, et al (including **Zhang, Jielai**), The Astrophysical Journal, Volume 828, L6

15. (2015) *Spectroscopic confirmation of the existence of large, diffuse galaxies in the Coma cluster* van Dokkum, Pieter, et al (including **Zhang, Jielai**), The Astrophysical Journal, Volume 804, L26

16. (2014) *Forty-Seven Milky Way-Sized, Extremely Diffuse Galaxies in the Coma Cluster* van Dokkum, P.G. Abraham, R. Merritt, A. **Zhang, J.** Marla, G. Charlie, C. The Astrophysical Journal Letters, Volume 798, Issue 2, L45

17. (2010) *The Radio-FIR Correlation in the Milky Way* **Zhang, J.** Hopkins, A. Barnes, P.J. Cagnes, M. Yonekura, Y. Fukui, Y., Publications of the Astronomical Society of Australia, Volume 27, Issue 3, pp. 340-346

In Conference Proceedings and Books

1. (2017) Book chapter "*Future prospects: Deep Imaging of Galaxy Outskirts Using Telescopes Large and Small*", Abraham, R.G., et al (including **Zhang, J**) in "Outskirts of Galaxies", Edited by Knapen, J.H., et al 2017, Sprinter International Publishing, Cham, Switzerland.

2. (2017) "*Probing Galactic Outskirts with Dragonfly"*, Abraham, R.G., Merritt, A., **Zhang, J.**, van Dokkum, P., Conroy, C., Danieli, S., Mowla, L., 2017, "*Formation and Evolution of Galaxy Outskirts"* Conference Proceedings, Cambridge University Press, Cambridge, United Kingdom

3. (2014) *"First Results from Project Dragonfly",* Abraham, R.G., van Dokkum, P.G., Merritt, A., Zhang, J., 2014, *"Lessons from the Local Group, a Conference in honour of David Block and Bruce Elmegreen"*, Stringer, Stringer International Publishing, Switzerland

Academic Presentations

2019 *Institute of Biomedical Engineering Imaging Cluster Seminar*
Astronomical Imaging: exploring the previously unseen low surface brightness Universe

2018 *Canadian Astronomical Society Annual Conference, British Columbia*
Enormous low surface brightness stellar disk observed with the Dragonfly Telephoto Array (oral, best student talk)

2018 *Invited Talks:*
The Australian Telescope National Facility Colloquium
The University of New South Wales Astronomy Department Colloquium
Australian Astronomical Observatory Colloquium
Macquarie University Astronomy Colloquium
Exploring the Low Surface Brightness Universe with the Dragonfly Telephoto Array

2016 *IAU321 Formation and Evolution of Galaxy Outskirts Conference*
How Big Are Galaxy Disks? (poster)

2015 *G2000 seminar series, University of Toronto*
Dragonfly: the extreme outer disk of local spiral galaxies (oral)

2014 *Thesis proposal presentation, University of Toronto*
Dragonfly: the extreme outer disk of local spiral galaxies (oral)

2013 *Dunlap Institute Symposium and Retreat*
Dragonfly: A Quest for Ultra Low Surface Brightness (poster)

2013 *Canadian Astronomical Society Annual Conference, British Columbia*
Dragonfly: A Quest for Ultra Low Surface Brightness (oral)

2012 *Honours Thesis Presentation, University of Sydney*
Machine Learning for Predictive Maintenance of Aircrafts (oral)

2012 *QANTAS Airlines Research and Development Presentations*
Machine Learning for Predictive Maintenance of Aircrafts (oral)

2010 *Anglo Australian Observatory Student Fellowship Presentations*
Statistical study of white dwarf and magnetic white dwarf motions for progenitor determination (oral)

2009 *Third Year Special Project Presentations, University of Sydney*
The Jeans Swindle: equilibrium conditions in gravitational systems (oral)

2009 *Advanced Design Project Presentations, University of Sydney*
Design and Build of Mars Rover: science experiments (oral)

2009 *Physical Vacation Scholarship Presentations, University of Sydney*
Determination of orbital parameters of Wolf-Rayet 140 via modeling (oral)

2008 *Physics Vacation Scholarship Presentations, University of Sydney*
The Radio-FIR Correlation in the Milky Way: probe for star formation (oral)

2007 *Talented Students Program Presentations, University of Sydney*
High Velocity Clouds (oral)

Research Experience

2018-present
University of Oxford
Prof. Alison Noble

3D and time-series ultrasound for fetal health monitoring
1. Application of deep learning techniques to create 3D ultrasound atlases for fetuses with congenital heart disease or were born small for their gestational age. Atlases are critical for image analysis for fetal health monitoring.
2. Application of deep learning techniques to routine fetal ultrasound videos and related multi-modal data to explore the systematic improvement of clinical ultrasound for fetal health monitoring.

2016-present
University of Toronto
Prof. Roberto Abraham
Prof. Peter Martin

Properties of Dust in the Milky Way
Light scattered by interstellar dust raining onto the Milky Way acts as tiny mirrors reflecting the integrated light of the Galaxy. This light is faint, but with the Dragonfly Telephoto Array it is easily detectable and is now our biggest source of light pollution. I study what the light emitted from our Galaxy looks like and test predictions of dust models. By understanding dust, I have started to develop a technique to remove their signal from images so we can peer deeper into the low surface brightness Universe.

2012-2018
University of Toronto
Prof. Roberto Abraham
Prof. Peter Martin

Extreme outer disk environment of local spiral galaxies
Observed for the first time the extreme outer disk of spiral galaxies using the Dragonfly Telephoto Array to test the standard model of cosmology.

Data management and processing software for novel telescope
Develop and maintain cloud orchestrated software for managing and processing images captured by the Dragonfly Telephoto Array.

2012-2013
University of Toronto
Prof. Keith Vanderlinde

Calibration by Noise Injection for CHIME
CHIME is a phased array radio interferometer designed to measure the expansion history of the Universe. Noise injection is used to calibrate the instrument.

2011-2012
University of Sydney
QANTAS Airlines
Prof. Salah Sukkarieh

Machine Learning for Predictive Maintenance of Aircrafts
I led a team that used machine learning to predict the optimal timing for aircraft maintenance. We demonstrated proof of concept and secured further funding for this line of research.

2010-2011
Imperial College London
Dr. Finn Giuliani

Battery Pack Subsystem for zero emissions racing car
I led the Battery Pack Systems team. This subsystem powers all other subsystems on this electrical car. The car won 5th place in the Silverstone UK Formula Student racing competition in the zero emissions category.

2007-2010
University of Sydney
Prof. Andrew Hopkins

The Radio-FIR Correlation in the Milky Way
Study the Milky Way's interstellar medium to determine FIR/Radio correlation in star forming regions. I found a new way to measure star formation rates.

Community Service and Leadership

2018-present **West African School for Young Astronomers Co-Director**

2013-present **West African School for Young Astronomers Curriculum Developer, Instructor**
This week-long summer school is held every two years in West Africa, for about 80 undergraduate and graduate STEM students and some teachers. There are not many opportunities to learn about astronomy in West African and this school lays the foundations for building a critical mass of astronomers in the region, and empowering young West Africans in becoming scientific leaders and sharing ideas about teaching and learning between West Africa and other countries. Our curriculum is based on education research, and alumni have gone on to become teachers, do PhDs in astronomy and a critical mass of astronomers is being built.

2016 **Yukon Westar Lecture Teacher's Workshop Developer, Presenter**
Canadian Astronomical Society (CASCA)
I co-designed and presented an inquiry activity in Whitehorse, Yukon. The Yukon is a remote federal territory in Canada and are underserved in astronomy education and outreach. The activity, named "Reasons for the Seasons", is suitable for primary and secondary students and have unique meaning in this high latitude place.

2015-2016 **Planetarium Shows in Aid of Syrian Refugees project initiator and lead**
I led a team of 20 astronomers and 2 historians to fundraised $10,869.50 by giving 37 public planetarium shows to 900+ members of the public in Toronto. We also gave 4 free shows in English and Arabic to refugee newcomers. We showcased the discoveries of the Islamic Golden Age and their impact on modern astronomy. We shared our belief that we are all united by the stars and have more in common than that which set us apart.

2015 **Inclusive Astronomy Conference Participant (***Vanderbilt University)*
Symposium on Canada's Research Future (*University of Toronto)*

2013-2016 **Head Teacher's Assistant, AST101, 201, University of Toronto**
I designed weekly tutorials incorporating education research recommendations, teach and coordinate 20 other teacher's assistants. This course has a class size of 1,400 and is aimed at non-science major students.

2014-2016 **Massey College Volunteer Tutor for local underserved students**
Massey College Junior Fellow, University of Toronto
Massey is a multidisciplinary fellowship of graduate students, senior academics and eminent members of society, collected together for intellectual exchange.

2014-2016 **Cosmology Inquiry Activity Developer**
I presented the activity at the SDSS Collaboration Meeting Teacher's Workshop (2016), Science Teachers Association of Ontario Annual Conference (2015) and the York University Professional Development Teacher's Workshop (2015)

2013 ***Invited Participant at Breakthroughs: Creativity Across Disciplines Seminar (Radcliffe college, Harvard University)***

2012 **Gifted and Talented Science Class Presenter and Program Developer**
(*St Andrew's Cathedral School, Sydney, Australia)*
My program consisted of a series of innovative hands-on inquiry-based labs where grade 7-10 students learnt scientific content and skills concurrently. Students' growth in experimental expertise was noticeable in other science classes.

2011-2012 ***Charity Runner for Amnesty International (raised $1000+, Sydney, Australia)***
Team Leader, Fundraising Event for the Cancer Institute, Australia

2010 **Charity Swimmer for MS Australia** *(raised $6,000+, Sydney, Australia)*
Selected Participant, Brightest Young Minds Summit *(Sydney, Australia)*
This is a summit for young people passionate about solving global issues.
Selected Participant, AIESEC Initiate the Future Summit *(Sydney, Australia)*

2009 **Co-Founder and Vice President of the University of Sydney Space Society**
Participant at the Engineers Without Borders Australia Humanitarian Engineering Conference (*Melbourne, Australia)*

2008-2010 **Executive Coordinator for Asylum Seeker Computer Literacy Program**
I brought the program to maturity, developing lessons, recruiting and training volunteers.

Public engagement in science

2019 **Guest Tweeter, @AstroTweeps account on Twitter**
Week of April 29, 2019
Guest TMRO YouTube Channel
April, 2019

2018 **Second prize, 3-minute Thesis, University of Toronto**

2017 **Quirk and Quarks (Canadian Broadcasting Corporation radio program)**
On the September 16 episode, I explained how a Solar Eclipse works.
Graduate Speaker Series presenter
Talk title: "Discovering Unknown Unknowns"
"Milky Way's Dark Twin" Astronomy on Tap Presentation, Toronto (in a Pub)

2016 **Radio interview for series of Planetarium Shows in Aid of Syrian Refugees**
Canadian Broadcasting Corporation, the Metro Morning program
Articles on the ultra-diffuse galaxies and their high dark matter content
News outlets that covered this include but are not limited to: The Atlantic, Photography Review, Extreme Tech, CNN, The Huffington Post, Forbes Magazine, International Business Times, BBC Sky At Night Magazine, Space.com, Fox News, Cosmos Magazine, Astronomy Now Magazine, Science Magazine, New Scientist, Phys.org, Washington Post, Nas Vesmir (Czech), La Repubblica (Italy), Metro News (Canada), Ulyces Magazine (France), Urania Magazine (Poland), Mahu Magazine (Hungary), India Times, Golem Magazine (Germany), ABC Science (Australia), Nature Magazine

2015 **Presenter at Science Teachers Association of Ontario Annual Conference**
Judge for Toronto Science Fair
TV interview (my research and the art of explaining science) *Fairchild TV, Canada*
Planetarium Show for the University of Toronto High School Gifted Program

2014-2015 **Director of the University of Toronto AstroTours program**
The program runs monthly public talks, telescope and planetarium tours. I initiated "LightsOFFUniverseON", an Earth Hour event attracting 400 members of the public.

2014 **1st Prize: Most Understandable Scientist at the University of Toronto**
"Black Holes" Astronomy on Tap Presentation, Toronto (in a Pub)
Public Talk titled "The Cosmic Dark Ages" to an audience of 200+, Toronto
Speaker Massey Junior Fellow Lecture Series

Academic Service

2015-2018 **Dunlap Institute for Astronomy and Astrophysics Diversity Committee**
University of Toronto
I attended the inaugural Inclusive Astronomy Conference. Afterwards, I implemented a climate survey across four astronomy departments. This set the tone for the Committee. We have initiated a series of DiversiTeas, which are workshops on topics such as imposter syndrome, mental health, sexual harassment, and microagressions. We have written and implemented a code of conduct, a postdoc hiring policy, a part time option for all fellows, gender neutral bathrooms and exist interviews.

2016 **Canadian Institute for Theoretical Astrophysics Director Search Committee**
University of Toronto, Department of Astronomy & Astrophysics
Successful Proposal: Departmental fund for Graduate student emergency loans
University of Toronto, Department of Astronomy & Astrophysics

2015 **Department of Astronomy & Astrophysics Chair Search Committee**
University of Toronto, Department of Astronomy & Astrophysics
Massey Diversity & Equity Committee co-chair
University of Toronto, Massey College