Chentao YANG (杨辰涛)*

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2017.11 - present

2006.09 - 2010.07

Current

ORCID: 0000-0002-8117-9991

Personal Information Current status: ESO Fellow in Chile (with duties at ALMA/JAO)

Gender: Year of birth: 1988 P.R. China Citizenship:

Languages: Chinese (native proficiency),

> English (full professional proficiency), French (elementary proficiency)

Employment

European Southern Observatory (ESO) Fellow, Santiago, Chile

(50% independent research + 50% ALMA duty)

Education

Institut d'Astrophysique Spatiale, Université Paris-Saclay, France 2014.11 - 2017.10

(Co-tutelle) PhD degree in Astrophysics, Diploma awarded in January, 2018

Supervisor: Alain Omont, Alexandre Beelen

Purple Mountain Observatory, Chinese Academy of Sciences, P.R. China 2013.09 - 2017.10

(Co-tutelle) PhD degree in Astrophysics, Diploma awarded in January, 2018

Supervisor: Yu Gao

Astronomy Department, Beijing Normal University, P.R. China 2010.09 - 2013.06

Master's degree in Astrophysics, Diploma awarded in July, 2013

Supervisor: Yu Gao, Biwei Jiang

Astronomy Department, Beijing Normal University, P.R. China

Bachelor's degree in Astronomy, Diploma awarded in July, 2010

Languages: IDL, FORTRAN, Matlab, MTx, Python, Julia Computer

Operating systems: GNU/Linux (CentOS, openSUSE, etc.), MacOS, Windows Skills

GILDAS, Starlink, DS9, CASA, HIPE, TOPCAT Software:

Research interests

• Submillimeter water maser in high-redshift galaxies

• Observations of the interstellar medium in submillimeter galaxies Current

• Millimeter and submillimeter line surveys at high redshift Current

• SUNRISE - Submillimeter molecUlar liNe suRveys in dIstant duSty galaxiEs

• Submillimeter H₂O lines as the ISM tracers in dusty galaxies near and far Current

Ph.D. Thesis • Physical conditions of the interstellar medium in high-redshift

submillimetre bright galaxies (ADS record) 2013-2017

Master Thesis • Water vapor in galaxies near and far 2011-2013

Bachelor Thesis • Cold dust in nearby galaxies 2009-2010

References

• Alain Omont, Emeritus Senior Scientist, Institut d'Astrophysique de Paris, France

• Yu Gao, Professor, Xiamen University, China

• Alexandre Beelen, Associate Astronomer, Laboratoire d'Astrophysique de Marseille, France

• Eduardo González-Alfonso, Professor, University of Alcalá, Spain

• Pierre Cox, Senior Scientist, Institut d'Astrophysique de Paris, France

• Violette Impellizzeri, Program manager, Allegro ARC, Leiden Observatory, Netherlands

^{*}In Chinese, 辰 - 涛 (chen-tao) can mean star-waves, in which 辰 (chen) means stars and 涛 (tao) means waves.

Accepted PI **Proposals** 477 h in total (A/B: A/B-rated)

- The Atacama Large Mm/submm Array (ALMA), 7 proposals, 62 h^{12m} + 50 h^{7m}. since 2017
 - 2017.A.00053.S (ACA observatory filler program, 50 h);
 - 2018.1.00861.S^B(EU, **10.4 h**), 2018.1.00797.S^B(EU, **6.6 h**), 2018.1.01710.S(EU, **9.1 h**);
 - 2019.1.00205.S^B(EU, **23.2 h**), 2019.1.00533.S^B(EU, **4.8 h**), 2019.1.00310.S(EU, **8.0 h**);
- The NOrthern Extended Millimeter Array (NOEMA), 12 proposals, 138 h. since 2013
 - W0B3^B, S14CT^B, S15CT^B, W15EQ^B, S16CG^B, S16CF^B, S16BT^B, W16DQ^B, W16DO^B, S18DC^A, S18CT^A, W18EB^A;
- The IRAM-30m telescope (IRAM-30m), 3 proposals, 76 h.

since 2015

- 079-15^A, 196-15^B, 076-16^A;
- The Karl G. Jansky Very Large Array (JVLA/NRAO), 3 proposals, 47 h.

since 2014

since 2016

- 14B-259^B, 15B-177, 18B-190;
- The Atacama Pathfinder EXperiment (APEX/ESO) telescope, 2 proposal, 55 h.
- 097.B-0914^B (SEPIA-5), 103.B-0471^A (SEPIA-9);
- The Green Bank Telescope (GBT/GBO) telescope, 1 proposal, 49 h. since 2020
- 21A-093^A (W-band);

Accepted proposals as a co-I: 88 approved proposals including:

ALMA (25 proposals, 5 A + 7 B + 13 C), NOEMA (42, including 1 large program, z-GAL), JVLA (4), GTC(1), Spitzer (1), VLT (2, KMOS), IRAM-30m (6), APEX (2), JCMT (7, including 4 large programs, JINGLE, MALATANG, AWESOME and RAGERS) and GMRT (1 proposal).

Observing **Experience**

- The IRAM 30m telescope (IRAM30/IRAM), 2013–2016: > 100 h;
- The James Clerk Maxwell Telescope (JCMT/EAO), 2016: > 100 h;
- The ALMA Observatory (ALMA/JAO), 2018–present: (AoD) > 1000 h.

Professional Service

- Referee for scientific journals: *Apl*:
- *HST* Expert external proposal reviewer;
- Individual reviewer for the Astronomy Grants Panel of STFC;
- Member of the ESO (Chile) Fellowship Selection Committee (2019–2020):
- Member of the ALMA (JAO) Post-Doctoral Fellow Selection Committee (2019);
- Technical Secretary of the ALMA Proposal Review meeting, 2018 (Cycle 6) 2021 (Cycle 8);
- Co-organiser of the ALMA proposal workshop at ESO (2018, 2021);

Teaching Mentorship

• Nina Grant, Princeton International Internship program,

Complete the rotation curve of NGC 7528 with neutral carbon emission; June-August 2019

• Lecture, Advance topics of astrophysics and astrobiology, Universidad Andrés Bello, Chile; 2nd Semester 2019 The ISM in high-redshift dusty star-forming galaxies.

Refereed **Publications**

NASA/ADS Library link 8 publications as the first/second author; 520 citations in total, including 168 citations of the first-author papers; Metrics: (NASA/ADS) h-index = 13, h-index/(years since PhD defence) = 3.2

- (†: 1st/2nd author) 30. An ACA 1mm survey of HzRGs in the ELAIS-S1: survey description and first results Hugo G. Messias, Evanthia Hatziminaoglou, Pascale Hibon, Israel Matute, Tony Mroczkowski, José M. Afonso, Edward Fomalont, ..., Chentao Yang 2021, MNRAS accepted;
 - 29. Close-up view of a luminous star-forming galaxy at z = 2.95S. Berta, A. J. Young, P. Cox, R. Neri, B. M. Jones, A. J. Baker, A. Omont, ..., C. Yang, D. A. Riechers, H. Dannerbauer, I. Perez-Fournon, P. van der Werf et al. 2021, A&A, 646, A122;
 - 28. A proto-pseudobulge in ESO 320-G030 fed by a massive molecular inflow driven by a nuclear bar
 - E. González-Alfonso, M. Pereira-Santaella, J. Fischer, S. García-Burillo, C. Yang, A. Alonso-Herrero, L. Colina, M. L. N. Ashby, H. A. Smith et al. 2021, A&A, 645, A49;
 - 27. Planck's Dusty GEMS. VIII. Dense gas reservoirs in the most active dusty starbursts at $z\sim3$
 - R. Cañameras, N. P. H. Nesvadba, R. Kneissl, S. König, C. Yang, A. Beelen, R. Hill, E. Le Floc'h and D. Scott 2021, A&A, 645, A45;
 - 26. ALMA [NII] 205 μ m imaging spectroscopy of the lensed submillimeter galaxy ID 141 at redshift 4.24

- Cheng Cheng, Xiaoyue Cao, Nanyao Lu, Chentao Yang, Dimitra Rigopoulou, Vassilis Charmandaris et al. 2020, ApJ, 898, 33;
- †25. Etching glass in the early Universe: Luminous HF and H₂O emission in a QSO-SMG pair at z = 4.7
 - M. D. Lehnert, C. Yang, B.H.C. Emonts, A. Omont, E. Falgarone, P. Cox, and P. Guillard 2020, A&A, 641, A124;
- 24. The MALATANG Survey: Dense Gas and Star Formation from High Transition HCN and HCO⁺ maps of NGC 253
 - Xuejian Jiang, Thomas R. Greve, Yu Gao, Zhi-Yu Zhang, ..., Chentao Yang, Qian Jiao, Aeree Chung et al. 2020, MNRAS, 494, 1276;
- † 23. The first detection of the 448 GHz ortho-H $_2$ O line at high redshift: probing the structure of a starburst nucleus at $z\sim$ 3.63
 - C. Yang, E. González-Alfonso, A. Omont, M. Pereira-Santaella, J. Fisher, A. Beelen, R. Gavazzi 2020, A&A, 634, L3;
- 22. A declining starburst at z = 4.72 lensed by a merging pair of massive galaxies at z = 1.48 L. Ciesla, M. Béthermin, E. Daddi, J. Richard, T. Diaz-Santos, M. Sargent, D. Elbaz, M. Boquien, T. Wang, C. Schreiber, C. Yang, J. Zabl et al. 2020, A&A, 635, A27;
- 21. NOEMA Redshift Measurements of Bright Herschel Galaxies
 R. Neri, P. Cox, A. Omont, A. Beelen, S. Berta, T. Bakx, M. Lehnert, ..., C. Yang and A.J. Young 2020, A&A, 635, A7;
- **20.** A SCUBA-2 Selected Herschel-SPIRE Dropout and the Nature of this Population J. Greenslade, E. Aguilar, D. L. Clements, H. Dannerbauer, T. Cheng, G. Petitpas, C. Yang, H. Messias et al. 2019, MNRAS, 490, 5317;
- 19. JINGLE V: Dust properties of nearby galaxies derived from hierarchical Bayesian SED fitting
 - Isabella Lamperti, Amélie Saintonge, Ilse De Looze, Gioacchino Accurso, Christopher J. R. Clark, Matthew W. L. Smith, Christine D. Wilson, ..., Chentao Yang 2019, MNRAS, 489, 4389;
- 18. JINGLE, a JCMT legacy survey of dust and gas for galaxy evolution studies: II. SCUBA-2 850 μm data reduction and dust flux density catalogues Matthew W. L. Smith, Christopher J. R. Clark, Ilse De Looze, Isabella Lamperti, Amélie Saintonge, Christine D. Wilson, ..., Chentao Yang and Ming Zhu 2019, MNRAS, 486, 4166;
- 17. The molecular-gas properties in the gravitationally lensed merger HATLAS J142935.3-002836;
 - Hugo Messias, Neil Nagar, Zhi-Yu Zhang, Iván Oteo, Simon Dye, Nicholas Timmons, Eduardo Ibar, ..., and Chentao Yang 2019, MNRAS, 486, 2366;
- [†]16. CO, H₂O, H₂O⁺ line and dust emission in a z = 3.63 strongly lensed starburst merger at sub-kiloparsec scales;
 - C. Yang, R. Gavazzi, A. Beelen, P. Cox, A. Omont, M. Lehnert, Y. Gao, R. J. Ivison, A. M. Swinbank, L. Barcos-Műnoz, R. Neri, A Cooray, S. Dye, S. Eales et al. 2019, A&A, 624, A138;
- 15. Planck's Dusty GEMS. VII. Atomic carbon and molecular gas in dusty starburst galaxies at z = 2 to 4;
 - N. P. H. Nesvadba, R. Cañameras, R. Kneissl, S. Koenig, C. Yang, E. Le Floc'h, A. Omont and D. Scott 2019, A&A, 624, A23;
- 14. VALES V: A kinematic analysis of the molecular gas content in H-ATLAS galaxies at $z\sim$ 0.03-0.35 using ALMA;
 - J. Molina, E. Ibar, V. Villanueva, A. Escala, C. Cheng, M. Baes, H. Messias, C. Yang, F.E. Bauer, P. P. Van der Werf, R. Leiton, M. Aravena, ..., S. Eales & L. Dunne 2019, MNRAS, 482, 1499;
- †13. Planck's Dusty GEMS. VI. Multi-J CO excitation and interstellar medium conditions in dusty starburst galaxies at z = 2-4
 - R. Cañameras, C. Yang, N. P. H. Nesvadba, A. Beelen, R. Kneissl, S. Koenig, E. Le Floc'h, M. Limousin, S. Malhotra, A. Omont, D. Scott 2018, A&A, 620, A61; (IRAM Press Release)
- 12. JINGLE, a JCMT legacy survey of dust and gas for galaxy evolution studies: I. Survey overview and first results;
 - Amélie Saintonge, Christine D. Wilson, Ting Xiao, Lihwai Lin, Ho Seong Hwang, Tomoka Tosaki, ..., Chentao Yang, Ming Zhu et al. 2018, MNRAS, 481, 3497;

- 11. Far-infrared *Herschel* SPIRE spectroscopy of lensed starbursts reveals physical conditions of ionised gas;
 - Zhi-Yu Zhang, R. J. Ivison, R. D. George, Yinghe Zhao, L. Dunne, ..., Chentao Yang, Stephen Eales, Ros Hopwood, Steve Maddox, Alain Omont et al. 2018, MNRAS, 481, 59;
- 10. Extreme conditions in the molecular gas of lensed star-forming galaxies at $z \sim 3$; Paola Andreani, Edwin Retana-Montenegro, Zhi-Yu Zhang, Padelis Papadopoulos, Chentao Yang, Simona Vegetti 2018, A&A, 615, A142;
- 9. The MALATANG Survey: the $L_{\rm gas}$ - $L_{\rm IR}$ correlation on sub-kiloparsec scale in six nearby star-forming galaxies as traced by HCN J=4-3 and HCO⁺ J=4-3; Qing-Hua Tan, Yu Gao, Zhi-Yu Zhang, Thomas Greve, Xue-Jian Jiang, Christine Wilson, Chen-Tao Yang, Ashley Bemis, Aeree Chung et al. 2018, ApJ, 860, 165;
- 8. VALES: IV. Exploring the transition of star formation efficiencies between normal and starburst galaxies using APEX/SEPIA and ALMA at low redshift;
 C. Cheng, E. Ibar, T. M. Hughes, V. Villanueva, R. Leiton, G. Orellana, A. Munoz-Arancibia, N. Lu, C. K. Xu, C. N. A. Willmer, J. Huang, T. Cao, C. Yang et al. 2018, MNRAS, 475, 248;
- 7. The *Herschel* Bright Sources (HerBS): Sample definition and SCUBA-2 observations; Tom J. L. C. Bakx, S. A. Eales, M. Negrello, M. W. L. Smith, E. Valiante, W. S. Holland, M. Baes, N. Bourne, D. L. Clements, ..., P. van der Werf, C. Yang, 2018, MNRAS, 273, 1751;
- High dense gas fraction in intensely star forming dusty galaxies;
 Oteo, Z-Y. Zhang, C. Yang, R. J. Ivison, A. Omont, M. Bremer, S. Bussmann, A. Cooray, P. Cox, H. Dannerbauer, L. Dunne, S. Eales, ..., and P. Van der Werf 2017, ApJ, 850, 170;
- †5. Molecular gas in the *Herschel*-selected strongly lensed submillimeter galaxies at $z \sim 2$ -4 as probed by multi-J CO lines; C. Yang, A. Omont, A. Beelen, Y. Gao, P. van der Werf, R. Gavazzi, Z.-Y. Zhang, R. Ivison, M. Lehnert, D. Liu, I. Oteo, E. González-Alfonso et al. 2017, A&A, 608, A144;
- †4. Submillimeter H₂O and H₂O⁺ emission in lensed ultra- and hyper-luminous infrared galaxies at z ~ 2-4;
 C. Yang, A. Omont, A. Beelen, E. González-Alfonso, R. Neri, Y. Gao, P. van der Werf, A. Weiß, R. Gavazzi, N. Falstad, A. J. Baker, R. S. Bussmann, A. Cooray et al. 2016, A&A, 595, A80;
- 3. High-J CO Versus far-infrared relations in normal and starburst galaxies;
 Daizhong Liu, Yu Gao, Kate Isaak, Emanuele Daddi, Chentao Yang, Nanyao Lu and Paul van der Werf 2015, ApJ, 810, L14;
- [†]2. Water vapor in nearby infrared galaxies as probed by *Herschel*; Chentao Yang, Yu Gao, A. Omont, Daizhong Liu, K. G. Isaak, D. Downes, P. P. van der Werf and Nanyao Lu 2013, ApJ, 771, L24;
- [†]1. H₂O emission in high-z ultra-luminous infrared galaxies; A. Omont, C. Yang, P. Cox, R. Neri, A. Beelen, R. S. Bussmann, R. Gavazzi, P. van der Werf, D. Riechers, D. Downes and 40 other authors 2013, A&A, 551, A115; (A&A Highlight)

Submitted Publications & Reviews In prep.

- Hydrogen fluoride at z > 4: witnessing the ramp-up of enrichment of the interstellar medium
 - M. Franco, K. E. K. Coppin, J. E. Geach, C. Kobayashi, S. C. Chapman, C. Yang, E. González-Alfonso, J. S. Spilker, A. Cooray, M. J. Michałowski, submitted to Nature Astronomy;
- Bright Extragalactic ALMA Redshift Survey (BEARS) I: redshifts of bright gravitationally-lensed galaxies from the Herschel ATLAS
 S. A. Urquhart, G. J. Bendo, S. Serjeant, T. Bakx, M. Hagimoto, P. Cox, R. Neri, M. Lehnert, ..., C. Yang, A.J. Young, submitted to MNRAS;
- Discovery of a new galaxy 'Darth Vader' at z = 3.4

 Natsuki H. Hayatsu, Zhi-Yu Zhang, R.J. Ivison, Chao-wei Tsai, ..., Chentao Yang, ... and Junfeng Wang, submitted to MNRAS
- Massive molecular gas reservoir in a luminous sub-millimeter galaxy during cosmic noon

Bin Liu, N. Chartab, H. Nayyeri, A. Cooray, C. Yang, ... and P. van der Werf, submitted to ApJ

Invited Review • Extragalactic water new and far

Chentao Yang, Eduardo González-Alfonso & Alain Omont, to be submitted to Royal Society Open Science (RSOS)

Presentations	2015-2021, ordered by category: 2 invited conference talks, 6 contributed talks, and 12 (incl. invited) seminar/colloquium talks	
Invited review talk •	"Water in the Universe" Symposium, ACS Fall 2019 National Meeting & Exposition, San Diego, California, USA August 25–29, 2019	
	Water vapor in galaxies at high redshift	
Invited talk •	The ALMA Quest for Our Cosmic Origins, Joint ALMA Observatory (JAO), Vitacura, Santiago, Chile March 27, 2018	
	Physical conditions of the ISM in high-redshift lensed submillimeter galaxies	
Contributed talk •	Multi-line Diagnostics of the Interstellar Medium, Nice, France TBD, 2022 The rich molecular inventory of two dusty galaxies twelve billion years ago (postponed due to COVID-19)	
Contributed talk •	KIAA forum on gas in galaxies: Multiple-phase Interstellar medium – Probing the Activities and Power Engines from Local to Distant Universe, Beijing, China September 9–13, 2019 The interstellar medium in high-redshift strongly gravitational lensed galaxies	
Contributed talk •	Views on the Interstellar Medium in galaxies in the ALMA era, Bologna, Emilia-Romagna, Italy September 2–6, 2019	
	Studying the ISM in high-redshift strongly lensed galaxies in the ALMA era	
Contributed talk •	The Laws of Star Formation: From the Cosmic Dawn to the Present Universe, Cambridge University, UK July 2-6, 2018	
	Molecular gas in high-redshift strongly lensed dusty starbursts as traced by multi- CO lines	
Contributed talk •	The Eighth Sino-French "LIA-origins" Workshop: Probing Baryons in the Universe, Sèvres, Hauts-de-Seine, France November 14–18, 2016 H ₂ O and H ₂ O ⁺ emission in lensed hyper/ultra-luminous infrared galaxies at $z \sim 2$ –4	
Contributed talk •	Water in the Universe: From Clouds to Oceans, European Space Agency (ESA/ESTEC), No- ordwijk, Netherland April 11–15, 2016	
	H ₂ O Emission in Ultra-luminous Infrared Galaxies at High-z	
Colloquium talk •	(invited) University of Massachusetts Amherst and the Five College Astronomy Department, Massachusetts, USA February 25, 2021	
	Physical conditions of the ISM in dusty star-forming galaxies in the early universe	
Colloquium talk •	European Southern Observatory (ESO Santiago), Chile Water vapor in galaxies near and far November 21, 2019	
Seminar talk •	(<i>invited</i>) The Dominion Radio Astrophysical Observatory (DRAO), Victoria, BC, Canada October 7, 2020 Extragalactic water across cosmic time	
Seminar talk •	(invited) CAS South America Center for Astronomy, Santiago, Chile January 8, 2020 Water vapor in galaxies near and far	
Seminar talk •	(<i>invited</i>) Astronomy Department, Beijing Normal University, China September 9, 2019 Water vapor in galaxies near and far	
Seminar talk •	(invited) The Cosmic Dawn Center, DTU-Space division, Denmark December 12, 2018 Physical conditions of the ISM in strongly lensed dusty star-forming galaxies in the early universe	
Seminar talk •	Centre for Extragalactic Astronomy, Durham University, UK Physical conditions of the interstellar medium in strongly lensed submillimeter galax ies at high-redshift June 29, 2018	
Seminar talk •	Department of Physics, Oxford University, UK Physical conditions of the ISM in high-redshift strongly lensed dusty star-forming galaxies June 28, 2018	
Seminar talk •	Instituto de Física y Astronomía, Universidad de Valparaíso, Chile January 18, 2018 Physical conditions of the ISM in high-redshift lensed submillimeter galaxies	

Seminar ta	 Institute of Astrophysics, PUC de Chile, Santiago, Chile Physical conditions of the interstellar medium in high-redshift ler galaxies 	December 20, 2017 nsed submillimeter
Seminar to	 CAS South America Center for Astronomy, Santiago, Chile Tracing the physical conditions of the interstellar medium in hi submillimeter galaxies 	December 11, 2017 gh-redshift lensed
Seminar ta	 Astronomy Department, Beijing Normal University, China Physical conditions of the ISM in high-redshift submillimeter gala 	December 23, 2016 axies
Pos	 IAU Symposium 352: Uncovering early galaxy evolution in the ALMA a do Castelo, Portugal CO, H₂O, H₂O⁺ line and dust emission in a z = 3.63 strongly lense at sub-kiloparsec scales 	and JWST era, Viana June 3–7, 2019
Posi	ter • Journées Nationales PNCG 2015, Nice, France Submillimeter H_2O line emission in the lensed ultra-luminous in $z\sim 2-4$	ecember 15–16, 2015 nfrared galaxies at
Post	er • XXIX IAU-GA IAUS315: From interstellar clouds to star-forming galaxies: Honolulu, Hawaii, USA Submillimeter H ₂ O emission in infrared bright galaxies near and	August 03-07, 2015
Post	er • XXIX IAU-GA FM15: Search for Water and Life's Building Blocks in the Hawaii, USA Water vapor emission in ultra-luminous infrared galaxies at $z\sim 2$	Universe, Honolulu, August 03-05, 2015
Grants & Awards	 ESO Science Support Discretionary Fund (SSDF) - 9,000 EUR Student mentoring project (on extragalactic [C I]) at European Southern IAP Visitorship Grant - 700 EUR/week	May, 2019; July, 2018 2017-2021 August 3–14, 2015 2012, 2013 cance 2010 2009 CNY 2008
Outreach Experiences	 Core member of the Astronomy Club Beijing Normal University 	2007-2009
	 Authors of outreach articles (6 in total) The "Amateur Astronomer" magazine (sponsored by Chinese Astronomical Society & Beijing Planetarium) 	2014-2017
	ALMA virtual tour guider Virtual guided tour of the ESO sites (for ESO Studentship candidates)	November 5, 2020

(Last update: August, 2021. Contents in green and purple are clickable links.)