Alexander Robert Pettitt

PhD, MPhys

Curriculum Vitae

PERSONAL DETAILS

Birth	December 19, 1987
Gender	Male (he/him)
Nationality	British
Mobile	(+81) 070 2811 4819
E-Mail	pettitt@csus.edu
Webpage	https://arptttt.github.io

EDUCATION

Ph.D. in Astrophysics 1/10/2010 – 30/9/2014

University of Exeter, U.K.

Supervisor: Dr Clare Dobbs

Thesis Title: The Morphology of the Milky Way

Master of Physics, 1st *(honours)* 1/10/2006 – 30/7/2010

Durham University, U.K.

Master's project supervisor: Dr Vincent Eke

Specialised in the Lunar atmosphere, cosmology, particle theory and theoretical matter physics.

EMPLOYMENT

Assistant Professor (tenure-track) 18/8/2021 – present

Member of physics and astronomy faculty at California State University Sacramento.
Undergraduate physics and astronomy lecturing, conduct own research and engage in public outreach.

Assistant Professor (fixed-term) 1/4/2016 – 6/8/2021

Appointed in joint post with education and research divisions of Hokkaido University.
Teach undergraduate physics courses and conduct own research in the field of galactic physics.

Post-Doctoral Researcher 1/9/2014 – 31/3/2016

Position as a Post-Doctoral Researcher in the field of astrophysics at
Hokkaido University, Japan, under the employment of Assistant Professor Elizabeth Tasker
in the field of of galactic structure and interactions.

SKILLS

Programming	FORTRAN, PYTHON, *C*, LaTeX
OS	Windows, Linux, Mac OS X
Refereeing	MNRAS (2016 – present), ApJ (2017 – present), ApSS (2017)
Observing	*Observatoire Haute Provence* (2011), running evening observing sessions for undergraduates at the University of Exeter (2010 – 2013).

Knowledge and extensive experience in using smoothed particle hydrodynamical and N-body simulations, with the application to galactic-scale systems (with the codes GASOLINE, GADGET, PHANTOM, SPHNG, GIZMO). A working knowledge and experience applying the process of radiative transfer to the Galactic interstellar medium and exo-planetary atmospheres. Familiarity with high performance computing facilities (e.g. ACCESS, XSEDE, DiRAC, Sharcnet, SciNet, CFCA-XC30/50) and the use of OPENMP and MPI parallelisation methods. Experience with maintaining and creating websites.

AWARDS AND PROPOSALS

- National Science Foundation LEAPS-MPS research grant of $230,000 for research conducted in galactic physics.
- CSUS's Research Enhanced Support Grant award ($12,000) for research and outreach related to spiral galaxies (2024).
- Successful adopted proposal for high performance computing resources for ACCESS's Bridges-2 cluster. (2024)
- Co-I on successful APEX proposal *Shaping the ISM: filaments and bubbles in the outer Galaxy.* (2024)
- CSUS's Research and Creative Activity Award ($10,000) for research conducted in the 2023 academic year (2023).
- Co-I on successful grant to the Spanish Ministry of Science and Innovation; *Diagnosis of the Milky Way's Disc.* (2023)
- Awarded Hu Award ($5775) by CSUS Department of Physics to perform summer research (2022).
- Co-I on successful ALMA proposal *Resolving the Cloud-Cluster Ecosystem in M33.* (2022)
- Awarded 2.86 million yen Early Career Scientist KAKENHI grant (20K14456) from the Japanese Society for the Promotion of Science (2020 – 2023).
- Successful adopted proposals for high performance computing resources for NAOJ/CFCA's XC-30/50 clusters while appointed at Hokkaido University. **Awarded nine distinct allocations** including: 2015($\times$2) 2016, 2017, 2018, 2019, 2020, 2021, 2022 as well as **Co-I as supervisor on six successful student applications**.
- Co-I on start-up allocation on NSF's XSEDE high performance computing facility (2021), PI: S. Benincasa, PHY210020.
- Co-I on the SEDIGISM galactic plane survey, an adopted ESO large programme (2014).
- STFC PhD studentship at the University of Exeter, U.K. (2010).

STUDENT MENTORSHIP

- Supervisor for a number of independent research projects at CSUS in astrophysics including senior projects. (2022–present)
- CAL-BRIDGE mentor for Justin Alejandro, including supervising research project (2023–present).
- Supervisor for Towy Zheng's CSUS SURE award summer scholarship (2023).
- CAL-BRIDGE mentor for Antonio Rivera, including supervising research project (2022–2023).
- Supervisor for Theresa Nguyen's CSUS SURE award summer scholarship (2022).

- Primary supervisor for MSc student Elizabeth Iles on the topic of star formation in simulations of barred-spiral galaxies (2018 – 2020). Continuing as PhD supervisor (2020–2023).
- Supervisor for MSc student Tung Do on the topic of galactic stellar feedback in dwarf galaxies (2021 – present).
- Primary supervisor for MSc student Veronica Zhang on the topic of galactic spiral arm generation mechanisms (2018 – 2020).
- Additional partial supervision of other students in the astrophysics group at Hokkaido University (N. Sakre and N. Nguyen). Examiner for PhD vivas of T. Shima (Hokkaido University) and T. Michiyama (Sokendai University) and several MSc students.

TEACHING AND OUTREACH

California State University Sacramento teaching

Lecture course: Introduction to Modern Physics (UD) 2022 – 2023
Basic concepts of special relativity and quantum theory of matter. Phenomenological study of atomic energy states and spectra. Elements of nuclear physics.

Lecture course: Solar System and Space Exploration (UD) 2024
Upper division astronomy course on the exploration of space, planets, and planetary systems. Writing intensive course.

Lecture course: Stars, Galaxies, and Cosmology (UD) 2022 – 2024
Upper division astronomy course on the structure and properties of stars, galaxies and the Universe. Writing intensive course.

Lecture course: Mathematical Methods (UD) 2021 – 2023
Advanced mathematical techniques for physics undergraduates. Including linear algebra, ODEs, Fourier techniques, solutions to PDEs, vector calculus.

Lecture course: Introduction to Stars, Galaxies, and Cosmology (GE) 2021 – 2024
Non-calculus astronomy course for beginners. Topics include observing the night sky, history of astronomy, stellar physics, galaxy evolution and basic cosmology.

Lecture course: Introduction to the Solar System (GE) 2024
Non-calculus astronomy course for beginners. Topics include observing the night sky, history of astronomy, the Sun, planetary properties, exoplanets, planet formation.

Hokkaido University teaching

Lecture course: Statistical Mechanics II (3^{rd} year undergraduates) 2019 – 2021
Teaching students at Hokkaido University intermediate level statistical mechanics. Topics include partition functions, quantum particle distributions, interactions. Includes 90min seminar/tutorial after each lecture.

Lecture course: Fourier Analysis (2^{nd} year undergraduates) 2018 – 2021
Teaching students at Hokkaido University Fourier-like mathematical techniques, including Fourier series/transforms, Laplace transforms, solutions to PDEs. Includes 90min seminar/tutorial after each lecture.

Lecture course: Classical Mechanics II (2^{nd} year undergraduates) 2018 – 2021
Teaching students at Hokkaido University upper level classical mechanics, focussing mainly on analytical mechanics (Lagrangian, Hamiltonian, Hamilon-Jacobi theory, coupled oscillators). Includes 90min seminar/tutorial after each lecture.

Lecture course: Classical Mechanics I (2^{nd} year undergraduates) 2018 – 2021
Teaching students at Hokkaido University classical mechanics, including advanced mathematical approaches to solve equations of motion (pre-analytical mechanics). Includes 90min seminar/tutorial after each lecture.

Lecture course: Physics I (1^{st} year undergraduates) 2017 – 2021
Teaching students at Hokkaido University their foundational physics module, including classical mechanics, waves and optics.

University of Exeter teaching

Laboratory Demonstrator: Astrophysics Labs (2^{nd} year undergraduates) 2010 – 2013

Demonstrated astrophysics labs at the University of Exeter, including daytime *IRAF* reduction sessions, evening observations with university telescope and marking reports.

Outreach and Engagement

Talks for the general public with CSUS's planetarium. Two appearances on Sacramento local television (ABC10). STEM Scholars public lecture for CSUS. Talks for amateur astronomy societies, organising demonstrations for science fairs, demonstrations and lectures at local schools in the U.K., U.S.A. and Japan. Writing blog posts about my work for Oxford University Press and Hokkaido University. Co-hosted a campus radio show on popular science for an undergraduate audience at the University of Exeter (2014). Conducted interactive demonstrations for BBC Sky at Night evenings, and for Big Bang Science Fairs in the U.K. (2011 – 2012). Gave astrophysics talks to prospective undergraduate physics students to introduce them to the astrophysics group at the University of Exeter (2010 – 2012). Represented Hokkaido University at a university recruitment fair in Taipei (2019).

INSTITUTIONAL DUTIES

- Organiser for Physics Department Colloquium series at CSUS (2022 – present).
- Numerous internal committees for CSUS department of physics and NSM's Academic Council.
- Acted as peer reviewer for RCA internal award within CSUS and juror for CSUS's student research symposium.
- Admission committee member for prospective students at Hokkaido University. Duties include screening application documents, conducting interviews and overall applicant evaluation.
- Representing Hokkaido University at career fairs and visiting high school student events (e.g. giving introductory talks). Aid with design of promotional materials, both paper and audio/visual.
- Editor of the physics webpages of CSUS. Co-creator/admin of several Hokkaido University webpages: https://www.oia.hokudai.ac.jp/isp/, https://astro3.sci.hokudai.ac.jp/ASTRO-HOMEPAGE.

TALKS

Invited Talks

- Seminar at CSU Fresno, Sept 2023.
- Seminar at CSU Chicco, Feb 2023.
- Seminar at UC Merced, Dec 2022.
- *SEDIGISM Workshop*, virtual, Sept. 2021.
- *Triggered Star Formation*, Nagoya, July. 2021.
- *FUGIN Science Workshop*, Nagoya, Feb. 2018.
- *COMING Science Workshop*, Tokyo, Nov. 2016.
- Seminar at University of Bristol astrophysics department, 2013.

Contributed Talks and Seminars

NbodyShop conference (virtual), Life and Times of the Milky Way (Shanghai), ISM-SSP (Cologne), From Stars to Galaxies (Hokkaido), Annual Meeting of Japanese Astronomical Society, x2 (Hokkaido, Kobe, Tsukuba), ALMA Science Workshop (Osaka), UK National Astronomy Meeting (Manchester). Seminar talks given at SHAO (China), McMaster University, x2 (Canada), CITA (Canada), NAOJ (Tokyo, multiple), IPMU (Tokyo), ELSI (Tokyo), RIKEN (Kobe). Posters presented at IAUXXIX (Honnolulu), Dirac Day (Leicester), IAU 298 (Lijiang), U.K. National Astronomy Meeting, x2 (Manchester, Llandudno). Attended the program *Dynamical Models for Stars and Gas in Galaxies in the Gaia Era* at KITP (Santa Barbara) and accompanying Gaia-SPRINT.

PUBLICATIONS

The following have been submitted and are in the referee stage:

- Craig, P., Chakrabarti, S., **Pettitt, A. R.**, Sanderson, R., Rosolowsky, E., submitted to ApJL

The following are published, peer reviewed papers:

- Duran-Camacho, E., Durate-Cabral, A., **Pettitt, A. R.**, Tress, R. G., Clark, P. C., Klessen, R. S., Bogue, K. R. J., Smith, R. J., Sormani, M. C., MNRAS, 532, 126
- Iles, E. J., **Pettitt, A. R.**, Okamoto, T., Kawata, D., 2024, MNRAS, 527, 2
- Kawata, D., Kawahara, H., Gouda, N., Secrest, N., Kano, R., Kataza, H., Isobe, N., Ohsawa, R., Usui, F., Yamada, Y., Graham, A. W., **Pettitt, A. R.**, et al., 2024, PASJ, 76, 3
- Ge, Y., Wang, K., Durate-Cabral, A., **Pettitt, A. R.**, Dobbs, C. L., Sanchez-Monge, A., Neralwar, K. R., Urqhart, J. S., et al., A&A, 675, A119
- Ali, A., Dobbs, C. L., Bending, T. J. R., Buckner, A. S. M., **Pettitt, A. R.**, 2023, MNRAS, 524, 555
- Sakre, N., Habe, A., **Pettitt, A. R.**, Okamoto, T., Enokiya, R., Fukui, Y., Hosokawa, T., 2023, MNRAS, 522, 4972
- Dobbs, C. L., Bending, T., **Pettitt, A. R.**, Buckner, A. S. M., Bate, M. R., 2022, *MNRAS*, 517, 1, 675
- Kawana, Y., Saito, T., Okumura, S., Kawabe, R., Espada, D., Iono, D., Kaneko, H., Lee, M, Michiyama, T., Motohara, K., Nakanishi, K., **Pettitt, A. R.**, Randriamanakoto, Z., Ueda, J., Yamashita, T., 2022, *ApJ*, 929, 1
- Colombo, D., Duarte-Cabral, A., **Pettitt, A. R.**, Urquhart, J. S., Wyrowski, F., et al., 2022, A&A 658, A54
- Iles, E. J. L., **Pettitt, A. R.**, Okamoto, T., 2022, *MNRAS*, 510, 3, 3899
- Dobbs, C. L., Bending, T., **Pettitt, A. R.**, Bate, M. R., 2022, *MNRAS*, 509, 1, 954
- Sakre, N., Habe, A., **Pettitt, A. R.**, Okamoto,T., 2021, *PASJ*, 73, S385.
- Urquhart, J. S., Figura, C., Cross, J. R., Wells, M. R. A., T. J. T. Moore, Eden, D. J., Ragan, S. E., **Pettitt, A. R.**, Duarte-Cabral, A., Colombo, D., Schuller, F., et al., 2021, *MNRAS*, 500, 3.
- Schuller, F., Urquhart, J. S., Csengeri, T., Colombo, D., Duarte-Cabral, A., Mattern, M., Ginsburg, A., **Pettitt, A. R.**, Wyrowski, F., Anderson, L., et al., 2021, *MNRAS*, 500, 3.
- Durate-Cabral, A., Colombo, D., Urquhart, J. S., et al., 2021, *MNRAS*, 500, 3.
- Quillen, A. C., **Pettitt, A. R.**, Chakrabarti, S., Zhang, Y., Gagne, J., Minchev, I., 2020, *MNRAS*, 499, 4.
- Benincasa, S. M., Wadsley, J. W., Couchman, H. M. P., **Pettitt, A. R.**, Keller, B. W., Woods, R. M., Grond, J. J., 2020, *MNRAS*, 499, 2.
- **Pettitt, A. R.**, Dobbs, C. L., Baba, J., D. Colombo, A. Duarte-Cabral, F. Egusa, A. Habe, 202, *MNRAS*, 498, 1.
- Hunt, J., Johnston, K. V., **Pettitt, A. R.**, Bovy, J., Cunningham, E. C., Kawata, D., Hogg, D., 2020 *MNRAS*, 497, 1.
- **Pettitt, A. R.**, Ragan, S. E., Smith, M. C., 2020, *MNRAS*, 491, 2.

- Benincasa, S. M., Wadsley, J. W., Couchman, H. M. P., **Pettitt, A. R.**, Tasker, E. J., 2019, *MNRAS*, 486, 4.
- Dobbs, C. L., Rosolowski, E., **Pettitt, A. R.**, Braine, J., Corbelli, E., Sun, J., 2019, *MNRAS*, 485, 4.
- Salak, D., Noma, Y., Sorai, K., Miyamoto, Y., Kuno, N., **Pettitt, A. R.**, Kaneko, H., Tanaka, T., et al., 2019, *PASJ*, psz004.
- Espada, E., Martin, S., Verley, S., **Pettitt, A. R.**, Matshitaka, S., Argudo-Fernandez, M., Randriamanakoto, Z., Hsieh, P., Saito, T., et al., 2018, *ApJ*, 866, 2.
- **Pettitt, A. R.**, Egusa, F., Dobbs, C. L., 2018, Tasker, E. J., Habe, A., Fujimoto, Y., 2018, *MNRAS*, 480, 3556.
- Price, D. J., Wurster, J., Nixon, C., Tricco, T. S., Toupin, S., **Pettitt, A. R.**, Chan, C., et al., 2018, *PASA*, 35, 31.
- Dobbs, C. L., **Pettitt, A. R.**, Corbelli, E., Pringle, J. E., 2018, *MNRAS*, 478, 3793.
- Nguyen, N. K., **Pettitt, A. R.**, Tasker, E. J., Okamoto, T., 2018, *MNRAS*, 475, 27.
- **Pettitt, A. R.**, Wadsley, J. W., 2018, *MNRAS*, 474, 5645.
- **Pettitt, A. R.**, Tasker, E. J., Wadsley, J. W., Keller, B. W., Benincasa, S. M., 2017, *MNRAS*, 468, 4189.
- Schuller, F., et al., 2017, *A&A*, 601, A124.
- Dobbs, C. L., Price, D. J., **Pettitt, A. R.**, Bate, M. R., Tricco, T. S., 2016, *MNRAS*, 461, 4482.
- Few, C. G., Dobbs, C. L., **Pettitt, A. R.** & Konstandin, L., 2016, *MNRAS*, 460, 4382.
- **Pettitt, A. R.**, Tasker, E. J. & Wadsley, J. W., 2016, *MNRAS*, 458, 3990.
- **Pettitt, A. R.**, Dobbs, C. L., Acreman, D. A. & Bate, M. R., 2015, *MNRAS*, 449, 3911.
- Tremblin P., Anderson L. D., Didelon P., Raga A. C., Minier V., Ntormousi E., **Pettitt A.**, Pinto C., Samal M., Schneider N. & Zavagno A., 2014, *A&A*, 568, 4.
- **Pettitt, A. R.**, Dobbs, C. L., Acreman, D. A. & Price, D. J., 2014, *MNRAS*, 444, 919.
- Wilson, P. A., et al., 2014, *MNRAS*, 438, 2395.

Published conference proceedings (first author only):

- **Pettitt, A. R.**, Tasker, E. J. & Wadsley, J. W., 2015, Proceedings of the IAU Symposium No. 315, Honolulu, U.S.A.
- **Pettitt, A. R.**, Dobbs, C. L., Acreman, D. A. & Price, D. J., 2014, Proceedings of the IAU Symposium No. 298, Lijiang, China.