



Alexander Robert Pettitt

PhD, MPhys

Curriculum Vitae

PERSONAL DETAILS

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| <i>Birth</i> | December 19, 1987 |
| <i>Gender</i> | Male (he/him) |
| <i>Nationality</i> | British |
| <i>Mobile</i> | (+81) 070 2811 4819 |
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| <i>Webpage</i> | https://www.csus.edu/faculty/p/pettitt/ |

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 galactic structure and interactions.

SKILLS

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|--------------------|---|
| <i>Programming</i> | FORTRAN, PYTHON, C, L ^A T _E X |
| <i>OS</i> | Windows, Linux, Mac OS X |
| <i>Refereeing</i> | MNRAS (2016 – present), ApJ (2017 – present), ApSS (2017) |
| <i>Observing</i> | <i>Observatoire Haute Provence</i> (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. 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

- 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*.
- 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

- 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–present).
- 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: Stars, Galaxies, and Cosmology (UD)** 2022 – 2023
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 – 2023
Non-calculus astronomy course for beginners. Topics include observing the night sky, history of astronomy, stellar physics, galaxy evolution and basic cosmology.

Hokkaido University teaching

- Lecture course: Statistical Mechanics II (3rd 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 (2nd 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 (2nd year undergraduates)** 2018 – 2021
Teaching students at Hokkaido University upper level classical mechanics, focussing mainly on analytical mechanics (Lagrangian, Hamiltonian, Hamilton-Jacobi theory, coupled oscillators). Includes 90min seminar/tutorial after each lecture.
- Lecture course: Classical Mechanics I (2nd 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 (1st 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 (2nd 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. 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. 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.
- Acted as peer reviewer for RCA internal award within CSUS.
- 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 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 IAUXIX (Honolulu), 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:

- 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., submitted to PASJ
- Iles, E. J., **Pettitt, A. R.**, Okamoto, T., Kawata, D., submitted to MNRAS
- 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., submitted to MNRAS

The following are published, peer reviewed papers:

- Ge, Y., Wang, K., Durate-Cabral, A., **Pettitt, A. R.**, Dobbs, C. L., Sanchez-Monge, A., Neralwar, K. R., Urquhart, 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.
- Duarte-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.