Stephen Taylor | Curriculum Vitae

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Education

Institute of Astronomy, University of Cambridge — **Cambridge, UK**
PhD (Astronomy) — *2010–2014*

University of Oxford — **Oxford, UK**
MPhys, First Class — *2006–2010*
Graduated 4^{th} in University

Doctoral Thesis

Title: *Exploring the cosmos with gravitational waves*

Supervisor: Dr. Jonathan R. Gair

Description:

Professional experience

NASA Jet Propulsion Laboratory — **Pasadena**
NASA Postdoctoral Fellow — *2014–Present*

California Institute of Technology — **Pasadena**
Visting scholar (TAPIR group) — *2014–Present*

Awards

2015: International Pulsar Timing Array (IPTA) Steering Committee Prize — "Honourable Mention"

2015: Gravitational Wave International Committee (GWIC) Thesis Prize — "Honourable Mention"

2014: NASA Postdoctoral Fellowship (JPL)

2010: Science and Technology Facilities Council (STFC) PhD Studentship at IoA Cambridge

2007–2010: Undergraduate Scholar of Jesus College, Oxford

2008: Examiner's Prize, Oxford Physics Speaking Competition

2007: Oxford Physics department prize for laboratory work

2006–2010: Various Oxford undergraduate departmental and college examination prizes

Teaching experience

Mar 2016: Co-organizer of student workshop at NANOGrav Spring meeting

2011–2013: Supervisor for Cambridge Part II undergraduate students in Relativity

2011: Updated Cambridge Part II undergraduate computing projects from C to Matlab

Computer skills

OS: Linux/Unix, Windows

Programming: C/C++, PYTHON

Typography: LaTeX, Microsoft Office, Pages, OpenOffice

Scientific: Mathematica, Matlab, PYTHON

GPU Programming: CUDA C, PyCUDA

Outreach

2013: Presentation at the Institute of Astronomy Open Day

2012–2014: Presentation to prospective students (Institute of Astronomy graduate interviews)

2012: Outreach talk at Institute of Astronomy public-observing evening

2011: Presentation at the Institute of Astronomy Open Day

Professional affiliations

American Physical Society: Member

APS DGRAV: Member

American Astronomical Society: Member

Royal Astronomical Society: Fellow

North American Nanohertz Observatory for Gravitational waves (NANOGrav): Full member

European Pulsar Timing Array (EPTA): Member

International Pulsar Timing Array (IPTA): Member

Recent presentations

Invited talks

Jun 2016: *Gravitational-wave data-analysis techniques for pulsar-timing arrays*, IPTA conference, Stellenbosch, South Africa

Apr 2016: *Sources of nanohertz gravitational-waves for pulsar-timing array searches*, NANOGrav student workshop, California Institute of Technology, Pasadena CA, USA

Contributed talks

May 2016: *Carrying the physics of supermassive black-hole binary evolution into pulsar-timing array searches*, EPTA meeting, Bielefeld, Germany

Apr 2016: *Are we there yet? Time to detection of nanohertz gravitational waves*, American Physical Society meeting, Salt Lake City UT, USA

Mar 2016: *Carrying the physics of supermassive black-hole binary evolution into pulsar-timing array searches*, NANOGrav meeting, California Institute of Technology, Pasadena CA, USA

Oct 2015: *Are we there yet? Time to detection of nanohertz gravitational waves*, NANOGrav meeting, McGill University, Montreal, Canada

Jun 2015: *Eccentric supermassive black-hole binary signals in pulsar-timing data*, European Pulsar Timing Array meeting, Bonn, Germany

Apr 2015: *Eccentric supermassive black-hole binary signals in pulsar-timing data*, American Physical Society meeting, Baltimore MD, USA

Feb 2015: *Eccentric supermassive black-hole binary signals in pulsar-timing data*, NANOGrav meeting, Arecibo, Puerto Rico

Jan 2015: *Exploring the cosmos with gravitational waves*, American Astronomical Society meeting, Seattle WA, USA

Nov 2014: *EPTA constraints on gravitational-wave anisotropy*, European Pulsar Timing Array meeting, Cambridge, UK

Jun 2014: *EPTA and IPTA searches for gravitational-wave background anisotropy*, International Pulsar Timing Array meeting, Banff, Canada

May 2014: *EPTA limits on gravitational-wave anisotropy*, European Pulsar Timing Array meeting, Astron, Netherlands

Jun 2014: *EPTA and IPTA searches for gravitational-wave background anisotropy*, International Pulsar Timing Array meeting, Banff, Canada

Oct 2013: *The pulsar-term in PTA continuous-wave searches: a blessing and a curse*, European Pulsar Timing Array meeting, Pula, Sardinia

Jul 2013: *Probing anisotropy of the GW background with pulsar timing arrays*, 20th International Conference on General Relativity and Gravitation and 10th Amaldi Conference on Gravitational Waves, Warsaw

Jun 2013: *The first PTA search pipeline for anisotropy in the GW background*, International Pulsar Timing Array meeting, Krabi, Thailand

Apr 2013: *Searching For Anisotropic Gravitational-wave Backgrounds Using Pulsar Timing Arrays*, European Pulsar Timing Array meeting, l'Observatoire de Paris, Paris

Nov 2012: *Weighing the evidence for a gravitational-wave background*, European Pulsar Timing Array meeting, Albert Einstein Institute (AEI), Potsdam

Feb 2012: *Hubble without the Hubble: Cosmology using advanced gravitational-wave detectors alone*, Gravitational-Wave Meeting, Institut de Ciències de l'Espai, Barcelona

Seminars

Dec 2015: *Prospects for near future detection and astrophysical inference with PTAs*, Gravitational-wave group seminar, University of Birmingham, UK

Dec 2015: *Prospects for near future detection and astrophysical inference with PTAs*, Statistics group seminar (School of Mathematics), University of Edinburgh, UK

Dec 2015: *Prospects for near future detection and astrophysical inference with PTAs*, CaJAGWR seminar, California Institute of Technology

May 2013: *Searching For Anisotropic Gravitational-wave Backgrounds Using Pulsar Timing Arrays*, Albert Einstein Institute (AEI), Hanover

Feb 2013: *Weighing the evidence for a gravitational-wave background, Institute of Astronomy seminar*, University of Cambridge

Dec 2012: *Weighing the evidence for a gravitational-Wave background*, University of Birmingham

Jun 2012: *Milestones in Spacetime: Double Neutron-Star Binaries as Gravitational-Wave Standard Sirens*, Institute of Astronomy seminar, University of Cambridge

Posters

Aug 2015: *Galactic environment effects on gravitational wave signals in pulsar timing arrays*, Postdoc Research Day, NASA Jet Propulsion Laboratory

Aug 2012: *Cosmology without EM counterparts: Standard sirens in the advanced era and beyond*, Rattle and Shine, KITP Santa Barbara

Dec 2011: *Cosmology using advanced gravitational-wave detectors alone*, Graduate Student Conference 2011, Cavendish Laboratory, University of Cambridge

Publications

[1] Z. Arzoumanian, A. Brazier, S. Burke-Spolaor, S. J. Chamberlin, S. Chatterjee, B. Christy, J. M. Cordes, N. J. Cornish, K. Crowter, P. B. Demorest, X. Deng, T. Dolch, J. A. Ellis, R. D. Ferdman, E. Fonseca, N. Garver-Daniels, M. E. Gonzalez, F. Jenet, G. Jones, M. L. Jones, V. M. Kaspi, M. Koop, M. T. Lam, T. J. W. Lazio, L. Levin, A. N. Lommen, D. R. Lorimer, J. Luo, R. S. Lynch, D. R. Madison, M. A. McLaughlin, S. T. McWilliams, C. M. F. Mingarelli, D. J. Nice, N. Palliyaguru, T. T. Pennucci, S. M. Ransom, L. Sampson, S. A. Sanidas, A. Sesana, X. Siemens, J. Simon, I. H. Stairs, D. R. Stinebring, K. Stovall, J. Swiggum, **Taylor, S. R.**, M. Vallisneri, R. van Haasteren, Y. Wang, W. W. Zhu, and The NANOGrav Collaboration. The NANOGrav Nine-year Data Set: Limits on the Isotropic Stochastic Gravitational Wave Background. *ApJ*, 821:13, April 2016.

[2] S. Babak, A. Petiteau, A. Sesana, P. Brem, P. A. Rosado, **Taylor, S. R.**, A. Lassus, J. W. T. Hessels, C. G. Bassa, M. Burgay, R. N. Caballero, D. J. Champion, I. Cognard, G. Desvignes, J. R. Gair, L. Guillemot, G. H. Janssen, R. Karuppusamy, M. Kramer, P. Lazarus, K. J. Lee, L. Lentati, K. Liu, C. M. F. Mingarelli, S. Osłowski, D. Perrodin, A. Possenti, M. B. Purver, S. Sanidas, R. Smits, B. Stappers, G. Theureau, C. Tiburzi, R. van Haasteren, A. Vecchio, and J. P. W. Verbiest. European Pulsar Timing Array limits on continuous gravitational waves from individual supermassive black hole binaries. *MNRAS*, 455:1665–1679, January 2016.

[3] R. N. Caballero, K. J. Lee, L. Lentati, G. Desvignes, D. J. Champion, J. P. W. Verbiest, G. H. Janssen, B. W. Stappers, M. Kramer, P. Lazarus, A. Possenti, C. Tiburzi, D. Perrodin, S. Osłowski, S. Babak, C. G. Bassa, P. Brem, M. Burgay, I. Cognard, J. R. Gair, E. Graikou, L. Guillemot, J. W. T. Hessels, R. Karuppusamy, A. Lassus, K. Liu, J. McKee, C. M. F. Mingarelli, A. Petiteau, M. B. Purver, P. A. Rosado, S. Sanidas, A. Sesana, G. Shaifullah, R. Smits, **Taylor, S. R.**, G. Theureau, R. van Haasteren, and A. Vecchio. The noise properties of 42 millisecond pulsars from the European Pulsar Timing Array and their impact on gravitational-wave searches. *MNRAS*, 457:4421–4440, April 2016.

[4] G. Desvignes, R. N. Caballero, L. Lentati, J. P. W. Verbiest, D. J. Champion, B. W. Stappers, G. H. Janssen, P. Lazarus, S. Osłowski, S. Babak, C. G. Bassa, P. Brem, M. Burgay, I. Cognard, J. R. Gair, E. Graikou, L. Guillemot, J. W. T. Hessels, A. Jessner, C. Jordan, R. Karuppusamy, M. Kramer, A. Lassus, K. Lazaridis, K. J. Lee, K. Liu, A. G. Lyne, J. McKee, C. M. F. Mingarelli, D. Perrodin,

A. Petiteau, A. Possenti, M. B. Purver, P. A. Rosado, S. Sanidas, A. Sesana, G. Shaifullah, R. Smits, **Taylor, S. R.**, G. Theureau, C. Tiburzi, R. van Haasteren, and A. Vecchio. High-precision timing of 42 millisecond pulsars with the European Pulsar Timing Array. *MNRAS*, 458:3341–3380, May 2016.

[5] J. Gair, J. D. Romano, **Taylor, S.**, and C. M. F. Mingarelli. Mapping gravitational-wave backgrounds using methods from CMB analysis: Application to pulsar timing arrays. *Phys. Rev. D*, 90(8):082001, October 2014.

[6] J. R. Gair, J. D. Romano, and **Taylor, S. R.** Mapping gravitational-wave backgrounds of arbitrary polarisation using pulsar timing arrays. *Phys. Rev. D*, 92(10):102003, November 2015.

[7] E. A. Huerta, S. T. McWilliams, J. R. Gair, and **Taylor, S. R.** Detection of eccentric supermassive black hole binaries with pulsar timing arrays: Signal-to-noise ratio calculations. *Phys. Rev. D*, 92(6):063010, September 2015.

[8] L. Lentati, P. Alexander, M. P. Hobson, **Taylor, S.**, J. Gair, S. T. Balan, and R. van Haasteren. Hyper-efficient model-independent Bayesian method for the analysis of pulsar timing data. *Phys. Rev. D*, 87(10):104021, May 2013.

[9] L. Lentati, R. M. Shannon, W. A. Coles, J. P. W. Verbiest, R. van Haasteren, J. A. Ellis, R. N. Caballero, R. N. Manchester, Z. Arzoumanian, S. Babak, C. G. Bassa, N. D. R. Bhat, P. Brem, M. Burgay, S. Burke-Spolaor, D. Champion, S. Chatterjee, I. Cognard, J. M. Cordes, S. Dai, P. Demorest, G. Desvignes, T. Dolch, R. D. Ferdman, E. Fonseca, J. R. Gair, M. E. Gonzalez, E. Graikou, L. Guillemot, J. W. T. Hessels, G. Hobbs, G. H. Janssen, G. Jones, R. Karuppusamy, M. Keith, M. Kerr, M. Kramer, M. T. Lam, P. D. Lasky, A. Lassus, P. Lazarus, T. J. W. Lazio, K. J. Lee, L. Levin, K. Liu, R. S. Lynch, D. R. Madison, J. McKee, M. McLaughlin, S. T. McWilliams, C. M. F. Mingarelli, D. J. Nice, S. Osłowski, T. T. Pennucci, B. B. P. Perera, D. Perrodin, A. Petiteau, A. Possenti, S. M. Ransom, D. Reardon, P. A. Rosado, S. A. Sanidas, A. Sesana, G. Shaifullah, X. Siemens, R. Smits, I. Stairs, B. Stappers, D. R. Stinebring, K. Stovall, J. Swiggum, **Taylor, S. R.**, G. Theureau, C. Tiburzi, L. Toomey, M. Vallisneri, W. van Straten, A. Vecchio, J.-B. Wang, Y. Wang, X. P. You, W. W. Zhu, and X.-J. Zhu. From spin noise to systematics: stochastic processes in the first International Pulsar Timing Array data release. *MNRAS*, 458:2161–2187, May 2016.

[10] L. Lentati, **Taylor, S. R.**, C. M. F. Mingarelli, A. Sesana, S. A. Sanidas, A. Vecchio, R. N. Caballero, K. J. Lee, R. van Haasteren, S. Babak, C. G. Bassa, P. Brem, M. Burgay, D. J. Champion, I. Cognard, G. Desvignes, J. R. Gair, L. Guillemot, J. W. T. Hessels, G. H. Janssen, R. Karuppusamy, M. Kramer, A. Lassus, P. Lazarus, K. Liu, S. Osłowski, D. Perrodin, A. Petiteau, A. Possenti, M. B. Purver, P. A. Rosado, R. Smits, B. Stappers, G. Theureau, C. Tiburzi, and J. P. W. Verbiest. European Pulsar Timing Array limits on an isotropic stochastic gravitational-wave background. *MNRAS*, 453:2576–2598, November 2015.

[11] C. J. Moore, **Taylor, S. R.**, and J. R. Gair. Estimating the sensitivity of pulsar timing arrays. *Classical and Quantum Gravity*, 32(5):055004, March 2015.

[12] J. D. Romano, **Taylor, S. R.**, N. J. Cornish, J. Gair, C. M. F. Mingarelli, and R. van Haasteren. Phase-coherent mapping of gravitational-wave backgrounds using ground-based laser interferometers. *Phys. Rev. D*, 92(4):042003, August 2015.

[13] **Taylor, S.**, J. Ellis, and J. Gair. Accelerated Bayesian model-selection and parameter-estimation in continuous gravitational-wave searches with pulsar-timing arrays. *Phys. Rev. D*, 90(10):104028, November 2014.

[14] **Taylor, S. R.** and J. R. Gair. Cosmology with the lights off: Standard sirens in the Einstein Telescope era. *Phys. Rev. D*, 86(2):023502, July 2012.

[15] **Taylor, S. R.** and J. R. Gair. Searching for anisotropic gravitational-wave backgrounds using pulsar timing arrays. *Phys. Rev. D*, 88(8):084001, October 2013.

[16] **Taylor, S. R.**, J. R. Gair, and L. Lentati. Weighing the evidence for a gravitational-wave background in the first International Pulsar Timing Array data challenge. *Phys. Rev. D*, 87(4):044035, February 2013.

[17] **Taylor, S. R.**, J. R. Gair, and I. Mandel. Cosmology using advanced gravitational-wave detectors alone. *Phys. Rev. D*, 85(2):023535, January 2012.

[18] **Taylor, S. R.**, E. A. Huerta, J. R. Gair, and S. T. McWilliams. Detecting Eccentric Supermassive Black Hole Binaries with Pulsar Timing Arrays: Resolvable Source Strategies. *ApJ*, 817:70, January 2016.

[19] **Taylor, S. R.**, C. M. F. Mingarelli, J. R. Gair, A. Sesana, G. Theureau, S. Babak, C. G. Bassa, P. Brem, M. Burgay, R. N. Caballero, D. J. Champion, I. Cognard, G. Desvignes, L. Guillemot, J. W. T. Hessels, G. H. Janssen, R. Karuppusamy, M. Kramer, A. Lassus, P. Lazarus, L. Lentati, K. Liu, S. Osłowski, D. Perrodin, A. Petiteau, A. Possenti, M. B. Purver, P. A. Rosado, S. A. Sanidas, R. Smits, B. Stappers, C. Tiburzi, R. van Haasteren, A. Vecchio, J. P. W. Verbiest, and EPTA Collaboration. Limits on Anisotropy in the Nanohertz Stochastic Gravitational Wave Background. *Physical Review Letters*, 115(4):041101, July 2015.

[20] **Taylor, S. R.**, M. Vallisneri, J. A. Ellis, C. M. F. Mingarelli, T. J. W. Lazio, and R. van Haasteren. Are We There Yet? Time to Detection of Nanohertz Gravitational Waves Based on Pulsar-timing Array Limits. *ApJ*, 819:L6, March 2016.

[21] J. P. W. Verbiest, L. Lentati, G. Hobbs, R. van Haasteren, P. B. Demorest, G. H. Janssen, J.-B. Wang, G. Desvignes, R. N. Caballero, M. J. Keith, D. J. Champion, Z. Arzoumanian, S. Babak, C. G. Bassa, N. D. R. Bhat, A. Brazier, P. Brem, M. Burgay, S. Burke-Spolaor, S. J. Chamberlin, S. Chatterjee, B. Christy, I. Cognard, J. M. Cordes, S. Dai, T. Dolch, J. A. Ellis, R. D. Ferdman, E. Fonseca, J. R. Gair, N. E. Garver-Daniels, P. Gentile, M. E. Gonzalez, E. Graikou, L. Guillemot, J. W. T. Hessels, G. Jones, R. Karuppusamy, M. Kerr, M. Kramer, M. T. Lam, P. D. Lasky, A. Lassus, P. Lazarus, T. J. W. Lazio, K. J. Lee, L. Levin, K. Liu, R. S. Lynch, A. G. Lyne, J. Mckee, M. A. McLaughlin, S. T. McWilliams, D. R. Madison, R. N. Manchester, C. M. F. Mingarelli, D. J. Nice, S. Osłowski, N. T. Palliyaguru, T. T. Pennucci, B. B. P. Perera, D. Perrodin, A. Possenti, A. Petiteau, S. M. Ransom, D. Reardon, P. A. Rosado, S. A. Sanidas,

A. Sesana, G. Shaifullah, R. M. Shannon, X. Siemens, J. Simon, R. Smits, R. Spiewak, I. H. Stairs, B. W. Stappers, D. R. Stinebring, K. Stovall, J. K. Swiggum, **Taylor, S. R.**, G. Theureau, C. Tiburzi, L. Toomey, M. Vallisneri, W. van Straten, A. Vecchio, Y. Wang, L. Wen, X. P. You, W. W. Zhu, and X.-J. Zhu. The International Pulsar Timing Array: First data release. *MNRAS*, 458:1267–1288, May 2016.