

**Curriculum Vitae****Dr Hua Xia**

Research School of Physics and Engineering, The Australian National University, Canberra, ACT  
2601, Australia; email: hua.xia@anu.edu.au

**Academic Qualification:** PhD in Physics, The Australian National University, Australia, 2006  
MEng, Southwestern Institute of Physics, China, 1998

**Research Interests :** Complex flows and Turbulence

- Lagrangian statistics of particles, turbulent transport
- Turbulence in fluids, two and three-dimensional;
- Turbulence in rotating fluids and in magnetized plasma;

Nonlinear waves

- Surface ripple generated turbulence;
- Wave turbulence, oscillons and solitons.

Wind turbulence in atmospheric boundary layer

**Present Appointment:** Fellow, Physics of Fluids Laboratory, Research School of Physics and Engineering, The Australian National University

**Research Output:** 44 papers published in refereed journals and book chapters  
2 paper in *Nature Physics* (journal impact factor 20.1)  
1 paper in *Nature Communications* (journal impact factor 11.5)  
11 papers in *Physical Review Letters* (journal impact factor 7.5)  
4 book chapters  
First author on 15 papers  
H-index = 16 (Web of Science)  
H-index = 20 (Scholar.Google)  
i10-index = 26 (Scholar.Google)  
Total citation > 1000, with over 150 citations in 2015

**Awards:**

- Jagadishwar Mahanty Prize 2007 for The Best PhD thesis submitted between 11/2005 and 09/2007, Research School of Physical Sciences and Engineering, ANU
- Dean's Award, Annual Graduate Program in Physical Sciences Seminar Series 2004 (ANU)
- The 3<sup>rd</sup> Award in Defense Technology of China (1999GFJ3178-4), 1999
- The 3<sup>rd</sup> Ministry-level Award of Academic Advance (96-3-253-3), China National Nuclear Company, 1996

**Grants**

- ARC Linkage Project (LP160100477), “Novel methods of spill containment and debris mitigation on water surfaces”, 2016-2019, \$229k
- ARC Discovery Project (DP160100863) 2016-2019, “Flow generation on the water surface”, \$551k
- ARC Future Fellowship (FT140100067), 2014-2018, “Transport barriers in complex turbulent flows: formation, detection and characterization”, \$712k;
- ARC Discovery Early Career Research Award (DECRA), “Understanding winds: energy transfer in rotating turbulent fluids”, 2012-2014, \$375k;
- ARC LIEF grant, “Wind profiler network for planetary boundary layer research”, 2012, \$480k;
- ANU MEC, “Upgrade of experimental facility for fluid and granular medium dynamics”, 2015, \$135k
- Small research equipment grant, College of Science, ANU, 2007, \$8k.

**University services:**

- Member of the RSPE Equity and Diversity Committee
- Member of the RSPE School Seminar committee
- Member of the College of Physics and Mathematic Science and College of Medicine, Biology and Environment Reconciliation Action Plan committee

**List of Publications :****Book Chapters:**

1. Shats M. and Xia H., **Turbulence**, in: *Encyclopedia of Marine and Offshore Engineering*, John Wiley & Sons, Ltd., ISBN: 978-1-118-47635-2 (2016)
2. Shats M., Xia H. and Punzmann H. **Extreme Capillary Wave Events Under Parametric Excitation**, in *Extreme Events: Observations, Modeling, and Economics*, M. Chaavez, M. Ghil and J. Urrutia-Fucugauchi, Eds., pp. 153-162, American Geophysical Union and John Wiley and Sons, ISBN 978-1-110-15701-4 (2015).
3. Shats M. and Xia H., **Experimental studies of plasma turbulence** in: *Turbulence and Coherent Structures in Fluids, Plasmas and Nonlinear Media*, M. Shats, H. Punzmann, editors, pp.233-280, World Scientific, ISBN 981-256-698-8 (2006).
4. Xia H. and Shats M., **Spectral transfer analysis in plasma turbulence studies** in: *Frontiers in Turbulence and Coherent Structures*, J. Denier, J.S. Frederiksen, editors, pp. 457-470, World Scientific, ISBN 981-270-393-4 (2007).

**Papers in Refereed Journals**

5. Francois N., Xia H., Punzmann H., Faber B. and Shats M., **Braid Entropy of Two-Dimensional Turbulence**, *Scientific Reports* **5**, 18564 (2015).
6. Francois N., Xia H., Punzmann H. and Shats M., **Wave-particle interaction in the Faraday waves**, *The European Physical Journal E* **38**, 106 (2015).
7. Francois N., Xia H., Punzmann H., Combriat T. and Shats M., **Inhibition of wave-driven two-dimensional turbulence by viscoelastic films of proteins**, *Physical Review E* **92**, 023027 (2015).
8. Punzmann H., Francois N., Xia H., Falkovich G. and Shats M., **Generation and reversal of surface flows by propagating waves**, *Nature Physics* **10**, 658-663 (2014).
9. Xu H., Pumir A., Falkovich G., Bodenschatz E., Shats M., Xia H., Francois N., and Boffetta G., **Flight-crash events in turbulence**, *Proceedings of the National Academy of Science of the USA* **111**, 7558-7563 (2014).
10. Francois N., Xia H., Punzmann H., Ramsden S., and Shats M. **Three-dimensional fluid motion in Faraday waves: Creation of vorticity and generation of two-dimensional turbulence**, *Physical Review X* **4**, 021021 (2014)
11. Xia H., Francois N., Punzmann H., and Shats M. **Taylor particle dispersion during transition to fully developed two-dimensional turbulence**, *Physical Review Letters* **112**, 104501 (2014)
12. Xia H., Francois N., Punzmann H., and Shats M. Lagrangian scale of particle dispersion in turbulence, *Nature Communications* **4**:2013 doi: 10.1038/ncomms3013 (2013).
13. Francois N., Xia H., Punzmann H., and Shats M. Inverse energy cascade and emergence of large coherent vortices in turbulence driven by Faraday waves, *Physical Review Letters* **110**, 194501 (2013)
14. Xia H., Maimbourg T., Punzmann H., and Shats M., *Oscillon dynamics and rogue wave generation in Faraday surface ripples*, *Physical Review Letters* **109**, 114502 (2012)
15. Xia H., and Shats M. *Propagating solitons generated by localized perturbations on the surface of deep water*, *Physical Review E* **85**, 026313 (2012)

16. Shats M., Xia H., and Punzmann H., *Parametrically excited water surface ripples as ensembles of oscillons*, **Physical Review Letters**, **108**, 034502 (2012)
17. Xia H., and Shats M. Structure formation in spectrally condensed turbulence, **Int. J. Mod. Phys. Conf. Ser.** **19**, 257--261 (2012)
18. Shats M., Xia H., Byrne D. Turbulence in thick layers, **Int. J. Mod. Phys. Conf. Ser.** **19**, 390--395 (2012)
19. Xia H., Byrne D., Falkovich G. & Shats M. *Upscale energy transfer in thick turbulent fluid layers*, **Nature Physics**, **7**, 321-324 (2011).
20. Byrne D., Xia H. & Shats M. *Robust inverse energy cascade and turbulence structure in three-dimensional layers of fluid*, **Physics of Fluids**, **23**, 095109 (2011).
21. Xia H., Shats M., and Falkovich G., *Turbulence in fluid layers*, **Journal of Physics: Conference Series** **318**, 012001 (2011)
22. Shats, M., Byrne, D. and Xia, H., *Turbulence decay rate as a measure of flow dimensionality*. **Physical Review Letters**, **105**, 264501 (2010).
23. Xia H., Shats M., Punzmann H., *Modulation instability and capillary wave turbulence*, **EuroPhysics Letters**, **91**, 14002 (2010).
24. Shats M., Punzmann H. and Xia H., *Capillary rogue waves*, **Physical Review Letters**, **104**, 104503 (2010).
25. Xia H., Shats M. and Falkovich G., *Spectrally Condensed Turbulence in Thin Layers*, **Physics of Fluids**, **21**, 125101 (2009).
26. Punzmann H., Shats M. and Xia H. *Phase randomization of three-wave interactions in capillary waves*, **Physical Review Letters**, **103**, 064502 (2009).
27. Xia H., Punzmann H., Falkovich G., Shats M., *Comment on "Turbulence –condensate interaction in two dimensions" Reply*, **Physical Review Letters**, **102**, 149402 (2009).
28. Shats M, and Xia H. *Spectrally Condensed Fluid Turbulence and L-H Transitions in Plasma*, **Plasma and Fusion Research**, **4**, 012 (2009).
29. Xia H., Punzmann H., Falkovich G., Shats M., *Turbulence –condensate interaction in two dimensions*, **Physical Review Letters**, **101**, 194504 (2008).
30. Shats M., Xia H., Punzmann H. and Falkovich G., *Suppression of Turbulence by Self-Generated and Imposed Mean Flows*, **Physical Review Letters**, **99**, 164502 (2007).
31. Fujisawa A., Ido T., Shimizu A., Okamura S., Matsuoka K., Iguchi H., Hamada Y., Nakano H., Ohshima S., Itoh K., Hoshino K., Shinohara K., Miura Y., Nagashima Y., Itoh S.-I., Shats M., Xia H., Dong J.Q., Yan L.W., Zhao K.J., Conway G.D., Stroth U., Melnikov A.V., Eliseev L.G., Lysenko S.E., Perfilov S.V., Hidalgo C., Tynan G.R., Holland C., Diamond P.H., McKee G.R., Fonck R.J., Gupta D.K. and Schoch P.M., *Experimental progress on zonal flow physics in toroidal plasmas*, **Nuclear Fusion**, **47**, S718 (2007).
32. Shats M., Xia H., Punzmann H. *Zonal flows, GAM and radial electric field in the H-1 heliac*, **Czechoslovak Journal of Physics** , **56**, 1353-1360 (2006).
33. Shats M., Xia H., Punzmann H., *Turbulent particle transport in the context of L-H transitions*, **Journal of Plasma and Fusion Research**, **82**, 353-356 (2006).
34. Xia H., Shats M., Punzmann H., *Strong ExB shear flows in the transport barrier region in H-mode plasma*, **Physical Review Letters**, **97**, 255003 (2006).
35. Shats M., Xia H., Yokoyama M. *Mean  $E \times B$  flows and GAM-like oscillations in the H-1 heliac*, **Plasma Physics and Controlled Fusion** **48**, S17-S29 (2006).

36. Shats M., Xia H., Punzmann H. *Spectral condensation of turbulence in plasma and fluids and its role in low-to-high phase transitions in toroidal plasma*, **Physical Review E** **71**, 046409 (2005).
37. Shats M., Xia H., Punzmann H. and Solomon W.M. *Spectral energy transfer, generation of zonal flows and their role in confinement transitions*, **Fusion Science and Technology** **46**, 279 (2004).
38. Xia H. and Shats M. *Spectral energy transfer and generation of turbulent structures in toroidal plasma*, **Physics of Plasmas**, **11**, 561 (2004).
39. Harris J.H., Shats M., Blackwell B.D., Solomon W.M., Pretty D.G., Collis S.M., Howard J., Xia H., Michael C.A. and Punzmann H. *Fluctuations and Stability of Plasmas in the H-INF Helic, Nuclear Fusion*, **44**, 279(2004).
40. Xia H. and Shats M., *Inverse energy cascade correlated with turbulent-structure generation in toroidal plasma*, **Physical Review Letters** **91**, 155001 (2003).
41. Shats M., Solomon W.M. and Xia H. *Turbulent transport reduction and randomization of coherent fluctuations by zonal flows in toroidal plasma*, **Physical Review Letters**, **90**, 125002 (2003).
42. Shats M., Punzmann H., Xia H. and Solomon W.M., *Measurements of poloidal rotation velocity using cross-correlation spectroscopy in the H-1 heliac*, **Review of Scientific Instruments** **74**, 2044 (2003).
43. Punzmann H., Shats M., Solomon W.M. and Xia H., *Multichannel visible spectroscopy diagnostic for particle transport studies in the H-1 heliac*, **Review of Scientific Instruments**, **74**, 2048 (2003).
44. Ding XT, Liu Y, Guo GC, Wang EY, Wong KL, Yan LW, Dong JQ, Cao JY, Zhou Y, Rao J, Yuan Y, Xia H., Liu Y., *Observation of internal kink instability purely driven by superthermal electrons in the HL-1M tokamak*, **Nuclear Fusion**, **42**, p491(2002)

#### Refereed Conference Proceedings

45. Xia H. **Lagrangian correlation and spectra in 2D turbulence**, *Int. J. Mod. Phys.: Conf. Series* **34**, 1460378 (2014)
46. Shats M., Francois N., Xia H., Punzmann H. **Turbulence driven by Faraday surface waves**, *Int. J. Mod. Phys.: Conf. Series* **34**, 1460379 (2014)
47. Xia H., Shats M. and Punzmann H., *Universality of Kolmogorov law in spectrally condensed turbulence in thin layers*, **Advances in Turbulence XII**, Springer, Berlin (2010)
48. Punzmann H., Shats M. and Xia H., *Observation of weak turbulence spectra of capillary waves*, **Advances in Turbulence XII**, Springer, Berlin (2010)
49. Shats M., Xia H. and Punzmann H., *Spectra of quasi-2D turbulence in plasma and fluid during spectral condensation*, **Advances in Turbulence XI**, Springer, Berlin (2007)