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College of Engineering and Physical Sciences  
Mathematics  
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## Research Interests

My present research interests include the following topics:

### **Wave Turbulence**

Optical wave turbulence

Gravitational wave turbulence in cosmology

Strong wave turbulence

### **Quantum and Superfluid Turbulence**

Vortex dynamics

Analogies to classical turbulence flows

Kelvin waves

### **2D and Geophysical Fluid Dynamics**

Structure and formation of large-scale mean flows

Turbulent statistics

### **Nonlinear Optics**

Soliton and optical vortex formation

Modulational instability

Soliton turbulence

Those interested in pursuing a research project in one of these areas may contact me and may also consider applying for one of the following postdoctoral research fellowships:

**Marie Skłodowska-Curie Research Fellowship:** 2 to 3 years funding

**EPSRC Postdoctoral Fellowship:** 3 years funding for research in designated 'priority area'

**Leverhulme Early Career Fellowship:** 3 years funding for those with a UK degree

**Newton International Fellowship:** 2 years funding for non-UK citizens and who are not currently working in the UK

## Qualifications

PhD, University of Warwick  
2006 → 2010  
Award Date: 24 Jan 2011

## Employment

**College of Engineering and Physical Sciences**  
Birmingham, United Kingdom  
1 Mar 2016 → present

### **Lecturer**

Lecturer  
Mathematics  
College of Engineering and Physical Sciences

1 Mar 2016 → present

### **Aston Institute of Urban Technology and the Environment**

College of Engineering and Physical Sciences

1 Sep 2020 → present

### **Systems Analytics Research Institute (SARI)**

College of Engineering and Physical Sciences

1 Mar 2016 → present

## **Research output**

### **A plausible model of inflation driven by strong gravitational wave turbulence**

Galtier, S., Laurie, J. & Nazarenko, S., 16 Jul 2020, In: Universe. 6, 7, 16 p., 98.

### **Coarse-grained pressure dynamics in superfluid turbulence**

Laurie, J. & Baggaley, A. W., 28 Jan 2020, In: Physical Review Fluids. 5, 1, 014603.

### **Protein lipograms**

Laurie, J., Chattopadhyay, A. K. & Flower, D. R., 7 Oct 2017, In: Journal of Theoretical Biology. 430, p. 109-116 8 p.

### **Jets or vortices - what flows are generated by an inverse turbulent cascade?**

Frishman, A., Laurie, J. & Falkovich, G. E., 29 Mar 2017, In: Physical Review Fluids. 2, 3, 8 p., 032602(R) .

### **A note on the propagation of quantized vortex rings through a quantum turbulence tangle: energy transport or energy dissipation?**

Laurie, J. & Baggaley, A. W., Jul 2015, In: Journal of Low Temperature Physics. 180, 1-2, p. 95-108 14 p.

### **Reconnection dynamics and mutual friction in quantum turbulence**

Laurie, J. & Baggaley, A. W., Jul 2015, In: Journal of Low Temperature Physics. 180, 1-2, p. 82-94 13 p.

### **Computation of rare transitions in the barotropic quasi-geostrophic equations**

Laurie, J. & Bouchet, F., 15 Jan 2015, In: New Journal of Physics. 17, 1, 25 p., 015009.

### **Thermal counterflow in a periodic channel with solid boundaries**

Baggaley, A. W. & Laurie, J., Jan 2015, In: Journal of Low Temperature Physics. 178, 1-2, p. 35-52 18 p.

### **Universal profile of the vortex condensate in two-dimensional turbulence**

Laurie, J., Boffetta, G., Falkovich, G., Kolokolov, I. & Lebedev, V., 17 Dec 2014, In: Physical Review Letters. 113, 25, 5 p., 254503.

### **Langevin dynamics, large deviations and instantons for the quasi-geostrophic model and two-dimensional Euler equations**

Bouchet, F., Laurie, J. & Zaboronski, O., Sep 2014, In: Journal of Statistical Physics. 156, 6, p. 1066-1092 22 p.

### **Kelvin-wave cascade in the vortex filament model**

Baggaley, A. W. & Laurie, J., 9 Jan 2014, In: Physical Review B. 89, 1, 5 p., 014504.

### **Vortex-density fluctuations, energy spectra, and vortical regions in superfluid turbulence**

Baggaley, A. W., Laurie, J. & Barenghi, C. F., 14 Nov 2012, In: Physical Review Letters. 109, 20, 5 p., 205304.

### **One-dimensional optical wave turbulence: experiment and theory**

Laurie, J., Bortolozzo, U., Nazarenko, S. & Residori, S., May 2012, In: Physics Reports. 514, 4, p. 121-175 55 p.

**Exact solution for the energy spectrum of Kelvin-wave turbulence in superfluids**

Boué, L., Dasgupta, R., Laurie, J., L'vov, V., Nazarenko, S. & Procaccia, I., 23 Aug 2011, In: Physical Review B. 84, 6, 10 p., 064516.

**Control and instanton trajectories for random transitions in turbulent flows**

Bouchet, F., Laurie, J. & Zaboronski, O., 1 Jan 2011, In: Journal of Physics: Conference Series. 318, SECTION 2, 022041.

**On the statistical mechanics of the 2D stochastic Euler equation**

Bouchet, F., Laurie, J. & Zaboronski, O., 1 Jan 2011, In: Journal of Physics: Conference Series. 318, SECTION 4, 042020.

**Interaction of Kelvin waves and nonlocality of energy transfer in superfluids**

Laurie, J., L'vov, V. S., Nazarenko, S. & Rudenko, O., 26 Mar 2010, In: Physical Review B. 81, 10, 14 p., 104526.

**Optical wave turbulence and wave condensation in a nonlinear optical experiment**

Laurie, J., Bortolozzo, U., Nazarenko, S. & Residori, S., 2010, *Localized states in physics: solitons and patterns*. Descalzi, O., Clerc, M. G., Residori, S. & Assanto, G. (eds.). Berlin (DE): Springer, p. 67-87 21 p.

**Optical wave turbulence and the condensation of light**

Bortolozzo, U., Laurie, J., Nazarenko, S. & Residori, S., 1 Dec 2009, In: Journal of the Optical Society of America B. 26, 12, p. 2280-2284 5 p.

**Modeling Kelvin wave cascades in superfluid helium**

Boffetta, G., Celani, A., Dezzani, D., Laurie, J. & Nazarenko, S., Sep 2009, In: Journal of Low Temperature Physics. 156, 3-6, p. 193-214 22 p.

## Activities

**EPSRC Early Career Forum (External organisation)**

Jason Laurie (Member)

1 Dec 2018

**United Kingdom Fluids Network (UKFN) (External organisation)**

Jason Laurie (Chair)

1 Mar 2017 → 1 Mar 2020

**EPSRC Peer Review College (External organisation)**

Jason Laurie (Member)

2016