

Dr Michael Smith

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[Google Scholar](#)

Education

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| 2004-2008 | PhD in Physics, School of Physics & Astronomy, University of Nottingham
(Supervisors: Dr James S. Sharp & Prof Clive J. Roberts) |
| 2000-2004 | MPhys in Physics (1 st Class), School of Physics & Astronomy, University of Manchester. |
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Career Highlights

- Created a 2D vibrated granular system using novel structured surfaces. Demonstrated that the correct surface structure can modify the classic 2D hard sphere phase transition from 2 step continuous to 1st order. This was published in **Physical Review Letters** and highlighted as an Editor's suggestion and featured in '*Physics – Spotlighting exceptional research*'.
 - Explanation of the physical mechanism behind the anti-rebound effect of droplets of dilute polymer solution. This resulted in a publication in **Physical Review Letters** which was highlighted as an Editor's suggestion and featured in '*Physics – Spotlighting exceptional research*'. Discussing this work in his plenary lecture at the 18th Ostwald Kolloquium, Professor Jens Eggers described it as "...some of the best experiments on drop impact ever".
 - Awarded a Royal Society University Research Fellowship
 - Principal Investigator funding awards totalling ~ **£1.4 million**
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Research Interests

My research interests centre on understanding how the interactions of particles in a fluid give rise to their collective larger scale structures and properties,

- Quasi-2D granular fluids
- Electrostatic charging of granular materials
- Dynamics / rheology of concentrated colloidal fluids
- Film formation in colloidal suspensions
- The anti-rebound phenomenon in dilute polymer solutions

Career Outline

- Assistant Professor (2020-present), School of Physics, University of Nottingham
- Proleptic lectureship, School of Physics, University of Nottingham (2016)
- Royal Society University Research Fellow (2012-2020), School of Physics, University of Nottingham
- Postdoctoral Research Associate (2009-2012), School of Physics, University of Nottingham (Employer: Dr James Sharp),
- Postdoctoral Research Associate, (2008-2009) School of Engineering, University of Edinburgh (Employer: Dr Volfango Bertola),
- PhD in Physics, (2004-2008) School of Physics & Astronomy, University of Nottingham (Supervisors: Dr James Sharp & Prof Clive Roberts)
- MPhys in Physics - 1st Class, (2000-2004) School of Physics & Astronomy, University of Manchester

Prizes and awards

Royal Society University Research Fellowship

'Extensional flow and jamming of concentrated colloidal suspensions' Oct 2012

Best paper award – Institute for Liquid Atomization and Spray Systems 2010,

Brno, Czech Republic, 6-8 Sept 2010 *"The anti-rebound effect of flexible polymers on impacting drops"*

Funding

Principal investigator:

Royal Society Enhancement Award	£81,092.00
<i>Dynamic Fluctuations in Granular Fluids</i> (12/2017)	

EPSRC ICase PhD studentship	£111,096.00
<i>Dynamic break-up in glassy fluids</i> (10/2017)	

Royal Society University Research Fellowship Renewal	£356,408.00
<i>"Dynamic Fluctuations and Break-up in Glassy Particle Fluids"</i> (10/2017)	

ESRF X-ray Beam time	-£25,822.20
<i>"Shear band formation in a drying colloidal film"</i> (12/2016)	

EPSRC-Royal Society fellowship engagement	£332,590.00
<i>"Ageing, film formation and cracking in colloidal glasses"</i> (11/2013)	

NNNC Early Career Research Competition	£2,000.00
Equipment time in Nottingham nanoscience & nanotechnology centre (15/01 – 31/03/2013)	
Royal Society University Research Fellowship	£543,720.64
“Extensional flow and jamming in concentrated colloidal suspensions” (10/2012)	
Named Researcher:	
UNICAS	~£5000.00
STFC ISIS neutron scattering time	~ £27,000.00

Publications

1. **Torque about electrostatically charged spheres makes them more attractive**
M.R. Swift, M.I.Smith Soft Matter 20, 7038 (2024)
2. **Studying the aging of Laponite suspensions using extensional rheology**
M.J. Hayes, M.I.Smith Eur. Phys. J. E 45, 91 (2022)
3. **Collective behavior of composite active particles**
J. Eglinton, M.I.Smith, M.R.Swift Phys. Rev. E 105, 044609 (2022)
4. **Fluid dynamics and cell-bound Psl polysaccharide allows microplastic capture, aggregation and subsequent sedimentation by Pseudomonas aeruginosa in water**
M.Romero, A.Carabelli, M.R.Swift, M.I.Smith J. Environ. Microbiology 24, 1560 (2022)
5. **Topographic control of order in quasi-2D granular phase transitions**
J.G.Downs, N.D.Smith, K.K.Mandadapu, J.G.Garrahan, M.I.Smith Phys. Rev. Letts 127, 268002 (2021)

(Highlighted as Editor’s suggestion – Featured in “Physics – spotlighting exceptional research”, May 2010)

6. **ParticleTracker: a gui based particle tracking software**
M.I.Smith, J.G.Downs J. Open Source Software 6, 3611 (2021)
7. **Slip in Adhesion Tests of a Kaolin Clay**
M.J.Hayes, M.I.Smith Eur. Phys. J. E 44, 102 (2021)
8. **Collision-enhanced friction of a bouncing ball on a rough vibrating surface**
N.D.Smith, M.R.Swift, M.I.Smith Sci. Rep. 11, 442 (2021)
9. **Shear bands and the evolving microstructure in a drying colloidal film studied with scanning μ -SAXS**
B. Yang, N. D. Smith, A. Johannes, M. Burghammer, M. I. Smith, Sci. Rep. 8, 12979 (2018)
10. **Boundary effects in a quasi-two-dimensional driven granular fluid**
N.D. Smith, M.I. Smith, Physical Review E 96:062910 (2017)
11. **Interplay of Crack Hopping, Delamination and Interface Failure in Drying Nanoparticle Films**
B. Yang, J.S. Sharp, M.I. Smith, Sci. Rep. 6:32296 (2016)

12. **Fracture of Jammed Colloidal Suspensions**
M.I. Smith, Sci. Rep. 5:14175 (2015)
13. **Mechanical vibrations of pendant liquid droplets**
R.H. Temperton, M.I. Smith, J.S. Sharp Eur. Phys. J. E 38:79 (2015)
14. **Shear Banding in Drying Colloidal Nanoparticles**
B. Yang, J.S. Sharp, M.I. Smith, ACS Nano 9:4077-4084 (2015)
15. **Origin of contact line forces during the retraction of dilute polymer solution drops**
M.I. Smith, J.S. Sharp, Langmuir 30, 5455-9, (2014)
16. **Giant Amyloid Spherulites reveal their true colours**
M.I. Smith, J.S. Sharp, C.J. Roberts, Soft Matter 8, 3751-5 (2012)
17. **Factors affecting the formation of Insulin Spherulites**
M.I. Smith, V. Fodera, J.S. Sharp, C.J. Roberts, A.M. Donald, Colloids & Surfaces B: Biointerfaces 89, 216-222 (2011)
18. **The effects of substrate constraint on crack pattern formation in thin films of colloidal polystyrene particles**
M.I. Smith, J.S. Sharp, Langmuir 27, 8009 (2011)
19. **Dilatancy in the flow and fracture of stretched colloidal suspensions**
M.I. Smith, R. Besseling, M.E. Cates, V. Bertola, Nature Communications. 1, 114 (2010)
20. **Particle Velocimetry inside Newtonian and non-Newtonian droplets impacting a hydrophobic surface**
M.I. Smith, V. Bertola, Experiments in Fluids 50, 1385-1391 (2010)
21. **Effect of polymer additives on the wetting of impacting droplets**
M.I. Smith, V. Bertola, Physical Review Letters 104, 154502 (2010)

(Highlighted as Editor's suggestion – Featured in "Physics – spotlighting exceptional research", May 2010)

22. **Insulin fibril nucleation: the role of prefibrillar aggregates**
M.I. Smith, J.S. Sharp & C.J. Roberts, Biophysical J. 95 3400-3406 (2008)
23. **Nucleation and Growth of Insulin Fibrils in Bulk Solution and at Hydrophobic Polystyrene Interfaces**
M.I. Smith, J.S. Sharp & C.J. Roberts, Biophysical J. 93, 2143-2151 (2007)
24. **Spinodal wrinkling in thin-film poly(ethylene oxide)/polystyrene bilayers**
J.S. Sharp, D. Vader, J.A. Forrest, M.I. Smith, M. Khomenko & K. Dalnoki-Veress, Eur. Phys. J. E 19, 423-432 (2006)

Conference Papers

1. **The anti-rebound effect of flexible polymers on impacting drops**
M.I. Smith, V. Bertola, *Proc. 23rd European Conference on Liquid Atomization and Spray Systems, Brno, Czech Republic, 6 -8 September 2010.*

(ILASS 2010 best paper award)

2. **Velocity measurements inside impacting drops of dilute polymer solutions**, M.I. Smith, V. Bertola, *DIPSI Workshop 2010 on droplet impact phenomena and spray investigation, Bergamo, Italy 27 -28 May 2010.*
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Invited Talks

- M.I. Smith, Drying Days Conference, Toulouse *'The interplay of instabilities in a drying colloidal film (23-24th March 2017)*

Invited Seminars

- M.I. Smith, Materials Physics seminar, University of Durham, *'Stretching dense colloidal suspensions: from flow to fracture' (14th January 2015).*
- M.I. Smith, Polymer physics seminar, University of Sheffield, *'Watching paint dry (& crack)' (6th Dec 2013)*
- M.I. Smith, J.S.Sharp, C.J. Roberts, Polymer physics seminar, University of Sheffield, *'Nucleation and growth of insulin fibrils' (21st March 2008)*

Conference presentations - Oral

- M.I. Smith, American Physical Society, New Orleans *'The interplay of instabilities in a drying colloidal film (13-17th March 2017)*
- M.I. Smith, American Physical Society, Baltimore *'The flow and fracture of concentrated colloidal suspensions (14-18th March 2016)*
- B. Yang, J.S. Sharp, M.I. Smith, European Coating Symposium 2015, Eindhoven, Netherlands (9-11th September 2015) *'Shear banding in drying colloidal films'*
- M.I. Smith, R. Besseling, A. Schofield, J.S. Sharp, M.E. Cates, V. Bertola, American Physical Society, Boston, USA (27th February – 2nd March 2012) *'Stretching dense suspensions from flow to fracture'*
- M.I. Smith, V. Bertola, Institute of Physics: Biennial meeting of the polymer physics group, University of Surrey, (12-14th September 2011) *'Controlling droplet impact by polymer additives'*
- M.I. Smith, R. Besseling, A. Schofield, J.S. Sharp, M.E. Cates, V. Bertola, 8th Liquid Matter Conference, Universitat Wien, Austria (5-10th September 2011) *'Stretching Dense Colloidal Suspensions: from flow to fracture'*
- M.I. Smith, V. Bertola, Institute of Physics: Condensed Matter and materials physics, University of Warwick (14-16th December 2010) *'Controlling droplet impact by polymer additives'*
- M.I. Smith, J.S. Sharp, C.J. Roberts, Institute of Physics: Biennial meeting of the polymer physics group, University of Durham (10th-12th September 2007) *'Nucleation and Growth of Insulin Fibrils in Bulk Solution and at hydrophobic polystyrene interfaces'*
- M.I. Smith, J.S. Sharp, C.J. Roberts, Institute of Physics: Interface of Medical and Biological Physics, University of Southampton (May 2007) *'Nucleation and Growth of Insulin Fibrils in Bulk Solution and at hydrophobic polystyrene interfaces'*

Conference presentations - Poster

- M.I. Smith, J.S. Sharp, American Physical Society, Boston, USA (27th February – 2nd March 2012) *'Cracking in thin films of colloidal particles on elastomeric substrates'*
 - M.I. Smith, J.S. Sharp, C.J. Roberts, American Physical Society, Boston, USA (27th February – 2nd March 2012) *'Optical properties of large amyloid spherulites'*
 - M.I. Smith, V. Bertola, American Physical Society, Boston, USA (27th February – 2nd March 2012) *'Controlling droplet impact with polymer additives'*
 - M.I. Smith, J.S. Sharp, Institute of Physics: Polymer Physics Group, University of Surrey, (12-14th September 2011) *'Crack formation in colloidal films: the role of substrate constraint'*
 - M.I. Smith, J.S. Sharp, Institute of Physics: Polymer Physics Group, University of Surrey, (12-14th September 2011) *'Coloured Spherulites'*
- (IOP PPG Biennial Best poster award)**
- M.I. Smith, R. Besseling, A. Schofield, J.S. Sharp, M.E. Cates, V. Bertola, Institute of Physics: Polymer Physics Group, University of Surrey, (12-14th September 2011) *'Stretching colloidal suspensions: from flow to fracture'*
 - M.I. Smith, V. Bertola, 8th Liquid Matter Conference, Universitat Wien, Austria (5-10th September 2011) *'Controlling droplet Impact with polymer additives'*
 - M.I. Smith, J.S. Sharp, 8th Liquid Matter Conference, Universitat Wien, Austria (5-10th September 2011) *'Cracking Colloids: the role of substrate constraint'*
 - M.I. Smith, V. Bertola, SET for Britain 2011, Houses of Parliament (14th March 2011) *'Making droplets stick'*
 - M.I. Smith, R. Besseling, M.E. Cates, V. Bertola, Institute of Physics: Condensed Matter and Material Physics, University of Warwick (14-16th December 2010) *'Stretching colloidal suspensions: from flow to fracture'*
 - M.I. Smith, J.S. Sharp, Institute of Physics: Condensed Matter and Material Physics, University of Warwick (14-16th December 2010) *'Cracking Colloids: the role of substrate constraint'*
 - M.I. Smith, V. Fodera, J.S. Sharp, A.M. Donald, C.J. Roberts, Institute of Physics: Condensed Matter and Material Physics, University of Warwick (14-16th December 2010) *'Towards an understanding of polymorphism in protein aggregation'*
 - M.I. Smith, V. Fodera, J.S. Sharp, A.M. Donald, C.J. Roberts, Institute of Physics: Physics meets Biology, University of Oxford (1st-3rd September 2010) *'Towards an understanding of polymorphism in protein aggregation'*
 - M.I. Smith, J.S. Sharp, C.J. Roberts, Institute of Physics: Self-assembling peptides, IOP London, (22nd March 2007) *'Nucleation and growth of insulin fibrils in bulk solution and at hydrophobic polystyrene interfaces'*

Referee for International Journals

Physical Review Letters, European Physical Journal E, Soft Matter, Experimental & Thermal Fluid Sci., J. Colloid & Int. Sci., Langmuir, Physics of Fluids

Teaching Experience

Module Convenor, Scientific Python (PHYS4038/ ASI) for PGT and PhD students at the University of Nottingham and other Universities in the Midlands Physics Alliance. (Autumn 2023-present)

Module Convenor, Force and Function at the Nanoscale (PHYS3009) for 2nd Yr students (Autumn 2018-present)

Lecturer and Assessor, Modern Applications of Physics (PHYS4025) for 4th Yr students (Spring 2017-2023)

3rd Yr Laboratory Teaching (Autumn 2016)

Frontiers in physics lecture / problems class for 1st Year students (March 2013)

Co-convenor for “Materials, Microstructure & Microscopy” 4th year module (Spring 2011)

Supervision of Research projects

Postdocs:

Dr Bin Yang: *Ageing, film formation and cracking in colloidal glasses” (Supervision of PGRA, University of Nottingham, 2013-Present)*

Phds: Nathan Smith: *“Interactions in a quasi-2D granular fluid” (2014-2018)*

Matthew Hayes: *“Dynamic break-up in glassy fluids” (EPSRC Icase studentship, 2017-2021)*

James Downs: *“Phase transitions in a 2D granular fluid” (2018-2022)*

Oliver Lunn: *“Interfacial fluctuations in 2D granular fluids”(2024-present)*

Masters Projects and Summer Internships:

A large number of student projects and internships

Outreach

- ‘Introduction to Nanoscience’ –Sutton Trust widening participation summer school (July 2015 - present) consisting of an introductory lecture and related laboratory practicals
 - ‘Introduction to Nanoscience’ – Nottingham Potential widening participation summer school (July 2015 - present) consisting of an introductory lecture and related laboratory practicals
 - ‘Seeing the unseeable’ – University of Nottingham widening participation campaign for sixth formers. Delivered introductory talk on nanoscience and lead UV-vis laboratory demonstration (11th February 2015)
 - ‘The electromagnetic spectrum’ - University of Nottingham outreach to primary school children (Easter 2014)
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Administration and Community

- Disability Liaison Officer for the school of physics (2022-present)
 - Membership of EDI and teaching committees (2022-present)
 - Member of the research committee (School of Physics, UoN, 2013-2019)
 - Nanoscience group meeting co-ordinator (2013-2016)
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Referees

Dr James Sharp	-	School of Physics & Astronomy, University of Nottingham, NG7 2RD e-mail: james.sharp@nottingham.ac.uk	tel: 0115 9515142
Dr Volfango Bertola	-	Centre for Engineering Dynamics , University of Liverpool, Liverpool e-mail: volfango.bertola@liverpool.ac.uk	tel: 0151 794 4804