

# Physics in Food Manufacturing Conference



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# Physics in Food Manufacturing Conference



## Chairs welcome

Welcome to the third conference in the series of Physics in Food Manufacturing. Following two very successful conferences hosted by Universities (Sheffield Hallam, Jan 2017 and Edinburgh, Jan 2018), we selected Campden BRI as our venue for the third conference to strengthen our reach to food manufacturers of all sizes. You will hear more of Campden BRI's impressive track record in providing the food and drinks industry – locally and internationally – with practical scientific, technical and advisory services.

The conference continues to showcase the remarkably wide variety of physics relevant to food manufacturing from computer modelling, advanced imaging and measurements techniques, and designing food products from microstructures upwards! I am also delighted that for the first time we have a Careers Panel and I look forward to stimulating discussions around careers development for physicists and scientists generally in food manufacturing. Please take time to explore the exhibitors and posters. On behalf of the committee, we hope you enjoy the programme over the next two days and meet new people and reconnect with old friends.

**Chair, Mr John Bows CPhys FInstP, PepsiCo**

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## Contacts

Please read this handbook prior to the event as it includes all of the information you will need while onsite at Physics in Food Manufacturing Conference 2019. If you have any questions or require further information, please contact a member of the conference organising team, Keenda Sisouphanh or Ana Santos.

Keenda and Ana will be on-site for the duration of the conference and will be based in the reception area during registration times. Outside of these times and only in case of an emergency, please telephone 07919 008 415.

Keenda Sisouphanh

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Conferences

Tel: +44 (0)20 7470 4800

Email: [conferences@iop.org](mailto:conferences@iop.org)

We hope that your time at the conference is trouble free. If you do encounter any problems, please report them to the conferences team who will make every effort to rectify the issue as soon as possible.

## Disclaimer

The Institute of Physics, the Campden BRI and their approved representatives accept no responsibility for any accident, loss or damage to participant's property during the conference.

## Social media



Follow and join the conversation at [#IOPpifm2019](https://twitter.com/IOPpifm2019)

# Physics in Food Manufacturing Conference



## Committee

### PiFM Committee

Chair, Mr John Bows CPhys FInstP, PepsiCo, UK

Secretary, Dr John Melrose FInstP, University of Nottingham, UK

Treasurer, Dr Robert Farr FInstP, Jacob Douwe Egberts, UK

### Ordinary Member(s)

Professor Sarah Bridle MInstP, University of Manchester, UK

Professor Douglas Cleaver CPhys MInstP, Sheffield Hallam University, UK

Professor Thomas Krauss CPhys FInstP, University of York, UK

Dr Felix Oppong MInstP, Unilever, UK

Professor Wilson Poon CPhys FInstP, University of Edinburgh, UK

Professor Megan Povey CEng CPhys FInstP, University of Leeds, UK

Dr Beccy Smith MInstP, Mondelez, UK

Dr Martin Whitworth CPhys MInstP, Campden BRI, UK

**Co-opted Member**, Dr Marco Ramaoli MInstP, University of Surrey, UK

**Early Career Physicist**, Dr Anne Pawsey MInstP, University of Edinburgh, UK

### Organising Committee

Mr John Bows CPhys FInstP, PepsiCo, UK

Dr Robert Farr, Jacobs Douwe Egberts, Coffee Scientist, UK

Dr Martin Whitworth CPhys MInstP, Campden BRI, Principal Scientist, UK

Dr Anne Pawsey, University of Edinburgh, Impact Acceleration Associate, UK

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## Venue

The conference will take place at Campden BRI.



Campden BRI  
Station Road  
Chipping Campden  
Gloucestershire  
GL55 6LD

 Telephone: 01386 842000

For more information about the venue, please visit their [website](#)

[Google map](#)

Event	Location
Registration	Reception
Technical talks	Lecture Room
Exhibition	Exhibition and Catering room
Posters	Lecture Room
Refreshments & Lunch	Exhibition and Catering room
Conference Dinner (Wed)	Cotswold House Hotel

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## Accommodation

Accommodation is NOT included in the registration fee.

The link below lists hotels and private houses offering bed & breakfast in the local area. Prices should be reconfirmed when booking your accommodation. Please note that some places may not accept credit cards.

<https://www.campdenbri.co.uk/campdenbri/accommodation.php>

## Travel

For travel information, visit the conference [website](#).

## Maps & Local Taxis

Printable PDF [Location Map](#)

[Local taxis](#) Advance booking recommended

## Parking

There is ample visitor parking onsite and you will need to sign in at the registration desk with your name and number plate on both days.

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## Programme

### Wednesday 9 January

- 09:00 Registration
- 10:00-10:15 **Welcome**  
Mr John Bows, PepsiCo, UK. Chair, IOP Physics in Food Manufacturing Group
- 10:15-10:30 **Introduction to Campden BRI**  
Professor Steven Walker, CEO, Campden BRI, UK

### Session: Fats, lipids and nutrition

Chair: Dr Beccy Smith MInstP, Mondelez, UK

- 10:30 **(Invited) Good fat, bad fat – how bad is bad?**  
Dr Kevin Smith, Fat Science Consulting, UK
- 11:00 **New nanostructural insights into triacylglycerols in the molten state**  
Michael Rappolt, School of Food Science and Nutrition (UoL), UK
- 11:20 **Structuring edible oils using sterol olefators**  
Stephen Euston, Heriot-Watt University, UK
- 11:40 **Applications of ultrasound in food science – novel control of fat crystallization and structuring**  
Megan Povey, University of Leeds, UK
- 12:00 **(Invited) Entropy, the second law of thermodynamics and why ‘a calorie may not be a calorie’**  
Andrew Preece, QinetiQ Group plc, UK
- 12:30 **Lunch and Posters**  
Exhibition and catering room

### Session: Physics of Food Microstructure

Chair: Megan Povey, University of Leeds, UK

- 13:30 **(Invited) Cereals and physics: windows on fundamental realities**  
Professor Grant Campbell, University of Huddersfield, UK
- 14:00 **Effect of storage temperature and relative humidity on reconstitutable freeze-dried oil-in-water emulsion stabilised by hydrophobically modified starch**  
Mingduo Mu, University of Leeds, UK
- 14:20 **Wetting, dispersion and dissolution of food powders at different length scales**  
Marco Ramaioli, University of Surrey, UK
- 14:40 **Fragmented proteins as steric stabilisers and emulsifiers in food colloid formulations**  
Rammile Ettelaie, University of Leeds, UK

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15:00 **(Invited) Structure and dynamics of lipid assemblies**  
Dr Arwen Tyler, University of Leeds, UK

15:30 **Coffee break and Posters**  
Exhibition and catering room

16:00 **Exhibitors presentations**  
16:00 Renishaw  
16:05 Oxford Instruments Magnetic Resonance  
16:10 Pro-lite Technology Ltd  
16:15 COMSOL Ltd  
16:20 Camlin Photonics

## Careers Panel

Chair: John Melrose, Jacobs Douwe Egberts, UK

16:00 **Panel:**  
Dr Beccy Smith, Mondelēz, UK  
Bertrand Emond, Campden BRI, UK  
Dr Arwen Tyler, University of Leeds, UK

19:00 **Conference Dinner**  
Cotswold House Hotel

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## Thursday 10 January

09:00 Registration

### Physical Measurement of Foods

Chair: Mr John Bows, PepsiCo, UK. Chair, Physics in Food Manufacturing Group

- 09:30 **(Invited) Lighting up the world of food security with raman spectroscopy**  
Professor Roy Goodacre, University of Manchester, UK
- 10:00 **Raman imaging of chocolate and other confectionary**  
Luen Yan Wong, Renishaw plc, UK
- 10:20 **Investigation of the reconstitution, structure and formation of dairy systems and gels: use of super-resolution microscopy and ultrasound spectroscopy**  
Zachary Glover, University of Southern Denmark, Denmark
- 10:40 **Hyperspectral Imaging: machine vision and ai for use in food sorting applications**  
John Gilchrist, Camlin Photonics, UK
- 11:00 **(Invited) mapping food composition by hyperspectral imaging**  
Dr Martin Whitworth, Campden BRI, UK
- 11:30 **Coffee break, posters and tours of Campden BRI facilities**  
Exhibition and catering room
- 12:30 **Lunch**  
Exhibition and catering room

### Physical and data modelling of foods

Chair: Dr Robert Farr, Jacobs Douwe Egberts, Coffee Scientist

- 13:30 **(Invited) Meso-scale modelling and applications in foods**  
Professor Julia Yeomans, University of Oxford, UK
- 14:00 **Outdoor 3D imaging of wheat for phenotyping**  
Imran Mohamed, National Physical Laboratory, UK
- 14:20 **Modelling molecular release during coffee brewing**  
Dr John Melrose, University of Nottingham, UK
- 14:40 **Electronic inspection of the inner pressure of bottled & canned food or beverages. How convex sets theory defines its limits**  
Roberto Alfano, University of Derby, UK
- 15:00 **(Invited) Getting the most out of physics based modelling in the food industry**  
Dr Ritchie Parker, Nestlé, Switzerland
- 15:30 **Closing remarks and presentation of student poster and presentation prizes**  
Mr John Bows, PepsiCo, UK. Chair, Physics in Food Manufacturing Group

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16:00            **Refreshments and close**  
Exhibition and catering room

## Poster programme

**P1. Ultrasound assisted extraction of rice bran protein and its functional properties**

Bipro Nath Dubey, Sheffield Hallam University, UK

**P2. Ultrasound spectroscopy techniques for the characterization of edible oleofoams**

Lorenzo Metilli, University of Leeds, UK

**P3. Quantifying the effect of natural antimicrobials and ultrasonic treatment on the stress adaptation and antimicrobial resistance of Listeria in viscoelastic gels**

Katherine Costello, University of Surrey, UK

**P4. Biotransformation of wastes of agrifood industries for animal feeding**

Dounia Lakhel, University Hassan II, Morocco

**P5. Lay's shapes has created exciting products to deliver Lay's branded snacks to consumers in emerging markets, via soft matter physics & material science tools**

John Bows, PepsiCo, UK

**P6. Effect of melt temperature on cocoa butter lipolysis**

Louise Sim, University of Leeds, UK

**P7. Modelling moisture loss in roasting coffee beans**

John Melrose, University of Oxford, UK

**P8. The modelling of coffee brew yield**

John Melrose, Jacobs Douwe Egberts R&D, UK

**P9. An in vitro study of the effect of lubrication on swallowing**

Marco Marconati, University of Surrey, UK

A printed copy will be included in your welcome pack, which you will receive on arrival at the conference. Please note the programme is subject to change.

The abstracts are on the website under the programme section and will be available in digital format only. This will be emailed to you, so if want a copy to refer to while on-site at the conference, please print or save a personal copy.

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## Registration

The registration desk will be located in the reception area at the times listed below. All attendees will receive a registration welcome pack which contains a copy of the programme, a list of participants, a pen and pad, and conference badge.

Participants are asked to wear their badges at all times throughout the conference to help with security and identify fellow participants.

Wednesday 9 January                      09:00-16:00

Thursday 10 January                      09:00-16:00

Outside of registration times and only in the case of an emergency, please call 07919 008 415.

## Catering

Catering will be provided at set times throughout the conference. Please refer to the programme for timings and the following table below for locations.

What	Location
Refreshments & lunch	Exhibition and Catering room
Conference Dinner (Weds)*	Cotswold House Hotel

## Dietary requirements

Participants with dietary requirements are asked to notify the conference office by email prior to their arrival. It will not be possible to provide an alternative menu unless prior notification has been received. Please email [keenda.sisouphanh@iop.org](mailto:keenda.sisouphanh@iop.org) if you have any queries.

## Payment

The organiser reserves the right to refuse admission to any participant who has failed to pay their registration fee prior to the event.

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## Exhibition

An exhibition will be held from lunchtime on Wednesday 9 January until 14:00 on Thursday 10 January. Exhibitors can set up from 08:00 on Wednesday and can dismantle their stands from 14:00 on Thursday.

Exhibitors contribute towards the cost to operate the conference, reducing the overall registration fee for all participants. We would therefore like to encourage participants to take the time to visit the exhibitors to find out about their products and services.

## Renishaw

[www.renishaw.com](http://www.renishaw.com)



Renishaw is one of the world's leading engineering and scientific technology companies, with expertise in precision measurement and healthcare. The company employs over 4,000 people worldwide and supplies products for use in applications as diverse as jet engine and wind turbine manufacture, through to 3D printing, dentistry and brain surgery. It manufactures a wide range of equipment for Raman spectroscopy including compact benchtop analysers, Raman microscopes, and hybrid systems.

## Oxford Instruments Magnetic Resonance

[www.nmr.oxinst.com](http://www.nmr.oxinst.com)



*The Business of Science®*

Oxford Instruments is a leading provider of high technology solutions, information and support for industry and research. Our Magnetic Resonance group offers a range of NMR instruments including MQR, a TD-NMR system for food research. MQR is a low resolution, high performance TD-NMR research system designed for applications based on relaxation and/or diffusion measurements. The system includes a high performance digital spectrometer, 20MHz (0.47T) permanent magnet, and a choice of interchangeable 10, 18 and 26mm diameter probes, some of which may be variable temperature. Measurements include microscopic and macroscopic oil/water distributions, solid/liquid ratios, phase transitions, amorphous/crystalline content, diffusion and droplet size.

Our product portfolio also includes: Pulsar, a high resolution cryogen-free benchtop NMR spectrometer which provides a fast, convenient and reliable method of determining fatty acid compositions and food authenticity

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screening amongst many other applications, and the MQC+ range of benchtop NMR QC analysers for fast and easy measurement of total oil or fat in food.

For more information visit: <http://www.oxinst.com/nmr> or email: [magres@oxinst.com](mailto:magres@oxinst.com)

### Pro-Lite Technology Ltd

[www.pro-lite.co.uk](http://www.pro-lite.co.uk)



Pro-Lite is a supplier of specialist equipment and services with a technical focus in the following areas of photonics: instruments for measuring light and the optical properties of materials; photometry; lasers and related equipment; opto-mechanics and positioning equipment; optics and optical materials; and spectroscopy and spectral imaging. We supply a range of sensitive miniature Raman spectrometers from Wasatch Photonics; a selection of hyperspectral and multispectral imagers from suppliers including HySpex, Surface Optics, Pixelteq and Photon etc; NIR spectrometers for food quality measurements and portable gas analysers for ethylene, CO<sub>2</sub> and O<sub>2</sub> measurements.

### COMSOL Ltd

<https://uk.comsol.com/>



COMSOL is a global provider of simulation software for product design and research to technical enterprises, research labs, and universities. Its COMSOL Multiphysics® product is an integrated software environment for creating physics-based models and simulation applications. A particular strength is its ability to account for coupled or multiphysics phenomena. Add-on products expand the simulation platform for electromagnetics, structural, acoustics, fluid flow, heat transfer, and chemical applications. Interfacing tools enable the integration of COMSOL Multiphysics® simulations with all major technical computing and CAD tools on the CAE market. Simulation experts rely on COMSOL Compiler™ and COMSOL Server™ to deploy applications to their design teams, manufacturing departments, test laboratories, and customers throughout the world. Founded in 1986, COMSOL has 19 offices worldwide and extends its reach with a network of distributors.

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Camlin Photonics Limited

[www.camlinphotonics.com](http://www.camlinphotonics.com)



The Camlin Photonics division of the Camlin Group specialises in bringing valuing adding spectroscopy products and solutions from concept through to market across a range of sectors: Scientific; Industrial and Security.

Our hyperspectral imaging systems are designed as a complete end-to-end solution to make robust, reliable, accurate and repeatable hyperspectral measurements and the systems are easily adaptable to a wide range of processes. At Camlin Photonics we have significant experience in deploying hyperspectral imaging solutions in many different food product inspection applications for grading, quality control, sorting, and other processes. Examples have included meat (both whole carcass and individual cuts), fish and other sea food, fruit and vegetables, and baked goods.

Our dedicated scientists and engineers have years of practical spectroscopy, machine vision and artificial intelligence experience. This team is on hand to demonstrate how hyperspectral technology can deliver significant performance improvements in industrial inspection processes, and to support implementation of tailored hyperspectral imaging systems into research laboratories and onto industrial process lines.

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## Presenter instructions

The Lecture room will be equipped with audio-visual aids listed below:

- 12ft x 9ft projection screen in 16:9 ratio
- PC and a seamless switcher
- PA system with PC sound kit and Microsoft office software
- Hand held and lapel microphones

The venue coordinator will be on hand throughout the conference to assist presenters to upload their presentation onto the house PC or to link up their own laptops.

If you require any additional equipment, please email [keenda.sisouphanh@iop.org](mailto:keenda.sisouphanh@iop.org)

- Invited talks: 20 minutes talk + 10 minutes questions
- Contributed talks: 15 minutes talk + 5 minutes questions

## Instructions for speakers

- We recommend presenters bring their presentation on a USB stick to load their talk onto the PC located in the Lecture room.
- Your presentation should be loaded on to the PC located in the meeting room in the break preceding the start of your session. Please save your presentation file in the appropriate named folder saved on the desktop. Direct connection of personal laptops is the alternative approach.
- Presenters are asked to prepare their talks to match the allocated times in the programme which will be strictly enforced by the conference chairs.

## Format and technical requirements

- The meeting room is large, so speakers should use a minimum 16-point font size in PowerPoint slides to ensure legibility.
- To avoid potential problems with display fonts, please only use fonts common to both platforms (Arial, Courier, Courier New, Geneva, Georgia, Helvetica, Times, Times New Roman).
- For images in your presentations, it is preferable that the images are in jpg format.
- If you have embedded video files to your presentation, they must be any of the following formats mpg, mpeg, wmv avi or QuickTime (mov)
- Do not forget to upload any video files separately in addition to your PowerPoint presentation.

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## Posters

Posters will be located in the Lecture room throughout the conference.

Any poster not removed at the correct time will be recycled.

Poster boards are 2m by 1m (h x w) and orientated vertically. Posters should be A0 in size (118.9 x 84.1cm/ 46.8 x 33.1 inches), in a portrait format. Posters must be prepared in advance of the conference as it will not be possible to print them on-site. Fixing material will be supplied to mount your poster.

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## Safety and evacuation procedures

No fire alarms/drills are planned, if the alarm sounds, please evacuate the building immediately and assemble outside by the side of the Railway line (all fire exits are sign posted). DO NOT re-enter the building until instructed it is safe to do so by the fire officer in charge.

## Smoking

In accordance with government legislation, smoking is not permitted in any building, temporary enclosed structure or substantially enclosed space outside of the building. E-cigarettes are also not permitted in the building.

## First aid

If you fall ill or injure yourself during the conference, please report the incident to a member of staff who will call a trained first-aider. In case of serious injury, paramedics will be called.

## Weather

The Weather in the UK can be unpredictable and therefore we recommend participants bring a water proof rain jacket and/or umbrella. The average temperature for Gloucestershire, UK in January is 8°C.

## General information

- Britain's currency is the pound sterling (£). Credit cards - especially Visa and MasterCard - are widely accepted in restaurants, bars, cafés and shops. American Express and Diners Club cards are less commonly accepted. There are plenty of cash machines (also known as cashpoints or ATMs) available within walking distance of the hotel.
- Value-added tax (VAT) is a 20% sales tax levied on most goods and services except basic food items, books and children's clothing. Restaurants must, by law, include VAT in their menu prices. If you are travelling for leisure or business purposes, you may be eligible for a VAT refund. The VAT refund scheme is called the Retail Export Scheme or Tax-Free Shopping.
- Electricity - British electrical standards are 50Hz 230 volts, so some North American and European electrical devices may require converters; all require plug adapters.
- Telephone - If you're visiting the UK from abroad, the UK dialling code is +44 (which replace the 0).
- Emergencies - Visitors should be aware of their personal safety. Call 999 for the emergency services (police, fire and ambulance) which is a free call from any phone. You can also call 112 for non-life threatening assistance and to report crimes. To report non-urgent crime, call the police on 101 from within the UK.

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## Conference app

Physics in Food Manufacturing Conference will have its own dedicated conference mobile app with information related to the programme and exhibitors. There will also be daily notifications to keep you up to date with each day's schedule. To opt in, please follow the joining instructions included within your confirmation email.