



## SHOCK WAVES AND EXTREME CONDITIONS

Studying the fascinating world of the behaviour of materials outside of the everyday.

### Welcome

Welcome to the third newsletter for the Shock Wave and Extreme Conditions (SWEC) Group. SWEC brings together parties from both industry and academia with a common interest in novel aspects of high strain-rate and pressure phenomena. This interest encompasses a wide range of disciplines from energetic material behaviour through biomaterials to phenomena such as crashworthiness of structures. Areas of interest include both the fundamental principles behind, and experimental techniques involved in accessing:

- Static high pressures, shock waves, blast and energetic materials
- Materials characterization across a range of strain rates
- High pressure or high-rate Materials Synthesis
- Development of equations of state and constitutive models
- The effects of high energy and high-rate energy deposition
- High-speed transient phenomena
- Complex diagnostics and sensing systems
- Pressure, energy, temperature and very high strain-rate response materials ranging from biological, soft systems to dislocation behaviour in single crystals.

SWEC seeks to facilitate research and discussion in these fields, aiming to initiate and develop links between physicists and other researchers in this multi-disciplinary area. We actively welcome all expressions of interest in collaborations with other interested parties.

*Gareth Appleby-Thomas (Chair)*

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### Help Needed from Members!

1. **Recruit new members** – spread the word and get your colleagues to join the IOP and SWEC.
2. **Get involved.**
3. **Tell us about your research interests** – we want to hear from you at [swec@physics.org](mailto:swec@physics.org)

## The SWEC Group Committee

The current SWEC Committee members are:

Gareth Appleby-Thomas	Cranfield University	<i>Chair</i>
Glenn Whiteman	AWE	<i>Secretary</i>
Ian Cullis	QinetiQ	<i>Treasurer</i>
James Perry	University of Cambridge	<i>Early Careers</i>
Chris Braithwaite	University of Cambridge	
Kate Brown	University of Cambridge	<i>Equality Diversity and Inclusion</i>
Mark Collinson	AWE	<i>Database management</i>
Daniel Eakins	University of Oxford	
Simon Finnegan	AWE	<i>Awards and Prizes</i>
Michael Goff	AWE	
Craig Hoing	MOD	
Bill Proud	Imperial College	<i>NMH 2020</i>
Steve Rothman	AWE	

## Committee News

The advent of lock down has meant the committee had to hold virtual meetings, which have been relatively successful. The IT has worked!

One of the recurring discussion points has been the creation of advisors to help the committee to cover the wide range of interests SWEC members have. We are pleased to announce the recruitment of our first two advisors for their areas of expertise: Rachael Hazael, Cranfield University and Neil Bourne, The University of Manchester and Rutherford Appleton Laboratory. Rachael is an expert in high pressure response of biomaterials as well as body armour and Neil is an expert in shock physics and dynamic material response.

The last newsletter examined the breakdown of the SWEC membership and showed that 51% of you were undergraduates. We would therefore like to appoint an undergraduate advisor to help us understand the needs of this section of our group. The committee meets perhaps 3 times a year and travel costs are reimbursed. However, you can always join our meetings remotely. If you are interested in becoming our undergraduate advisor, then please let us know. We really need you!

*If you are interested in working with the committee, please let Glenn know by emailing [swec@physics.org](mailto:swec@physics.org).*

## Studentships

### Oxford University

**Project:** On the shock compression response of single crystal tin

<https://eng.ox.ac.uk/study/research-studentships/research-studentship-in-impact-engineering-daniel-eakins/>

**Project:** On the Response of Discontinuous Interfaces to Impact Loading

<https://eng.ox.ac.uk/study/research-studentships/research-studentship-in-impact-engineering-daniel-eakins-2/>

**Project:** New paradigms for X-ray probing of dynamic failure at the mesoscale

<https://eng.ox.ac.uk/study/research-studentships/research-studentship-in-impact-engineering-daniel-eakins-david-chapman/>

## Group prizes

Simon Finnegan has been working hard to establish our first group prize, which will be a video competition. It will certainly be a more exciting challenge than an essay. The prize has now been approved by the IOP.

We had hoped to launch the prize ahead of the summer but schools and universities closing naturally spoilt this. Alongside the prize money we are awaiting formal approval for the winners to be added to the IOP YouTube page.

The intention is to allow anyone to enter the competition as the target audience is non-scientists. There will also be a separate category for post-graduates who have more knowledge of the field.

We very much want the videos to be used on the SWEC website/social media to advertise the field to members, other IOP groups, and non-scientists alike so that with every year we can grow a library of entertaining, short SWEC videos.

**The Prize will be launched in JULY 2021 so look out for the advertisement announcing the details how to enter early next year.**

## IOP Joint group meetings

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The Committee continue to work on joint group meetings and have potentially identified joint meetings with the Applied Mechanics, Structural Condensed Matter, Combustion, Food, and Materials and Characterisation Groups.

Once again if you are also a member of another group and have ideas for cross-correlation of meetings we would very much like to hear from you. We can also help you with the organisation.

*We are aiming to organise between 1 and 3 events each year. Watch out for our calling notices!*

## Group sponsored events

The committee are always interested in sponsoring meetings related to the SWEC area. If you are interested in organising a workshop or training activity, then please contact a member of the Committee.

We have identified several potential workshops including: Introduction to EoS, Shock experiments at Synchrotrons, XRD, Introduction to HetV, Shock Physics Course, Experiments at Laser Sources. If you have a topic you would like to learn more about then please let us know.

Dan is in discussion with ESRF in Genoble regarding the dynamic experiments with x-ray sources workshop. As you will see in the Events section below, the DyCoMaX workshop is due to take place 14-15 January 2021 online. The organizers, however, are keen for SWEC to be jointly involved in future years. So this year join the existing online workshop, where in addition to a number of invited talks, elements of the workshop will be directed towards practical information for new users of dynamic loading facilities at synchrotron facilities

*Watch out for future events on the IOP and SWEC calendars.*

## SWEC Speakers

One of the 'new normals' resulting from the Corvid pandemic is of course the virtual lecture, meeting, and seminar. Being able to join the talk and participate remotely allows a significantly greater participation.

We are continuing to collate a list of potential speakers and topics relevant to SWEC, which could be provided to local IOP branches.

These talks also provide the opportunity to communicate to our undergraduate members on the range of courses available for postgraduate study to help with the development of career paths. Gareth is proposing a talk on 'The diverse nature of teaching in the high strain-rate discipline' to try and convey the breadth of the

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field high strain-rate response of materials. interested in what we do. This may be coupled with a talk from Neil Bourne on the fascinating capabilities of the Rutherford Appleton Laboratory. So, watch this space!

*If you would like to offer a talk for our list, then please get in touch with a member of the committee or email [swec@physics.org](mailto:swec@physics.org) with 'Speaker' in the subject line.*

## Early Careers (EC)

James, subject to the agreement of the Early Careers group, has agreed a joint Early Careers event between SWEC, the Early Careers and Materials and Characterisation Groups, to be provisionally held in December 2021. He and Glenn have been talking to the Early Careers group to explore the format of this event.

Please email James at [jjp24@cam.ac.uk](mailto:jjp24@cam.ac.uk) (with "SWEC EC" in the subject line) and confirm that you would like to be included in discussions of SWEC-specific early-career events.

*Any thoughts and suggestions for activities would also be very welcome, and if you are keen to get involved in organising things then please let James know!*

## Diversity and Inclusion

Kate has been busy as our focus for Diversity and Inclusion (D&I) and attended the IOP Giving Voice to Inclusion meeting, where she raised several key points. IOP have stated they will be rolling out specific activities and actions starting early December as well as workshops to begin to improve D&I within the IOP. The SWEC D&I event is still a key aim for the near future and Kate is committed to help drive this forward once she has reviewed the latest intended IOP D&I activities and workshops.

Kate has further sought out engagement with the Cavendish D&I groups, who are also looking into real mentoring schemes, the like of which don't exist in the IOP. Kate will continue to report back on this at future meetings.

## Case Study

**Case Study:** Although we do not feature a case study in this edition of the Newsletter, we are still very interested in receiving short articles on your research work and any interesting behaviours you have observed.

**If you have a case study you would like to publish in future newsletters, then please let us know at [swec@physics.org](mailto:swec@physics.org).**

**Please note we now also have a twitter account: [@ShockGroup](https://twitter.com/ShockGroup)**

## Events diary

Corvid 19 has played havoc with conferences and workshops around the world. However, it has woken organisers up to the possibilities offered by on-line participation expanding the reach of a workshop or conference. The revised list below is not exhaustive but provides information of meetings pertinent to SWEC members.

Dates	Event	Location	Website	Notes
14 – 15 January 2021	DyCoMax 3rd workshop on Studies of Dynamically Compressed Matter with X-rays	ESRF - Grenoble - France	<a href="https://www.esrf.eu/dycomax-workshop">https://www.esrf.eu/dycomax-workshop</a>	Virtual meeting.
25 May – 27 May 2021	PETER 21- New Models and Hydrocodes for Shock Physics	ON-LINE Conference	<a href="http://nmh2021.iopconfs.org/home">http://nmh2021.iopconfs.org/home</a>	Abstracts by 28 March 2021.
27 June – 2 July 2021	SHOCK2021 APS Topical Group on Shock Compression of Condensed Matter	Chicago USA	<a href="https://www.aps.org/units/gscm/meetings/annual/">https://www.aps.org/units/gscm/meetings/annual/</a>	
6 July – 8 July, 2021	International Explosives Conference 2020	London, UK	<a href="https://www.coeem.org">https://www.coeem.org</a>	
20 – 24 September 2021	13 <sup>th</sup> DYMAT International Conference on dynamic material behaviour	Madrid, Spain	<a href="http://www.dymat2021.org">www.dymat2021.org</a>	Abstracts due 15 <sup>th</sup> January 2021
20 – 24 September 2021	25 <sup>th</sup> DYMAT technical Meeting: Microstructure - Dynamic Properties Relations in metal	Madrid, Spain	<a href="http://www.dymat2021.org">www.dymat2021.org</a>	In conjunction with the 13 <sup>th</sup> International meeting.
8 May – 13 May 2022	32nd International Symposium on Ballistics	Peppermill Resort, Reno, Nevada, USA	<a href="http://www.ballistics.org">www.ballistics.org</a>	

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June 26 – July 1 2022	Gordon Conference: Energetic Materials	Southern New Hampshire University, New Hampshire, USA	<a href="https://www.grc.org/energetic-materials-conference/2022/">https://www.grc.org/energetic-materials-conference/2022/</a>	
16-17 July 2022	Gordon Conference: High Pressure Physics	Holderness, New Hampshire, USA	<a href="https://www.grc.org/research-at-high-pressure-grs-conference/2022/">https://www.grc.org/research-at-high-pressure-grs-conference/2022/</a>	
TBD	ICILSM	TBD	<a href="https://www.ntnu.edu/icilsm2020">https://www.ntnu.edu/icilsm2020</a>	TBD

If you have any additional events to add to the diary, then please let us know at [swec@physics.org](mailto:swec@physics.org).