SPIE University of Cambridge
Student Chapter

2017 Annual Report

November 2017
Dear SPIE,

We, SPIE University of Cambridge Student Chapter (CUSPIE), would like to submit our 2017 Annual Report. CUSPIE would not have been possible without the reinstatement approval from SPIE (now based at the Cavendish Laboratory) last August, and strong support from our chapter advisor Dr. Sarah Bohndiek.

We have endeavoured to develop and promote the field of optics and photonics by building a network within the research groups of the Cavendish and across other departments including at present Chemistry, Material Science and Engineering. To this end, the committee is organizing events and providing opportunities for networking and professional development for students in research frontiers pertaining to further evolution of the ‘Science of Light’. Furthermore, our chapter is seeking to promote the intellectual, personal and cultural interactions within STEM student community from our premier at the Fresher’s Fair, through the Seminar series, that attracted several prominent speakers.

Our first flagship event held in November 2016, visit of Prof. Philip Russell FRS, was highlighted by SPIE community as a well-organized full-day event to maximize the mutual benefits of a guest-speaker visit for both the local community and the speaker. For our Lent Term Seminar, we invited Ms Alaina Levine, an award-winning entrepreneur and an excellent science and engineering career consultant from the USA to provide career development workshops and seminar, together with consultation for final year PhD students currently making career decisions. The recent event, Life after PhD, turned out to be quite successful with the practical career advices from Cambridge alumni in different career stages across academia, industry, finance and consultancy.

We make every effort to raise money for high-quality events and encourage student members to apply for SPIE scholarships. In addition to generous SPIE annual funding and SPIE Outreach Grant, we successfully secured funding from Winton Programme, Sensor Centre for Doctoral Training and OSA Student Chapter. Cavendish Laboratory has agreed to sponsor £450 to support our chapter and its functioning. For the first time, Cambridge student, Travis Sawyer, won the renowned 2017 SPIE top scholarship - John Kiel Scholarship.

In this report, we have summarized the past events, together with a detailed financial statement. With the joint efforts by the committee, we believe CUSPIE has largely increased its influence in both the University of Cambridge and SPIE community. Our events are also open to the wider optics and photonics community in Cambridge, stimulating cross-group interactions within the Cavendish and cross-departmental collaborations. We believe that organizing these events will not only provide students with an opportunity to learn more about the latest light-based technologies and developments, but will also expand their vision and horizons.

Sincerely on behalf of the CUSPIE committee,

Jiangbin Zhang (Chapter President)
Chapter Advisor

Dr. Sarah Bohndiek
University Lecturer
Group Leader,
CRUK Cambridge Institute
Fellow of Corpus Christi College

SPIE University of Cambridge Student Chapter Committee 16-17

Jiangbin Zhang
President
Cavendish Laboratory

Arfa Karani
Vice President
Cavendish Laboratory

Arya Thampi
Secretary
Cavendish Laboratory

Shahab Akhavan
Treasurer
Dept. of Engineering

Qifei Gu
Webmaster
Cavendish Laboratory

Dale Waterhouse
Outreach Coordinator
Cavendish Laboratory

Han Qin
Social Coordinator
Dept. of Engineering
Chapter Advisor

Dr. Sarah Bohndiek
University Lecturer
Group Leader,
CRUK Cambridge Institute
Fellow of Corpus Christi College

SPIE University of Cambridge Student Chapter Committee 17-18

Jiangbin Zhang
President
Cavendish Laboratory

Haralds Abolins
Vice President
Cavendish Laboratory

Jiangbin Zhang
Treasurer
Cavendish Laboratory

Dale Waterhouse
Outreach Coordinator
Cavendish Laboratory

Qifei Gu
Social Coordinator
Cavendish Laboratory

Sascha Feldmann
Event Officer
Cavendish Laboratory
<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Expires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qifei Gu</td>
<td>Physics (qg215)</td>
<td>31 July 2018</td>
</tr>
<tr>
<td>Arfa Karani</td>
<td>Physics (ahk36)</td>
<td>31 July 2018</td>
</tr>
<tr>
<td>Michal Tomaszewski</td>
<td>Physics (mt626)</td>
<td>12 January 2018</td>
</tr>
<tr>
<td>Dale Waterhouse</td>
<td>Physics (djw93)</td>
<td>12 January 2018</td>
</tr>
<tr>
<td>Ben Woodhams</td>
<td>Physics (bjw48)</td>
<td>29 November 2017</td>
</tr>
<tr>
<td>Jiangbin Zhang</td>
<td>Physics (jz400)</td>
<td>19 June 2018</td>
</tr>
<tr>
<td>Dan Moinard</td>
<td>Physics (dm674)</td>
<td>30 May 2018</td>
</tr>
<tr>
<td>Dimitrios Simatos</td>
<td>Physics (ds755)</td>
<td>5 July 2018</td>
</tr>
<tr>
<td>Martin Statz</td>
<td>Physics (ms2343)</td>
<td>28 February 2018</td>
</tr>
<tr>
<td>Gregory Tainter</td>
<td>Physics (gt294)</td>
<td>23 July 2018</td>
</tr>
<tr>
<td>Mojtaba Bagheri</td>
<td>Engineering (mb2040)</td>
<td>4 February 2018</td>
</tr>
<tr>
<td>Daniel Gortat</td>
<td>Engineering (dg458)</td>
<td>11 December 2017</td>
</tr>
<tr>
<td>Jyi Sheuan Ten</td>
<td>Engineering (jst44)</td>
<td>11 December 2017</td>
</tr>
<tr>
<td>Han Qin</td>
<td>Engineering (hq217)</td>
<td>1 August 2018</td>
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<tr>
<td>Haralds Abolins</td>
<td>Physics (ha385)</td>
<td>7 September 2017</td>
</tr>
<tr>
<td>Sascha Feldmann</td>
<td>Physics (sf561)</td>
<td>Not online</td>
</tr>
<tr>
<td>Kayn Forbes</td>
<td></td>
<td>17 June 2018</td>
</tr>
<tr>
<td>Radhika Poduval</td>
<td></td>
<td>23 May 2018</td>
</tr>
<tr>
<td>Oscar Rahnama</td>
<td></td>
<td>5 April 2018</td>
</tr>
<tr>
<td>Florian Stroehl</td>
<td></td>
<td>12 October 2018</td>
</tr>
<tr>
<td>Alexandra Vaidean</td>
<td></td>
<td>13 October 2017</td>
</tr>
</tbody>
</table>
One-year journey of SPIE Cambridge Student Chapter

2016-2017

Reinitiation of CUSPIE
- Advisor: Dr. Sarah Bohndiek
- Based in Cavendish Laboratory

Welcome Party
4/10/2016

Fresher's Fair
104 email subscription
8/8/2016

Lent Term Flagship
- Alaina G Levine
- Workshop and talk on career development

22/10/2016

Michaelmas Flagship
- Prof. Philip Russell, FRS
- 25th Anniversary of Photonic Crystal Fibre

17/11/2016

Departmental Grant
Yearly £450 support

24/5/2017

Science Festival
Outreach on Cancer Imaging

23/5/2017

AGM
New committee forms: looking forward

9/6/2017

Easter Flagship
Life after PhD: Inspirational lessons from Cambridge PhD Alumni

24/7/2017

Cambridge SPIE Student Chapter Committee:
Jiangbin Zhang, Arfa Karani, Dale Waterhouse, Qifei Gu, Arfa Thampi, Shahab Akhavan, Han Qin
(NOTE: To strictly manage our balance, our bank account is a sub-account of Cavendish Laboratory)

Account Name: KAFE.EGDT SPIE-Student Chapter Community

Table 1 Summary of Balance

<table>
<thead>
<tr>
<th>Term</th>
<th>Event</th>
<th>Expense</th>
<th>Incoming Funds</th>
<th>Funding Source</th>
<th>Account Balance</th>
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<tbody>
<tr>
<td>Michaelmas 2016</td>
<td>2016 SPIE Annual Grant</td>
<td></td>
<td>£524.42</td>
<td>SPIE</td>
<td>£524.42</td>
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<tr>
<td></td>
<td>CUSPIE Freshers’ Fair</td>
<td>£48.40</td>
<td></td>
<td>SPIE</td>
<td>£476.02</td>
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<tr>
<td></td>
<td>CUSPIE Welcome Party</td>
<td>£144.35</td>
<td></td>
<td>SPIE</td>
<td>£331.67</td>
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<tr>
<td></td>
<td>CUSPIE Michaelmas Seminar by Prof. Philip Russell (Germany)</td>
<td>£204.40</td>
<td></td>
<td>SPIE</td>
<td>£127.27</td>
</tr>
<tr>
<td>Lent 2017</td>
<td>CUSPIE Lent Seminar by Ms. Alaina Levine (USA)</td>
<td>£1,630.00</td>
<td>£1,200</td>
<td>SPIE</td>
<td>£127.27</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>£280</td>
<td>Winton Programme</td>
<td>£127.27</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>£150</td>
<td>Sensor DTC</td>
<td></td>
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<td></td>
<td>SPIE Officer Travel Grant Awarded to Dale Waterhouse (Outreach officer)</td>
<td>£1,500.00</td>
<td>£1,500</td>
<td>SPIE</td>
<td>£127.27</td>
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<tr>
<td></td>
<td>Cambridge Science Festival (Outreach Event)</td>
<td></td>
<td></td>
<td>Cavendish Laboratory</td>
<td>£127.27</td>
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<tr>
<td></td>
<td>2017 SPIE Annual Grant</td>
<td>£549.58</td>
<td></td>
<td>SPIE</td>
<td>£676.85</td>
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<tr>
<td>Easter 2017</td>
<td>2017 SPIE Outreach Grant¹</td>
<td>£3,518.62</td>
<td>£3,518.62</td>
<td>SPIE</td>
<td>£676.85</td>
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<tr>
<td></td>
<td>CUSPIE Alumni-Life after PhD</td>
<td>£259.09</td>
<td>£125*</td>
<td>SPIE/OSA</td>
<td>£542.76</td>
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<td>Summer 2017</td>
<td>CUSPIE AGM</td>
<td>£59.94</td>
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<td>SPIE</td>
<td>£482.82</td>
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<td>Michaelmas 2017-18 (estimated)</td>
<td>CUSPIE Freshers' Fair</td>
<td>£200.00</td>
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<td></td>
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<td></td>
<td>CUSPIE Welcome Party</td>
<td>£200.00</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>CUSPIE Michaelmas Seminar</td>
<td>£700.00</td>
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<td></td>
<td>Annual Grant from Cavendish</td>
<td>£450*</td>
<td></td>
<td>Cavendish</td>
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<td>Grand Total</td>
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<td>£8,464.8</td>
<td>£8,297.62</td>
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<td>-£167.18</td>
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</table>

*Items needed to be collected into the financial account.

¹ The outreach funding is specifically for planned outreach events thus not accounted in the account balance.
Table 2 Detailed Summary of held events (Oct 2016 – July 2017)

<table>
<thead>
<tr>
<th>Term</th>
<th>Time M/Y</th>
<th>Events</th>
<th>Expenses</th>
<th>Attendance</th>
<th>Funding Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michaelmas</td>
<td>Oct, 16</td>
<td>CUSPIE Fresher’s Fair</td>
<td>£48.4</td>
<td>~200</td>
<td>SPIE</td>
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</tbody>
</table>

- Detailed Expense

<table>
<thead>
<tr>
<th>Items</th>
<th>Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stall</td>
<td>£40</td>
</tr>
<tr>
<td>Sweets</td>
<td>£8.4</td>
</tr>
<tr>
<td>Posters</td>
<td>£0</td>
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</tbody>
</table>

- Supporting Documents:
  1-1 P11 Flyer of Fresher’s Fair
  1-2 P12 Summary of Fresher’s Fair: *Fresher’s Fair 2016: Our First Show in Cambridge*

- We thank SPIE for providing nice posters and NanoDTC for lending the poster holder.

<table>
<thead>
<tr>
<th>Term</th>
<th>Time M/Y</th>
<th>Events</th>
<th>Expenses</th>
<th>Attendance</th>
<th>Funding Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michaelmas</td>
<td>Oct, 16</td>
<td>CUSPIE Welcome Party</td>
<td>£144.35</td>
<td>~60</td>
<td>SPIE</td>
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</table>

- Detailed Expense

<table>
<thead>
<tr>
<th>Items</th>
<th>Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pizza</td>
<td>£85.45</td>
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<tr>
<td>Crisps and drinks</td>
<td>£56.4</td>
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<tr>
<td>Paper plates</td>
<td>£2.5</td>
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</table>

- Supporting Documents:
  2-1 P13 Flyer of Welcome Party
  2-2 P14-17 Slides for Welcome Party
  2-3 P18 Summary of Welcome Party

- We are grateful to Cavendish Laboratory for providing Pippard Lecture Theatre for this event.

<table>
<thead>
<tr>
<th>Term</th>
<th>Time M/Y</th>
<th>Events</th>
<th>Expenses</th>
<th>Attendance</th>
<th>Funding Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michaelmas</td>
<td>Nov, 16</td>
<td>CUSPIE Michaelmas Seminar by</td>
<td>£204.4</td>
<td>~100</td>
<td>SPIE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prof. Philip Russell FRS</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Detailed Expense

<table>
<thead>
<tr>
<th>Items</th>
<th>Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight ticket, taxi, one-day</td>
<td>Covered by Philip</td>
</tr>
<tr>
<td>accommodation</td>
<td></td>
</tr>
<tr>
<td>Accommodation</td>
<td>£67</td>
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<tr>
<td>Taxi</td>
<td>£17.6</td>
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<tr>
<td>Biscuits, tea and coffee for the</td>
<td>£78</td>
</tr>
<tr>
<td>seminar</td>
<td></td>
</tr>
<tr>
<td>Wine and juice</td>
<td>£19.05</td>
</tr>
<tr>
<td>Russell’s Dinner</td>
<td>£22.75</td>
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</table>

- Supporting Documents:
  3-1 P19 Flyer of Michaelmas Seminar
  3-2 P20 Day event schedule for Prof. Philip Russell FRS
  3-3 P21-23 Summary

- We thank Dr. Tijmen Euser for help in the event.
- We are grateful to Cavendish Laboratory for providing Pippard Lecture Theatre for this event.
Lent  | Mar, 17  | CUSPIE Lent Seminar by Ms. Alaina G. Levine | £1630 | ~100  | SPIE Winton Sensor CDT

- Detailed Expense

<table>
<thead>
<tr>
<th>Items</th>
<th>Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flight ticket, accommodation</td>
<td>SPIE Visiting Lecture Program (£1500, £1200)</td>
</tr>
<tr>
<td>Guest Speaker Honorarium</td>
<td>Winton ($350, £280)</td>
</tr>
<tr>
<td>Guest local travel and meal</td>
<td>Sensor CDT (£50)</td>
</tr>
<tr>
<td>Biscuits, tea and coffee for the seminar</td>
<td>Sensor CDT (£100)</td>
</tr>
</tbody>
</table>

- Supporting Documents:
  4-1 P24 Day-Event Plan for Alaina
  4-2 P25 Flyer
  4-3 P26-28 Summary

- We gratefully thank Winton Programme and Sensor CDT for kind financial support.
- We are grateful to Cavendish Laboratory for providing Pippard Lecture Theatre and Maxwell Centre for Seminar Rooms for this event.

Lent  | Mar 25  | Science Festival   | / | ~150  | Cavendish Lab SPIE

- Supporting Documents:
  5-1 P29-31 Cambridge Science Festival Summary

- We gratefully thank VISIONLab for providing demonstration tools.

Easter | May, 17  | Alumni Networking  | £259.09 | ~150  | SPIE OSA

- Detailed Expense for each event

<table>
<thead>
<tr>
<th>Items</th>
<th>Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juice and plates</td>
<td>£67.50</td>
</tr>
<tr>
<td>Disposable plastic wine glasses</td>
<td>£11.59</td>
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<tr>
<td>Pizza from Zio Mario</td>
<td>£180.00</td>
</tr>
<tr>
<td>Funding from OSA</td>
<td>-£125.00</td>
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</tbody>
</table>

- Supporting Documents:
  6-1 P32 Flyer
  6-2 P33-34 Introduction of the speakers
  6-3 P35-37 Summary

- We gratefully thank OSA Cambridge Student Chapter for kind financial support.

Summer | July, 17  | 2017 AGM            | £59.94 | ~15     | SPIE
• Detailed Expense for each event

<table>
<thead>
<tr>
<th>Items</th>
<th>Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pizza from Domino’s</td>
<td>£59.94</td>
</tr>
</tbody>
</table>

Further Supporting Documents

P38-39 Summary of Officer Travel Grant from Dale Waterhouse
P40 Website, social platform and media coverage
P45 SPIE Outreach Grant Award
P46 SPIE Outreach Grant Application Form
SPIE
Cambridge Student Chapter

Who are we*?
Undergraduate and graduate student society for Optics and Photonics technology.

What do we do**?
- Lab tours of state of the art facilities
- Career mentoring events
- Excursions
- Speaker seminars
- SPIE Scholarships

Website:
spiecambridge.weebly.com

* #Lasersarecool
**Food is offered at all our events

FREE TICKET
SPIE Michaelmas Term Event
(DATE/TIME TBC)

Made by Qifei Gu
Fresher’s Fair 2016: Our First Show in Cambridge

After being approved by SPIE Student Office in August this year, SPIE Cambridge Student Chapter participated in this year’s two-day Cambridge University Fresher’s Fair event from 4th-5th October. Our aim was to introduce ourselves to Cambridge students, especially to new arrivals in Cambridge.

In the venue, we put up two enlightening posters brought from the SPIE conference, which illustrate the nature of light – particle-wave duality (See picture below). This actually drew many people’s attention to our stall and raised many questions about the physics of light and about our chapter. We are not surprised that many undergraduates and postgraduates signed up to our chapter from various backgrounds, such as Physics, Chemistry, Materials Science, Biology and etc. Indeed, we are quite impressed by a mother of a middle school child, saying that her son had interested in physics, especially light and optics. We are also encouraged by a PI in Cambridge, “It is a promising society. Good job!”

Jiangbin Zhang, President of our chapter, was interviewed by the radio team to broadcast our chapter around the stadium. He said, “We are quite fascinated by the broad field of optics and photonics, not only because it is related to such wide scientific research fields but also that light technology has been transforming our life.”

We are proud to say that we have 104 people signed up to our mailing list. Among them, around 40 were undergraduates mainly with science and engineering backgrounds. There were also around 50 postgraduates coming from different departments. This event is just a starting point for this new chapter.

We are happy to announce our first social activity, ‘Welcome Party’, starting at 5.30 pm on October 24 in Pippard Lecture Theatre in Cavendish Laboratory. We warmly welcome our potential SPIE student members to attend this informal gathering with some drinks and food, and share your ideas with us.

Figure Arya (Chapter Secretary) in front of our stall with posters from SPIE Optics+Photonics, in the Fresher’s Fair

Written by Jiangbin Zhang
Photo taken by Jiangbin Zhang
Welcome Party

5:30 PM OCT 24 (MONDAY)
PIPPARD LECTURE THEATRE, BRAGG BUILDING, CAVENDISH LABORATORY

What's SPIE?
What can you benefit from being a student member?
How can we influence people by outreach activities?

Free PIZZA and WINE is provided upon reservation.
Scan QR code and Sign up
Or find us in Facebook
SPIE Cambridge Student Chapter

Made by Jiangbin Zhang
Slide 1

Supporting Document 2-2 Slides for Welcome Party

Page 1 – Slides 1 - 6

Slide 1

SPIE CAMBRIDGE STUDENT CHAPTER
Promoting the field of optics and photonics

Slide 2

Emergency Exit

Slide 3

OUTLINE
- Examples of light technology
- SPIE Student Chapter and its scholarships
- Cambridge Student Chapter
- Snapshots of future activities

Slide 4

LIGHT TECHNOLOGY SHAPED THE WORLD, ESPECIALLY AFTER LASER WAS DEMONSTRATED.

Slide 5

DISPLAY TECHNOLOGY
Light Emitting Diode

Slide 6

COMMUNICATION
Optical Fiber

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Supporting Document 2-2 Slides for Welcome Party

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Slide 7

TIME STANDARD(SI)
Optical atomic clock

Slide 8

OBSERVATION
LIGO and Nanoscopy

Slide 9

ENERGY
SOLAR CELLS

Slide 10

What is SPIE?

SPIE, the international society for optics and photonics.

Founds in July 1st, 1955
140 meetings and events per year

Society of Photo-Optical Instrumentation Engineers
12,000+ members

BIG Conferences... (over 20,000 attendees)

- Optics + Photonics
  - Nanosense + Engineering
  - Optics + Photonics for Sustainable Energy
  - Organic Photonics + Electronics
  - Optical Engineering + Applications
- Photonics West
  - BOS
  - LASE
  - OPTO

1. Student Author Travel Grants

- Who?
  - Undergraduate / graduate program who will give an oral presentation + conference paper in SPIE conferences
  - Submit your complete application form and a letter of recommendation

- Cover?
  - $250-$500 USD per domestic traveler OR
  - $300-$850 USD per international traveler

- Newport Research Excellence Travel Awards:
  - Only in Photonics West and Optics + Photonics
Supporting Document 2-2 Slides for Welcome Party

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**STUDENT MEMBER BENEFITS**

*STANDARD STUDENT MEMBERSHIP: $20/YEAR*

- Eligibility for SPIE Scholarships and Grants: Over $300,000 in scholarships and grants awarded annually
- Eligible for travel assistance to attend SPIE events
- Networking events at SPIE conferences designed for students
- Reduced registration fees at SPIE conferences
- Receive 60% off all conference educational courses
- 10 SPIE Digital Library Proceedings or Journal article downloads per year
- Subscription to one of 10 SPIE online journals
- Subscription to SPIE Professional, the quarterly Membership magazine

Slide 14

**SPIE OPTICS+PHOTONICS**

*2016 CONFERENCE EXPERIENCE*

- $500 from Student Author Travel Grants
- Attend one-day Leadership Workshop
- Lunch with experts
- Original and tasty Mexican food

Slide 15

**2. SPIE TRAVEL SCHOLARSHIPS**

- Who?
  - Studying or planning to study optics, photonics or related field
- Criteria: prospect for long-term contribution that the granting of an award will make to the field of optics, photonics or related field
- What?
  - Two recommendations are required.
- Annual Scholarship Report
- Restriction:
  - At most one at the same academic level
  - SPIE Conferences
- Deadline?
  - Cycle 2, deadline September 21, 2016; results in November/December

Slide 16

**3. OPTICS AND PHOTONICS EDUCATION SCHOLARSHIPS**

- Who?
  - High school, pre-university, secondary school, undergraduate and graduate students
- How much?
  - $2,500 to $11,000
- Deadline?
  - Probably next February
- What?
  - Tuition, books, research activities, and other education-related expenses
- Criteria: prospect for long-term contribution that the granting of an award will make to the field of optics, photonics or related field

Slide 17

**4. OTHER SCHOLARSHIPS (HIGHLY COMPETITIVE)**

- D.J. Lovell Scholarship ($11,000 annually)
- John Kiel Scholarship ($10,000 annually)
- Laser Technology, Engineering, and Applications Scholarship ($5,000 annually)
- Optical Design and Engineering Scholarship
- RACUS Scholarship ($5,000 annually)
- Teddi Laurin Scholarship ($5,000 annually)

Slide 18

**SPIE STUDENT CHAPTERS**

- 307 Student Chapters comprised of more than 6,600 members in 54 countries around the world
- In UK, 10 active student chapter now, including Cambridge, Southampton, ICL, St. Andrews and so on.
- >10 Student members to maintain active

[Map of SPIE Chapters]
Supporting Document 2-2 Slides for Welcome Party

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Slide 19

STUDENT CHAPTER COMMITTEE

- Jiangbin Zhang
  President
  Cavendish Laboratory
- Arfa Karani
  Vice President
  Cavendish Laboratory
- Arya Thampi
  Secretary
  Cavendish Laboratory
- Shahab Alhassan
  Treasurer
  Dept. of Engineering
- QiQiu Gu
  Webmaster
  Cavendish Laboratory
- Han Qin
  Social Coordinator
  Dept. of Engineering
- Dale Waterhouse
  Outreach Coordinator
  Cavendish Laboratory
- Undergraduate Representative

Slide 20

STUDENT CHAPTER OFFICER GRANT

- One officer from each chapter every year
- 2017 Conference Choice
  - Conference: Photonics West
    - Time: January
    - Place: San Francisco, USA
  - Conference: Optical Metrology
    - Time: April
    - Place: Munich, Germany
  - Conference: Optics Photonics
    - Time: August
    - Place: San Diego, USA
- Dale Waterhouse is applying for this grant.
  - Another $350 for Photonics West $1800+$350=$2150

Slide 21

Vice President – Arfa Karani

- Host celebrated Professors in the field to give guest talks
- In-house speaker series
- Journal club with specific themes to develop collaborations
- We want to promote inter-disciplinary research!

Slide 22

SOCIAL COORDINATOR – Han Qin

- Keep everyone be in touch
- Organize social events (Welcome Party, BBQ, Happy Hour, Formal dinner etc.)
- Freshers Fair
- Update Society Membership and SPIE Membership

Slide 23

Outreach Activities

Dale Waterhouse, Outreach Coordinator

Slide 24

Thank you!

Made by Jiangbin Zhang, Arfa Karani, Han Qin and Dale Waterhouse
CUSPIE Welcome Party

Following our society debut in the Fresher’s Fair, the Welcome Party was held on the 24th of October 2016 in the Cavendish Laboratory Pippard Lecture Theatre. The event attracting around 40 students from various research field spanning over Optoelectronics, NanoPhotonics, Quantum Optics, Material Sciences and Biophysics.

The meeting started with a presentation by the Chapter President Jiangbin Zhang. He introduced the field of optics and photonics with examples of light technology which have shaped our daily lives. For example the most precise atomic clocks which are the basis of GPS, solar cell technology which have the potential to provide the world with ‘green’ energy, ergonomic curved LED TVs bringing the display technology into a new era. Following that, he introduced the aims and milestones of SPIE and how student members could benefit from various scholarship programs and from attending SPIE conferences. Focusing on our chapter, he briefly introduced the status of this new chapter and the committee members. After this general introduction, Arfa Karani (Vice-President) described the Chapter's plan to launch a lecture series of prominent scientists in the field of optics and photonics, and the possibility of a Journal Club to discuss cutting edge research in smaller groups. Subsequently Dale Waterhouse, the Student Chapter outreach officer gave an outline about different levels of outreach activities in schedule with the Cambridge Science Festival, Physics at Work and the like, to increase the awareness of the public.

Thanks to the grant from SPIE, free pizza and drinks were available after the talk. This offered a fantastic opportunity for our attendees and Committee members to network and socialise.

Figure Jiangbin, Arfa and Dale were introducing SPIE Cambridge Student Chapter to the audience.

Figure The drink reception after the talk, including pizza, crisps, beers and wine.

Link: [http://spiecambridge.weebly.com/blog/cuspie-welcome-party](http://spiecambridge.weebly.com/blog/cuspie-welcome-party)

Written by Arya Thampi and Jiangbin Zhang

Photos taken by Arya Thampi
Abstract:

Gas, Glass & Light: 25 Years of Photonic Crystal Fibres

Philip Russell, Max Planck Institute for the Science of Light, Erlangen, Germany

The idea for a new kind of optical glass fibre—photonic crystal fibre (PCF)—first emerged in 1991 [Science 299, 358–362 (2003)]. The aim was to realise a fibre with a two-dimensional periodic array of microscopic features (typically hollow channels) running along its entire length. A quarter of a century later, PCF has led to a whole series of new developments, some of which are already moving into real-world applications. This is largely because it is able to "corral" light within a central hollow or solid core, permitting light and matter to be tightly confined over long distances while precisely controlling the dispersion. Solid-core PCFs have been used to transform invisible infrared laser pulses into white light 10 million times brighter than an arc lamp, and are now used in commercial supercontinuum sources. Twisted solid-core PCF acts like an "optical impeller", creating optical vortices that carry orbital angular momentum. Hollow core PCF filled with gases underpins a range of unique and extremely bright sources of tunable deep and vacuum ultraviolet light, driven by ultrashort pulses of infrared light. Microparticles can be optically trapped and propelled over 100 m distances in hollow core PCF, and used as reconfigurable point sensors. Hollow core PCFs are also ideal for flexible delivery of high power laser light in laser manufacturing and, when filled with solvents containing minute quantities of reagents, as convenient microreactors for optical studies of chemical processes.
**Supporting Document 3-2 Day event schedule for Prof. Philip Russell FRS**

**Professor Philip Russell FRS Visit**

**Detailed events schedule**

**University of Cambridge SPIE Student Chapter**

**November 22nd, 2016**

<table>
<thead>
<tr>
<th>TIME</th>
<th>SCHEDULED EVENT</th>
<th>HOSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 - 10:30</td>
<td><strong>Hotel check-out and head for Cavendish Laboratory</strong></td>
<td>Jiangbin Zhang</td>
</tr>
<tr>
<td></td>
<td>Location: Hotel Lobby</td>
<td></td>
</tr>
<tr>
<td>10:30 - 11:30</td>
<td><strong>NanoPhotronics and Maxwell Centre</strong></td>
<td>Jiangbin and Dr. Tijmen Euser</td>
</tr>
<tr>
<td></td>
<td>Location: Meet Tijmen at Maxwell Centre main entrance</td>
<td></td>
</tr>
<tr>
<td>11:30 - 12:00</td>
<td><strong>Lab tour at Centre for Advanced Photonics and Electronics</strong></td>
<td>Jiangbin and Dr. George Gordon</td>
</tr>
<tr>
<td></td>
<td>Location: Meet George at the entrance of CAPE</td>
<td></td>
</tr>
<tr>
<td>12:00 - 13:00</td>
<td><strong>Lunch with Committee</strong></td>
<td>Jiangbin, Arfa, QiFei, Dale, Han, Arya, Shahab</td>
</tr>
<tr>
<td></td>
<td>Location: All meet outside West Cafe</td>
<td></td>
</tr>
<tr>
<td>13:00 - 13:30</td>
<td><strong>Meeting with Professor Sir Richard Friend FRS</strong></td>
<td>Arfa Karani and Prof. RHF</td>
</tr>
<tr>
<td></td>
<td>Location: Maxwell Centre</td>
<td></td>
</tr>
<tr>
<td>13:30 - 14:00</td>
<td><strong>Maxwell Centre Optoelectronics Lab Tour</strong></td>
<td>QiFei Gu and Arfa</td>
</tr>
<tr>
<td></td>
<td>Location: Meet outside Prof. Friend’s office</td>
<td></td>
</tr>
<tr>
<td>14:00 - 15:00</td>
<td><strong>Cambridge Graphene Centre (CGC) Lab Tour</strong></td>
<td>Shahab Akhavan, Senior Research Fellow at CGC and Arfa</td>
</tr>
<tr>
<td></td>
<td>Location: Meet outside CGC main entrance</td>
<td></td>
</tr>
<tr>
<td>15:00 - 15:30</td>
<td><strong>Optoelectronics Kapitza Building Lab Tour</strong></td>
<td>QiFei and Arfa</td>
</tr>
<tr>
<td></td>
<td>Location: Meet outside CGC and head to Kapitza</td>
<td></td>
</tr>
<tr>
<td>15:30 - 16:00</td>
<td><strong>Break / Prepare for the Talk</strong></td>
<td>Jiangbin and Arfa</td>
</tr>
<tr>
<td></td>
<td>Location: Pippard Foyer</td>
<td></td>
</tr>
<tr>
<td>16:00 - 18:00</td>
<td><strong>Seminar talk, Q&amp;A session followed by drinks reception</strong></td>
<td>Location: Pippard Lecture Theatre</td>
</tr>
<tr>
<td>18:00 - 20:30</td>
<td><strong>Dinner (Hot pot) with invited guests</strong></td>
<td>Location: 72 China</td>
</tr>
</tbody>
</table>

*Made by Arfa Karani and Jiangbin Zhang*
Supporting Document 3-3 Summary of CUSPIE Michaelmas Seminar

Page 1 – Pictures taken in the day event

Figure CUSPIE Michaelmas Seminar Snapshots

Visit Tijmen’s Group-1  Visit Tijmen’s Group-2  Visit Nanophotonics Centre-1

Visit Dept. of Engineering  Visit Nanophotonics Centre-2  Visit Cambridge Graphen Centre

Coffee time in Maxwell Centre  Delicious Chinese hot pot-1  Delicious Chinese hot pot-2
Supporting Document 3-3 Summary of CUSPIE Michaelmas Seminar

Page 2 – Summary (1)

Following considerable preparation, the University of Cambridge SPIE student chapter (CUSPIE) launched its first major event – the Michaelmas seminar talk – given by the renowned physicist Professor Philip Russell, FRS. This one-day event was a remarkable success and greatly increased the chapter’s influence in West Cambridge, the hub of natural sciences at the University of Cambridge.

Professor Russell, director of the Max Planck Institute for the Science of Light, is one of the pioneers in the field of light technology. After completing his D. Phil in the field of volume holography, he joined Technische Universität Hamburg-Harburg as an Alexander von Humboldt Fellow. Later in 1986, he took a position in the fibre optics group at the University of Southampton. In 1995, along with researchers at the University of Bath, he directed the research which led to the creation of the first Photonic Crystal Fibres (PCF) with micron-level inner structures. This revolutionised the field of optical fibre technology.

To honour his contributions to the field of photonic crystal fibres, numerous awards and recognitions have been bestowed upon Professor Russell over the years. He is a Fellow of the Royal Society and the Optical Society of Light (OSA) and has won several international awards for his research: the 2000 OSA Joseph Fraunhofer Award/Robert M. Burley Prize, the 2005 Thomas Young Prize of the Institute for Physics (UK), the 2005 Körber Prize for European Science, the 2013 European Physical Society Prize for Research into the Science of Light, the 2014 Berthold Leibinger Zukunftpreis, and the 2015 IEEE Photonics Award. He was the Director-at-Large of OSA in its early years and served as the president of OSA in 2015, the International Year of Light.

The entire day of 22nd of November was scheduled to give Professor Russell a glimpse of ongoing research in the field of optics and photonics at the University of Cambridge. The schedule covered lab visits, meetings with various group leaders in the Cavendish Laboratory, informal lunch with the CUSPIE committee, and dinner with invited guests.

The day began with visiting the newest building in West Cambridge, the Maxwell Centre, which aims to promote the interaction between academia and industry. Dr. Tijmen Euser (Lecturer and Fellow of Magdalene College) – also a former student of Prof. Russell - hosted Professor Russell in his Optofluidics Lab. It was a great pleasure for us to give them a chance to reunite through our event. Accompanied by the chapter’s President (Jiangbin Zhang), Prof. Russell then visited the NanoPhotonics Centre where Dr. Hamid Ohadi and William Deacon introduced their work on polaritons quantum condensates and plasmonic molecular sensing. It was very exciting to witness the stimulating discussions between the enthusiastic young scientists and the well-established senior scientists. This was followed by a visit to the Centre of Advanced Photonics and Electronics (CAPE) where Dr. George Gordon introduced his fantastic work on using optical coherent light scattering to diagnose early-stage cancer, which might greatly improve the accuracy of diagnosis.
After a busy morning, the committee members spent some quality time with the Professor at an informal lunch meeting. Following this, Prof. Russell met with the Cavendish Professor of Physics, Sir Richard H. Friend. Shahab Akhavan (Treasurer, CUSPIE) then escorted Professor Russell to the Centre for Graphene Studies (CGS) where several Senior Research Fellows welcomed our guest and brought him up to speed with all the fascinating one-layer carbon sheet research in Cambridge. Finally, the lab tours ended with visiting the ultrafast laser labs in Optoelectronics (OE) Group with Qifei Gu (Webmaster, CUSPIE), Arfa Karani (Vice President, CUSPIE) and Jiangbin – both PhD students in OE – also attended this final lab tour and engaged in some exciting discussions with Professor Russel about their research.

The highlight of the day came with Professor Russell’s delightful seminar on ‘Gas, Glass and Light: 25 years of Photonic Crystal Fibres’ at the Pippard Lecture Theatre, Cavendish Laboratory. With a large attendance this was one of the most popular talks in Cavendish this term. A Q&A session hosted by Arfa followed the talk in which she asked Professor Russell about his advice on career development for young student members of SPIE.

Some precious advice came from Prof. Phillip in his response when being asked, “What do you look for in applications of students who wish to join your research group?” to which he replied “…students should ideally have a specific project idea to start working on, should be well aware of the work going on in the group and should have read some of the papers published by the group. Asking intelligent questions about our group’s work and supporting references letters also play an important part in creating good impression”. On being questioned (based on his brilliant talent with musical instruments) if the aspiring students should know a musical instrument in order be able to join his research group, Prof. Russell replied laughing “Well, that’s of course a necessity, yes! *Wink*”.

A drinks reception followed this session, which led to enhanced interaction between our guest speaker and attendees. This gave the committee an opportunity to publicize CUSPIE and talk about the benefits of becoming a SPIE member.

Overall this event was a fantastic success and we express our immense gratitude to Professor Russell for his time and for sharing some brilliant ideas. The SPIE visiting lecturer scheme allows us to host pioneers in the field of optics and light, and provides an excellent opportunity to researchers at all levels to interact, communicate and share their exciting science!

Future events will be planned with the same vigour to promote our community and the CUSPIE. We are also keen to explore the industrial aspects of light technology research at upcoming events. Stay tuned to our Facebook page or blog to hear more about these exciting upcoming events!

Written by Arfa Karani, Arya Thampi and Jiangbin Zhang
Supporting Document 4-1 Day-Event Plan for Alaina

CUSPIE Lent Term Seminar

Alaina G. Levine

Day-Event Schedule

March 6th, 2017

<table>
<thead>
<tr>
<th>Time</th>
<th>Scheduled Event</th>
<th>Hosts</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00 - 12:30</td>
<td>Workshop: How to Transition from PhD into the Real World?</td>
<td>Arfa Karani</td>
</tr>
<tr>
<td></td>
<td>Location: JJ Thomson Seminar Room, Maxwell Centre</td>
<td></td>
</tr>
<tr>
<td>12:30 - 13:30</td>
<td>Lunch Break</td>
<td></td>
</tr>
<tr>
<td>13:45 - 16:00</td>
<td>One-To-One Sessions</td>
<td>Arfa Karani</td>
</tr>
<tr>
<td></td>
<td>Location: Blue Meeting Room, Maxwell Centre</td>
<td></td>
</tr>
<tr>
<td>16:00 - 17:00</td>
<td>Set-Up and Prepare for Seminar</td>
<td>Jiangbin</td>
</tr>
<tr>
<td></td>
<td>Location: Small Lecture Theatre and Pippard Foyer</td>
<td>Arfa Karani</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Qifei Gu</td>
</tr>
<tr>
<td>17:00 - 18:30</td>
<td>Seminar Talk: How to Land Your Dream Career in Science?</td>
<td>Arfa Karani</td>
</tr>
<tr>
<td></td>
<td>Location: Small Lecture Theatre, Cavendish Laboratory</td>
<td></td>
</tr>
<tr>
<td>18:30 - 19:00</td>
<td>Drinks Reception and Networking</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Location: Pippard Foyer</td>
<td></td>
</tr>
<tr>
<td>19:00 - 20:30</td>
<td>Dinner with CUSPIE Committee and Invited Guests</td>
<td>CUSPIE Committee</td>
</tr>
<tr>
<td></td>
<td>Location: Thai Khun</td>
<td></td>
</tr>
</tbody>
</table>

Sponsors:

SPIE
http://spie.org/

The Winton Programme for the Physics of Sustainability
http://www.winton.phy.cam.ac.uk/

CambridgeSens
EPSRC Centre for Doctoral Training in Sensor Technologies & Applications
http://cdt.sensors.cam.ac.uk/

Made by Arfa Karani and Jiangbin Zhang
Supporting Document 4-2 Flyer

CUSPIE Lent Term Seminar Talk

**Alaina G Levine**

**HOW TO LAND YOUR DREAM JOB IN SCIENCE?**

**Networking for Nerds!**

6th March, 2017 at 17.00
Small Lecture Theatre (near Pippard Lecture Theatre)
Food and drinks reception after the seminar

**Short Bio:**

Alaina G. Levine is an award-winning writer, entrepreneur, STEM careers consultant, and professional speaker. She has given over 600 keynote speeches, workshops, and webinars all around the world.

For her one day event at Cambridge she will be speaking about how to secure your dream job in science and describing the key skills to pick up during your PhD!

Made by Qifei Gu, Jiangbin Zhang and Arfa Karani
This Monday (6th of March 2017) marked yet another successful event for SPIE Student Chapter Cambridge (CUSPIE). Our guest speaker, Ms. Alaina G. Levine from Arizona, USA was sponsored by SPIE, The Winton Programme for Physics of Sustainability and CamBridgeSens (EPSRC CDT in Sensor Technologies and Applications) to visit Cambridge and take part in a day full of exciting events.

The day kicked off with an enjoyable and highly interactive workshop titled ‘Transitioning from a PhD into the real world!’ where Alaina provided the attendees with detailed tips on how to probe self-interests and identify jobs that bring you ‘joy’. Specifically targeted towards PhD students, this workshop provoked discussion around transitioning out of academia into alternative careers.

Following this, Alaina was kind enough to provide one-to-one consulting sessions to nine lucky students who had signed up in advance. Each had 15 minutes of personal consulting with Alaina jam-packed full of useful tips and discussion tailored to them.

Through this event, CUSPIE was yet again successful in providing a platform for people across the world to connect. One of the students completing their PhD with the Winton Programme of Physics of Sustainability commented ‘I have had my CV analysed and criticised by a lot of people, but no one with her calibre. All the feedback was extremely useful!’
The afternoon came to a close with an exciting seminar, ‘How to land your dream career in science? – Networking for Nerds!’

Alaina’s unique, often comedic, style of delivery really stuck a chord with the audience of around 60 people, but never distracted from her depth and wealth of knowledge and advice. In the concluding 30 minute Q&A session, Alaina’s interaction with the audience continued to deliver yet more wisdom as she enthusiastically established that scientists (or scientists in making) are AWESOME and could get AWESOMER if they brushed up on their networking skills.
These networking skills were put to the test in a food and wine reception. Guests mingled with Alaina and other like-minded attendees.

After about six hours of inspiring talks and discussions, CUSPIE committee members along with a few invited guests had the honour of dining with Alaina. Over delicious Thai food, we discussed ways to network, build connections and develop the student chapter further. CUSPIE committee is very grateful to our sponsors and SPIE for this wonderful opportunity.

Finally, we would like to extend an enormous thank you to Alaina for an incredible day. Her passion and enthusiasm was infectious and will surely have inspired attendees to consider their personal and professional development. Thank you Alaina!

Written by Arfa Karani
For two weeks in March, Cambridge became abuzz with excitement as the 2017 Cambridge Science Festival captivated audiences young and old across the city. This was a chance for the University of Cambridge SPIE Student Chapter (CUSPIE) to reach out to the general public and share our love of optics, photonics and general science.

On Saturday 25th March, our advisor, Dr. Sarah Bohndiek launched our activities with an exciting talk, ‘Shedding Light on Cancer’, in which she described the work of VISIONLab, her Cambridge research group, in manipulating light to detect cancer sooner.

Following this exciting talk, guests were invited to get hands on with some demonstrations at our stall, ‘What is the Colour of Cancer’, where Sarah was available to answer further questions.
Manned by real scientists from both CUSPIE and VISIONLab, the stall demonstrated the equipment we use to manipulate light, and gave the audience a chance to engage with the real researchers.

Polarising glasses were used to demonstrate the polarisation of light and diffraction gratings were used to show splitting of light into its constituent colours, much to the attendees’ delight!

Guests enjoyed the diffracting and polarising glasses.

Arfa Karani, a PhD student in Optoelectronics, and CUSPIE Vice President demonstrates diffraction to some of our younger attendees.
And there was plenty of time for attendees to ask questions about the research going on right now.

Dr James Joseph, a PostDoctoral Researcher in VISIONLab explains his research.

Michal Tomaszewski, a PhD Student in VISIONLab, answers questions regarding his work.

The stall was another great success for CUSPIE and VISIONLab, gathering great feedback:

“The "What is the colour of cancer" was fascinating and the person was really engaging.”

“What is the colour of cancer was so cool and the person hosting it was really engaging and passionate.”

Written by Dale Waterhouse
Supporting Document 6-1 Flyer for “Life after PhD”

Life after PhD

Inspirational Lessons from Cambridge PhD Alumni

We warmly invite you to an evening of networking, drinks and canapés with...

Dr. Michael Butler
R&D Director
Unilever

Dr. Julia Attwood
Analyst
Bloomberg New Energy Finance

Dr. George Gordon
Henslow Research Fellow
St. Edmund’s College

Dr. Hannah Stern
Junior Research Fellow
Trinity College

Dr. Nicki Humphry
-Baker
Project Physicist
Isaac Physics

Dr. Rhiannon Mulherin
Business Development
Shell New Energy

Wine Reception and Canapés

9th June, 18:00 – 19:30, Maxwell Centre, Cavendish Laboratory

Made by Qifei Gu and Arfa Karani
Cambridge SPIE Student Chapter warmly welcomes you to the flagship Easter term networking event on June 9th, 6.00pm at the Cavendish laboratory Maxwell Centre. We have invited several Cambridge PhD alumni across various disciplines to come and share their inspiring stories. The event is meant to give you an idea of the various fields that are open to graduate students after completing your degree. Drinks and canapés reception is provided.

We’d like to introduce our first outstanding alumni Dr. Michael Butler the R&D director at Unilever. Michael obtained his PhD from Cambridge in 1996. After two years of Post-Doc also at Cambridge he joined Unilever in 1998. Since then he’s worked up the ranks from research scientist to project leader to finally R&D director of Advanced Materials Strategic Science Group. We are definitely looking forward to hearing from Michael about his thoughts on how to succeed in the corporate research world.

https://www.linkedin.com/in/michael-butler-457146/?ppe=1

Our second alumnus is Dr. Julia Attwood currently working as an analyst for Bloomberg New Energy Finance focusing on financial, economic and policy analysis in the energy storage space. Dr. Attwood graduated in 2015 from Cambridge with a PhD from Materials Engineering. Her graduate work focused on understanding the mechanical and ballistic resistance properties of fibre composites which have applications in both military and civilian use cases. During her PhD, Dr. Attwood has been very active with internships and Cambridge societies. She’ll definitely have more than a few interesting stories to tell.

https://www.linkedin.com/in/julia-attwood-825b9482/?ppe=1

Our third alumnus is Dr. George Gordon, Henslow Research Fellow (funded by the Cambridge Philosophical society) at the Department of Engineering. Dr. Gordon is leading his own research programme in the area of optical telecommunications, focusing on mode-division multiplexing in optical fibres. Dr. Gordon completed his PhD from Trinity College Cambridge in 2013. Among Dr. Gordon’s achievements include President of Trinity College MCR rowing for First and third Trinity boat club and performing comedy with Cambridge Footlights. We are delighted to have Dr. Gordon to come and share his experiences.

https://www.linkedin.com/in/george-gordon-24a2504a/

Our fourth alumnus is Dr. Hannah Stern, recent PhD graduate of Cavendish laboratory at Cambridge. Dr. Stern is continuing her research career at Cambridge through the Trinity College Junior Research fellowship. For her PhD, she focused her research on the photophysics of organic semiconductors and contributed to the understanding of how these novel materials can be used to improve solar cell efficiencies. In 2015 she won the Churchill Alumni Research prize in regard for her graduate research. Dr. Stern is also the co-founder of Cavendish Inspiring Women, a society of the Department of Physics that aims to promote women in science. We are thrilled to have Dr. Stern back to share her inspirational stories.

https://www.linkedin.com/in/hannah-stern-17153aa2/
Our fifth alumna is Dr. Nicki Humphry-Baker works for Isaac Physics as a Project Content Creator. She develops teaching resource to help bridge the gap between A-level and university Physics, with the aim to nurture students’ problem solving skills. Dr. Humphry-Baker graduated with a PhD from Cambridge in 2013. Her research focused on the photophysics in dye-sensitised solar cells using ultrafast absorption spectroscopy. During her PhD Dr. Humphry-Baker was the President of the St John’s Women’s Society. We are very interested to hear about Nicki’s insights about life after PhD!

https://www.linkedin.com/in/nicki-humphry-baker-8702a235/

Our sixth and final alumnus is Dr. Rhiannon Mulherin currently working in Business Development at Shell New Energies. Dr. Mulherin’s interests lie in renewable energy and sustainable growth, focusing on the transition to a low-carbon energy systems. After graduating with a PhD in 2012 from Cambridge, she has worked in various organisations including in strategy development at the National Physical Laboratory and as senior policy advisor for the Department of Energy and Climate Change. During her PhD at Cambridge Dr. Mulherin was the president of the Zero Carbon Society and on the executive team of the E3 Foundation. We are looking forward to hear from Dr. Mulherin about her experiences across multiple organisations.

https://www.linkedin.com/in/rhiannonmulherin/

Written by Qifei Gu
With generous sponsorship from SPIE and OSA (Optical Society of America) Student Chapter, CUSPIE Student Chapter hosted a Student- Alumni Networking event on the 9th of June, 2017. With a panel of six successful University of Cambridge alumni coming back to inspire and motivate the next generation of scientists, it was yet another evening leaving a mark in the STEM student community.

Our alumni guests included Dr. Michael Butler (Mike), R&D Director at Unilever; Dr. Nicola Humphry-Baker (Nicki), Project Content Creator at Isaac Physics; Dr. Julia Attwood, Analyst at Bloomberg New Energy Finances; Dr. Hannah Stern, who will be starting as Junior Research Fellow at Trinity College soon; Dr. Rhiannon Mulherin working in the Business Development with Shell and Dr. George Gordon, Henslow Research Fellow at St. Edmund’s College.

The event was intended to give the student members an idea of various options available to STEM students after finishing their PhDs. Each of the speakers shared an inspirational story from their professional journey so far.

With an ensemble of speakers, all from different career stages, we received a beautiful variety of advice. While Hannah thought it helped her to go out of her way to learn new programming languages in her spare time during her PhD, Mike had a completely different opinion. According to Mike, each job or upcoming opportunity requires you to learn a new set of skills particular to that job, so meanwhile, enjoying your PhD is the key! However, they both agreed that for each person the journey will be completely different and taking breaks when you need them, taking a step back and thinking about your options, is a must!
Dr. Hannah Stern speaks about the importance of taking breaks.

It was inspiring to hear Rhiannon talk about her path to Shell and in the off shore wind energy sector in the heart of a well-established oil giant! Julia spoke beautifully about her time as an overseas student (from Canada) in Cambridge. She described her struggle as she relied on the careers service at the University to secure jobs in the UK after completing her PhD, a struggle many will be familiar with.

Many STEM students are passionate about outreach and Nicki, who obtained her PhD found an incredible way of converting this passion for outreach into a career! Her story about how she juggled her personal and professional life whilst finding a way to turn her passion into a career was truly motivating!

Nicki tells us how she transformed her passion for outreach into a career.

George gave us some extremely critical advice on how important ‘networking’ was towards his career and how he fought through all the rejections to accomplish what he really wanted.
Having switched fields completely from telecommunications to biomedical optics, George had a lot of inspiring stories to share with the students over some wine afterwards!

A couple of general themes that stood out from all the talks were: everyone’s journey through their careers is going to be entirely different and that rejections are a part of all application processes. With this in mind, we need to be sure of what we want and persevere; un- swayed by the rejections we are all sure to face!

And another important lesson, perhaps unexpected to some, was to enjoy PhD life, and not whittle it away with worry. Research while you have the opportunity to do so and fulfil your curious souls. The evening ended with an elaborate canape and wine reception where the students got a chance to dig a bit deeper into the wealth of knowledge very kindly offered by our alumni guests.

We would like to thank everyone who attended this event and once gain extend a massive thank you to our generous speakers for giving up their time and wealth of experience for our student chapter community. Thank you!

Written by Arfa Karani
Supporting Document – Officer Travel Grant – Photonics West 2017

The CUSPIE 2017 officer travel grant was awarded to Dale Waterhouse, sponsoring him to attend Photonics West 2017. Below is the summary report from him.

In January 2017, Dale Waterhouse, Outreach Officer for the chapter, attended Photonics West is San Francisco, supported by the officer travel grant.

On the Friday, I attended the Student Chapter Leadership workshop in which I learnt about leading a chapter, which included practicing essential skills for delivering an elevator pitch, solving conflict and engaging in productive networking.

I also attended workshops on ‘The Craft of Scientific Writing’ and ‘The Craft of Scientific Presentations’ on Monday, where I learnt how to develop my scientific communication and help my work stand out from the crowd. Since these sessions, I have applied many of the lessons learnt to my presentations, and I have also given a summary lecture to my lab to share the 10 most important tips I picked up.
On the Tuesday, I attended a session on ‘Endoscope Specification and Design’, in which I had the chance to talk to an expert in the field and solve some of my long-term problems relating to endoscope design. I relayed the answers to other members of my lab working on endoscopy.

Of course, I also attended many talks at PW and also delivered my own talk, which was met with many interesting questions. I met several others working on similar projects and have since been in contact with these people.

I also had the chance to meet many of my fellow students at the student networking events, and this was an invaluable part of my experience. Many of these other students, from universities around the world, are still in contact with me via Facebook.

Overall, PW was a fantastic opportunity for professional development, for sharing of scientific ideas, and most importantly for networking with others in the fields of Optics and Photonics. The friends I made by being part of the SPIE student events will be friends for life.
Homepage of chapter website

As a chapter, our active Website and Facebook group have reached a wide community of people outside and inside Cambridge, respectively. The website is designed to be the window for other bodies to get knowledge of what is going on in our chapter. After every event, we summarize share our stories. For the Facebook group with around 73 members, this unique multimedia platform enables us to contain various forms to people where we share our coming activities, event summaries and optics-related news from SPIE as well.
SPIE Cambridge Student Chapter Facebook Group

Our events are widely reported by both the SPIE Students facebook and SPIE member newsletters, which greatly increases our chapter influence.

Reinitation document

“I can't tell you how impressed I am by the amount of thought and organization that has gone into reviving chapter. May I have your permission to use this document as an example for future chapters wishing to return to good standing? It shows a level of commitment that will drive the chapter on a path of success for years to come. Please send my thanks to any and all contributors.”

- Meagan Harris

Outreach Event

Inspiring the next generation of scientists was the goal of the SPIE Cambridge Chapter's alumni networking event that we mentioned a few days ago. This drive is also what motivates the chapter to get involved in outreach events such as their university's science festival. This year, their demonstration "What is the Colour of Cancer" was used to help describe the work of the VISIONLab at Cambridge to an audience of all ages.

Thanks for your outreach efforts, Cambridge! We look forward to seeing this research develop! #chapterhighLIGHT

PhD after Life

Our SPIE Cambridge Chapter has held some fantastic events recently including an "Life after PhD: Inspirational Lessons from Cambridge PhD Alumni" networking reception wherein six successful PhD alumni returned to Cambridge to inspire and motivate the next generation of scientists.

Great idea, Cambridge! This is a wonderful model for other chapters to follow! #chapterhighLIGHT
Dale Waterhouse

(May 26, 2017) Last time on #FacesofPhotonics, we shared Dale's VISIONlab YouTube endeavors with you. This time, we wanted to delve into the backstory of the channel, and share why Dale was inspired to continue his outreach efforts online. This is what inspired him:

"At school I found Physics to be the least engaging of the sciences, and only ended up studying it due to reading popular science. I believe this is because students are often taught Physics in a dry textbook style and as independent from Biology and Chemistry.

I am keen to change this misconception by increasing students’ awareness that in ‘real science’ the subjects are more fluid and overlapping, whilst also instilling a sense that there are exciting and impactful ‘real world’ applications for optics (and science in general).

The hope is that this may inspire students to consider further education in science by exposing them to ‘real scientists’ and opening their eyes to the wide range of ‘real problems’ we work on, many of which the students won’t have previously considered during their science classes.

As a student in a small comprehensive state school, I was rarely exposed to this 'real science' or 'real scientists'. Science at school was interesting, but the real world applications and industries seemed far away.

This is not atypical. There are still many students in the UK that are not given the opportunity to interact with universities and their scientists. We are planning on reaching these students by using an SPIE Outreach Grant to travel to these areas and deliver inspiring outreach events."

Shout-out to Dale and his lab for making the world a better place through STEM outreach. So many individuals in the SPIE and broader STEM community are successfully changing the world, one outreach mission at a time. Thank you for all you do!
Happy Wednesday, #FacesofPhotonics followers! We have an amazing story for you today. On Monday, we met Dale Waterhouse, the Outreach Officer for the University of Cambridge SPIE Student Chapter.

Dale is extremely passionate about outreach - so much so, that he developed an incredible YouTube channel to promote his lab's research, "teach the science behind the research, and give insight into the day-to-day life of researchers". This is all in an effort to "provide a window into 'real research'...thus helping build trust with the public".

He also says his YouTube channel aims to "humanize scientists, showing students that scientist are just like them, and fostering the belief that a career in science is an aspirational but achievable goal".

We love this! If you want to check out Dale's YouTube channel, VISIONLab, and watch his easy-to-follow, entertaining, and educational videos, here is the link: http://bit.ly/VISIONlab

Enjoy!

(May 22, 2017) Welcome back to #FacesofPhotonics! This week, we are introducing Dale Waterhouse, the Outreach Officer for the University of Cambridge SPIE Student Chapter. Dale is originally from Yorkshire, England, and started studying in the optics and photonics field at the end of his undergraduate degree in #physics. He shared this with us:

"Clinicians working at the Cancer Research UK Cambridge Institute and the MRC Hutchinson Laboratory on the Cambridge University Hospitals site had developed a novel molecular fluorescence-imaging agent for early detection of oesophageal cancer. This dye showed promise in tissue samples, but the endoscopists were struggling to see the fluorescence in patients due to background signal from tissue auto-fluorescence."
To overcome this problem, the team decided to bring on board an engineer or physicist to collaborate with them in the development of a tailored fluorescence endoscope. I applied for this role and began working on developing this new device as I started my PhD in October 2014.”

What an incredible opportunity, Dale! We love the multidisciplinary collaboration that happened here. Stay tuned to hear more from Dale this week, and follow along on Twitter and Instagram for more of the story!

---

**Career Service Event**

Our Cambridge Univ. Chapter knows how to get the most out of their Visiting Lecturer Benefit! Read more about their full-day line-up of activities with Ms. Alaina Levine, a professional development speaker featured in our Visiting Lecturer Directory. #chapterhighLIGHT

For a look into a well-organized, full-day use of the Visiting Lecturer Benefit, check out the Cambridge Chapter's blog post. They hosted a seminar by Prof. Philip Russell last week and included many opportunities throughout the visit for networking and professional development. Great work, Cambridge! #chapterhighLIGHT


Prof. Philip Russel, inventor of the photonic crystal fiber, visited the Univ. of Cambridge chapter for their first visiting lecturer talk. Thanks to everyone involved for making this a successful visit. Check out their blog for details.

http://spiecambridge.weebly.com/.../cuspie-michaelmas-seminar…
7 April 2017

Mr. Dale Waterhouse
Clare College
Trinity Lane
Cambridge CB21TL
United Kingdom

Dear Mr. Waterhouse,

On behalf of the SPIE Board of Directors and the 2017 Education Committee, I am pleased to announce that the University of Cambridge has been awarded a 2017 Cycle 1 Education Outreach Grant in the amount of $4526 by SPIE, the international society for optics and photonics. Congratulations!

We trust that the funds awarded will assist your organization to updated and expand demonstrations on the use of optics in biomedical imaging at various outreach festivals and events.

This award carries with it the following conditions:
1. the SPIE name and logo must be included on related print and web materials. The SPIE logo is available to download from our website at http://spie.org/about-spie/press-room/spie-logos-and-names/corporate-logos.
2. after these funds have been spent, a report must be submitted to SPIE describing their disposition and how your institution benefited from the award (A reporting form is attached)
3. the money is not to be used for overhead and administrative costs of the institution; and
4. the funds provided will be used to impact students and increase optics and photonics awareness.

Again, congratulations and best wishes for success!

Sincerely,

Glenn Boreman
2017 SPIE President
SPIE Education Outreach Grant Proposal: ‘The Color and Sound of Cancer’

January 2017

SPIE. STUDENT CHAPTER
UNIVERSITY OF CAMBRIDGE

in association with

VISIONLAB
www.bohndieklab.org

Dale J. Waterhouse (Chapter Outreach Coordinator)
Joanna Brunker (VISIONLab)
Travis Sawyer (VISIONLab)
Supporting Document SPIE Outreach Grant Application Form

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Student Chapter Information

Univ. of Cambridge Chapter
Cavendish Laboratory
J J Thomson Avenue
Cambridge
United Kingdom
CB3 0HE
Phone: 44 01223 339709
Web: http://spiecambridge.weebly.com/

The chapter was established on 31 October 2002.

2017 Chapter Officers
Advisor: Sarah Bohndiek
President: Jianguo Zhang
Vice President: Arfa Karani
Secretary: Arya Thampi
Treasurer: Shahab Akhavan
Webmaster: Qifei Gu
Membership Coordinator: Han Qin
Outreach Coordinator: Dale Waterhouse
Author Information

Dale J. Waterhouse

Dale Waterhouse is a third year PhD student in Sarah Bohndiek's lab at the University of Cambridge where he previously gained a BA MSci in Natural Sciences. In his role as a Postgraduate Mentor for the Cambridge Admissions Office (2015 – present), Dale has experience designing and delivering bespoke sessions to be delivered at summer schools for secondary school and sixth form students for the past two years, resulting in good feedback and requests for sessions to be re-run with further groups. During his PhD, Dale has supervised first year undergraduate students and demonstrated in first year undergraduate labs, being promoted to senior demonstrator for his efforts in 2016. He currently helps to co-ordinate the outreach and public engagement activities of the VISIONLab research group. Dale has helped deliver demonstrations to a wide range of non-student audiences including members of the general public at a ‘Pint of Science’ event (2016) and patients at a patient awareness evening (2016). In his role as the University of Cambridge SPIE Student Chapter Outreach Coordinator (2016 – present), Dale hopes to reach those who wouldn't normally have access to higher education and highlight the multidisciplinary aspects of modern science.

Dr. Joanna Brunker

Joanna started at Cambridge in March 2016 as a postdoctoral research associate in Sarah Bohndiek’s Vision Lab. She has been involved in numerous public engagement and outreach events both during her PhD years at UCL and now in her present employment at Cambridge. She currently helps to co-ordinate the outreach and public engagement activities of the VISIONLab research group, assisting in events such as “Pint of Science” and “Soapbox Science”. In addition Jo is organising her own outreach scheme in local schools, which has started this January 2017 with a series on “Unpicking the Brain”. This is an extension of her previous school outreach work with the "Brilliant Club" where she delivered university-style tutorials to small groups of 9-10 year-olds (2015) and 14-16 year-olds (2014).  She is also a STEM Ambassador, and has helped out children/parents at The Big Bang UK Young Scientists and Engineers Fairs in London (2013) and Birmingham (2014, 2015). At UCL she helped to design and exhibit medical imaging demonstrations at the inaugural UCL “Spark Festival” (2015), volunteered as a demonstrator for UCL Biomedical Optics at the Wellcome Trust “On Light” exhibition (2015), and represented the UCL Centre for Advanced Biomedical Imaging (CABI) at the “Limits of Perception” stand at the prestigious Royal Society Summer Exhibition (2014). Furthermore, Jo demonstrated Medical Physics equipment to parliamentarians, policy makers and scientists at the IOP launch of physics case studies in the House of Commons; received letter of commendation from the CEO of the IOP (2013).
Travis Sawyer

Travis Sawyer is a Master’s student in Physics, who previous attended the University of Arizona to receive a Bachelor’s Degree in Optical Sciences and Engineering. An avid supporter of outreach, Travis was a member of the outreach committee for the University of Arizona SPIE chapter for three years, where he participated in a wide range of outreach events, including visiting schools to carry out optics demonstrations, judging science fairs, and conducting tours of the University and laboratories for prospective students. Each year, he took a major role in organizing Laser Fun Day, an annual outreach event that can bring over a thousand visitors to participate in demonstrations and activities relating to optics and its role in society. Travis became the outreach coordinator in his final year, where he had the responsibility of organizing and conducting the outreach activities of the student chapter, as well as events organized by the Department. His efforts led to the most productive outreach year in chapter history, reaching over 2000 people. Now, he is involved with the University of Cambridge SPIE student chapter to spread awareness of optics and its role in biomedical imaging.

Future Contributors

We are fortunate to have access to the CRUK Cambridge Institute Public Engagement team with whom we have collaborated before. This will ensure our events are professional, enjoyable and effective in their goals.

Below: Previous outreach events attended by the authors of this proposal. Left: Pint of Science Event. Right: Soapbox Science Event.
1. Detailed Proposal

1.1 Proposal Summary

To build upon demonstrations used previously to illustrate optics in biomedical imaging at various outreach festivals and events, to provide a more coherent and structured outreach session that can be easily tailored and deployed at events targeting a range of audiences. The coherent hands-on session will be titled: ‘The Color and Sound of Cancer’.

Our session will be divided into 4 parts forming a coherent narrative:

1. **Properties of Light 1**: The properties of light including wavelength/color and polarization offer huge potential for diagnostic imaging.

2. **Properties of Light 2**: However, light scattering makes it difficult to perform optical imaging deep inside the body: we are not transparent!

3. **Properties of Sound**: One way to overcome the limited depth penetration is to couple light to sound.

4. **Photoacoustics**: So, we combine the advantages of light and sound using photo-acoustic imaging.

Hands on demonstrations will support each of these parts as described in **Section 2**.

Studies have shown that repeated exposure to outreach through a series of sessions is more likely to have an impact upon students. However, a series of sessions requires lengthy organization and can only realistically be delivered to a single class at a time due to the large weekly time commitment. On the other hand, a short single session can be delivered to many more people in the same time, but has smaller lasting impact.

For these reasons we will develop a set of demonstrations, based around the coherent narrative above, that can be delivered as part of a single one hour session, a series of stations on a science festival stand, or an extended series of five one hour sessions. This allows us great flexibility to increase the impact of our outreach activities.

In order to overcome the aforementioned issues surrounding shorter sessions, we will supplement them with detailed follow-up. Attendees will be invited to engage further with our YouTube channel and website following the events. Here they can further engage with (a) videos documenting ‘A Day In The Life Of’ a researcher, (b) videos of the demonstrations they have experienced at the event, as well as those they have missed, and (c) web based apps we intend to develop (see **Section 3**).
1.2 Intended Audience

<table>
<thead>
<tr>
<th>Audience</th>
<th>Event</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>Secondary School and Sixth Form Students (aim for 10 events with 20-30 student = ~250 students)</td>
<td>Summer Schools organized by the Cambridge Admissions Office (CAO) and College Outreach Coordinators.</td>
<td>Summer 2017</td>
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<tr>
<td>General Public</td>
<td>Cambridge Science Festival (&gt;250 people to visit our stall)</td>
<td>March 2018</td>
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<tr>
<td></td>
<td>Manchester Science Festival (&gt;250 people to visit our stall)</td>
<td>Thursday 19 October – Sunday 29 October 2017</td>
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<td>Secondary School Students from schools in traditionally non-academic areas (aim for 2 classes of 20-30 students at each school = ~ 250 students)</td>
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<td>October – November 2017 TBC</td>
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<td></td>
<td>Peterborough: Jack Hunt School; Arthur Mellows School TBC</td>
<td>October – November 2017 TBC</td>
</tr>
<tr>
<td></td>
<td>Hertfordshire: Onslow St Audreys; Monk's Walk; Freman college; John Henry Newman TBC</td>
<td>October – November 2017 TBC</td>
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<td></td>
<td>School 4 TBC</td>
<td>February – April 2017 TBC</td>
</tr>
<tr>
<td></td>
<td>School 5 TBC</td>
<td>February – April 2017 TBC</td>
</tr>
<tr>
<td>Patients</td>
<td>Patient Awareness Evening (~50 patients)</td>
<td>TBC</td>
</tr>
</tbody>
</table>

1.3 Intended Impact

Secondary School and Sixth Form Students

Students are often taught Physics in a dry textbook style and as a completely separate entity to Biology and Chemistry. Our primary aim is to address both of these concerns. Our session will increase students' awareness that in 'real science' the subjects are more fluid and overlapping whilst also instilling a sense that there are exciting and impactful 'real world' applications for optics (and science in general). The hope is that this may inspire students to consider further education in science by exposing them to 'real scientists' and opening their eyes to the wide range of 'real problems' we work on, many of which the students won't have previously considered during their science classes.

The General Public and Patients

Our chosen application, the use of optics in the field of early detection of cancer, is particularly emotive, helping to captivate the audience and emphasize the importance of advancement in the field of optics. The role of optics, and more generally the role of science, technology, engineering and math (STEM), in medical advancement may come as a surprise to some audience members, positively changing their attitude to these subjects in future.
2. Demonstration Descriptions

Below is a list of demonstrations that will form the core of our session. The level of detail in the explanation of the concepts can be substantially expanded/reduced depending on session time and intended audience.

2.1 Properties of Light 1

**Key Physics Principles:** Wavelength, Absorption, Reflection, and Transmission
**Wider Context:** The wealth of information we can gather from tissue in biomedical imaging.

**DEMO 1: Spectrometer**
The audience will have the chance to use a fiber-coupled spectrometer to measure the spectra of several objects:
- Plastic and real leaves. Both are green but the detailed spectrum reveals the underlying differences – analogous to endoscopic imaging of Barrett’s esophagus.
- Deoxygenated and oxygenated blood in capillary tubes. Directly related to application in medical imaging to measure oxidative stress, tumor vasculature and hypoxia.

**DEMO 2: Pulse Oximeter**
Demonstrate how absorption spectra of oxy- and deoxy-haemoglobin can be used to reveal biological information.

2.2 Properties of Light 2

**Key Physics Principles:** Polarization and scattering
**Wider Context:** Early detection of cancer, depth imaging, 3D visualization

Flash cards describing demonstrations we have used in some of our previous events are shown below.
DEMO 3: Lasers in Milk

Why did it glow?

- Almost all objects scatter light, which means they reflect light in all directions. If the objects around us reflected light perfectly without scattering they would appear like mirrors.
- There are several ways that scattering can occur: in milk, light is scattered by the tiny fat droplets, and this causes the light beam to become a glowing ball.

How is this related to cancer research?

- We are developing new endoscopy techniques based on light scattering to enable early detection of cancer in the gastrointestinal (GI) tract, in particularly the deadly disease oesophageal cancer.
- In the very earliest stages, the microstructure of the tissue (invisible to the naked eye) will start to change and we can use light scattering to detect this.

DEMO 4: 3D Glasses

Why do we see 3D?

3D TV shows each eye a slightly different picture, taking advantage of your brain to combine these two pictures to form one 3D image with a perceived depth.

To create 3D movies, two synchronized projectors project two respective views onto the screen, each with a different polarization. The glasses allow only one of the images into each eye because they contain lenses that are polarized as well.

How is this related to cancer research?

- In the future, 3D visualization could help endoscopists to study high resolution images provided by endoscopy.
- Furthermore, light polarization can be used to select information at different depths in tissue, to assess the penetration of cancer beyond the tissue surface.
2.3 Properties of Sound

**Key Physics Principles:** Ultrasound  
**Wider Context:** Deep body imaging

**DEMO 5: Ultrasound**  
Doppler ultrasound can be used on the neck of the speaker or a volunteer from the audience to listen to the heartbeat (research ethics and risk assessments will be carried out). This can be followed by brief physical exertion to demonstrate the ultrasound can be used to detect the change in heartbeat.

2.4 Photoacoustics

**Key Physics Principles:** Combination of light and sound to create a photoacoustic device, which has depth penetration whilst maintaining spatial resolution and spectral information. 
**Wider Context:** Ongoing clinical trials for early detection of breast cancer, imaging of tumor microenvironment.

**DEMO 6: Photophone**

Demonstrate a photophone, a device that uses a modulated light emitting diode (LED) torch and an electronic stethoscope. The output of a music player is used for light modulation and allows the music to be heard through the stethoscope.

Further detail:  

**Below:** The photophone we previously built in collaboration with UCL.
3. Follow-up Resources

3.1 YouTube channel

https://www.youtube.com/channel/UCgKWlnn1jYV_OqqFZtA

Note: Currently under construction.

3.2 Example web based app (Photoacoustic Signals)

Below is a very preliminary example of an app we have designed to demonstrate the photoacoustic signal. The user can click the different shapes to hear an audible representation of the ultrasound wave generated by them. In future we plan to develop the app to allow the user to build different shaped tumours and hear ‘the sound of cancer’.
### 4. Detailed Budget

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<tr>
<td>Construction of loudspeaker photophone</td>
<td>See below*</td>
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* Detailed photophone budget:*

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## Supporting Document  SPIE Outreach Grant Application Form

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<td>322.92</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>£469.49</strong></td>
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</tbody>
</table>
## 5. Timeline

<table>
<thead>
<tr>
<th>Task</th>
<th>Deadline</th>
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</thead>
<tbody>
<tr>
<td>SPIE Outreach Grant Application</td>
<td>January 2017</td>
</tr>
<tr>
<td>Contact CAO and College Outreach Coordinators to arrange sessions at summer schools</td>
<td>February 2017</td>
</tr>
<tr>
<td>Contact schools in traditionally non-academic areas to offer them our outreach session</td>
<td>February 2017</td>
</tr>
<tr>
<td>Practice giving current imaging based session at Cambridge Science Festival in partnership with OSA Student Chapter</td>
<td>March 2017</td>
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<tr>
<td>Grant Decision</td>
<td>April/May 2017</td>
</tr>
<tr>
<td>Design and construction of photophone</td>
<td>June 2017</td>
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<tr>
<td>Purchase of other equipment</td>
<td>June 2017</td>
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<tr>
<td>Internal practice of sessions (including training of volunteers)</td>
<td>April – June 2017</td>
</tr>
<tr>
<td>Deliver sessions at Cambridge summer schools</td>
<td>August 2017</td>
</tr>
<tr>
<td>Manchester Science Festival</td>
<td>October 2017</td>
</tr>
<tr>
<td>Visit 3 schools in traditionally non-academic areas</td>
<td>October – November 2017</td>
</tr>
<tr>
<td>Visit 2 schools in traditionally non-academic areas</td>
<td>January – March 2018</td>
</tr>
<tr>
<td>Cambridge Science Festival</td>
<td>March 2018</td>
</tr>
</tbody>
</table>