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Princeton University
PO Box 36
87 Prospect Avenue, Second Floor
Princeton, NJ 08544 -2020

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RPPR Final Report
as of 06-Jan-2020

Agency Code:

Proposal Number: 73624EGCF **Agreement Number: W911NF-19-1-0105**
INVESTIGATOR(S):

Name: Chung King Law
Email: cklaw@princeton.edu
Phone Number: 6092585271
Principal: Y

Organization: **Princeton University**
Address: PO Box 36, Princeton, NJ 085442020
Country: USA
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Report Date: 01-Oct-2019 Date Received: 20-Dec-2019
Final Report for Period Beginning 01-Apr-2019 and Ending 01-Sep-2019
Title: Conference/Symposium: 2019 Princeton-CI Summer School on Combustion
Begin Performance Period: 01-Apr-2019 **End Performance Period:** 01-Sep-2019
Report Term: 0-Other
Submitted By: Chung King Law Email: cklaw@princeton.edu
Phone: (609) 258-5271
Distribution Statement: 1-Approved for public release; distribution is unlimited.

STEM Degrees: **STEM Participants:**

Major Goals: To provide the next generation of combustion researchers with a comprehensive knowledge in the technical areas of combustion theory, experiment, computation, fundamentals, and applications.

Accomplishments: The 2019 Princeton-Combustion Institute Summer School on Combustion was conducted at Princeton University and attended by 175 US and international graduate students and researchers. Five 15-hour lectures on aspects of foundational and technical combustion were delivered by seven world-renowned researchers (S. Candel, H.J. Curran, A. Violi, J.H. Chen, J.A. Sutton and J.L. Torero) who are also recognized as master lecturers.

Training Opportunities: Nothing to Report

Results Dissemination: Nothing to Report

Honors and Awards: Nothing to Report

Protocol Activity Status:

Technology Transfer: Nothing to Report

PARTICIPANTS:

Participant Type: PD/PI
Participant: Chung King Law
Person Months Worked: 2.00 **Funding Support:**
Project Contribution:
International Collaboration:
International Travel:
National Academy Member: Y
Other Collaborators:

RPPR Final Report
as of 06-Jan-2020

Report to the Army Research Office on the

2019 Princeton Summer School on Combustion

Submitted by Chung K. Law

Principal Organizer, and

Robert H. Goddard Professor, Princeton University

September, 2019

TECHNICAL REPORT

The 2019 Princeton-Combustion Institute Summer School on Combustion was conducted at Princeton University and attended by 175 US and international graduate students and researchers. Five 15-hour lectures on aspects of foundational and technical combustion were delivered by seven world-renowned researchers (S. Candel, H.J. Curran, A. Violi, J.H. Chen, J.A. Sutton and J.L. Torero) who are also recognized as master lecturers. The following are summaries of the program, feedbacks from the participants and lecturers, thoughts of the organizers, and images of the event.

PROGRAM AND SCHEDULE

2019 Princeton-Combustion Institute Summer School on Combustion - Schedule of Events

Sunday, June 23

13:00 – 17:00 Check In (Butler College)
16:00 – 17:30 Combustion/Fluids Lab Tours*
18:30 – 20:30 Welcome Dinner/BBQ (Lawn of Butler College)

Monday, June 24 – Friday, June 28 (see schedule below for special events)

08:45 – 09:45 Morning Lectures
09:45 – 10:00 Break#
10:00 – 11:00 Morning Lectures Continues
11:00 – 11:15 Break#
11:15 – 12:15 Morning Lectures Continues
12:15 – 14:00 Lunch Break (Tiger Inn Eating Club**)
14:00 – 15:00 Afternoon Lectures
15:00 – 15:15 Break#
15:15 – 16:15 Afternoon Lectures Continues
16:15 – 16:30 Break#
16:30 – 17:30 Afternoon Lectures Continues
17:30 Adjourn for the day

Visit the poster-room during the breaks. Poster presenters are encouraged to leave their contact information on the poster boards, so that they can be contacted by the interested parties to discuss/schedule meetings.

Friday, June 28

08:45 – 17:30 Check Out (to our staff at Friend Center). After 17:30, dorm keys should be returned to the public safety.

Lecture Schedule:

Mon 6/24	Tue 6/25	Wed 6/26	Thurs 6/27	Fri 6/28
Morning Lectures: 08:45 – 12:15				
Combustion Dynamics (Mon-Fri) - Prof. Sébastien M. Candel, Friend Center 101				
Combustion Chemistry and Modeling (Mon-Fri) - Prof. Henry J. Curran, Comp Sci Bldg 104				
Afternoon Lectures: 14:00–17:30				
Computational Methods for Soot Formation (Mon-Wed) – Prof. Angela Violi, Friend Center101			Numerical Combustion from Fundamentals to Engine Applications (Thu-Fri) – Dr. Jacqueline H. Chen, Friend Center101	
Laser Diagnostics in Turbulent Combustion Research - Prof. Jeffrey A. Sutton (Mon-Fri), Comp Sci Bldg 104				
Combustion Fundamentals of Fire Safety - Prof. José L. Torero (Mon-Fri), Friend Center 006				

Special Events Schedule:

Sun 6/23	Mon 6/24	Tue 6/25	Wed 6/26	Thurs 6/27	Fri 6/28
Welcome BBQ - Lawn of Butler College (in case of rain, Whitman College Dining Hall) 18:30-20:30	**Poster Session- 19:45 – 21:00 Friend Center Convocation Room (Posters will be in display until Friday Morning)**	**Group Picture 12:15-12:45 (You must wear your Summer School T-Shirt to be included in the photo)**	**Career Panel (Lunch Event) 12:45-13:45 at Friend Center**	**Celebration and Farewell Dinner – Frick Chemistry Building 18:00-20:00**	**Program Adjourns 17:30**

* Combustion/Fluids Lab Tours are only for pre-enrolled participants.

During breaks, coffee and tea will be available in the convocation room (poster room).

Dining Hall Hours: Breakfast: 07:00-08:30 (Wilcox Dining Hall, adjacent to Butler dorm); Lunch: 12:15 – 14:00 (Tiger Inn, Student Eating Club), Dinner: 17:30 – 19:30 (Tiger Inn, Student Eating Club)

Emergencies - Dial 911 (Call 609-258-3333 from your cell phone for on-campus emergencies)

Princeton University Public Safety - (609) 258-1000 (non-emergencies)

GEOGRAPHICAL BREAKDOWN OF ATTENDEES

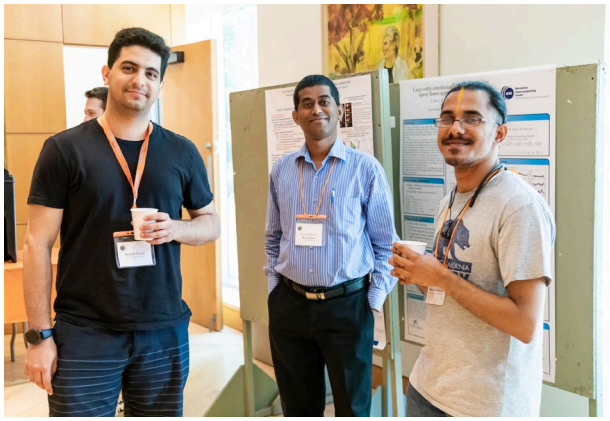
Country of Affiliation	No. of Participants	Continent of Affiliation	No. of Participants
Bangladesh	1	Asia	12
China	1		
India	2		
Japan	2		
Saudi Arabia	6		
Belgium	3	Europe	22
Finland	1		
France	1		
Germany	1		
Spain	2		
United Kingdom	14		
Canada	5	North America	138
USA	133		
Brazil	1	South America	2
Mexico	1		
Total	**175**	**4**	**175**

IMAGES

Group Portrait: A Magnificent Sea of Blue!

Opening Dinner

Farewell Banquet



Poster Session

After-Class Discussions with Lecturers

Career Panel

FEEDBACKS AND SUGGESTIONS

Sample Feedbacks from Participants

At the conclusion of the session, participants were asked to provide their feedback and suggestions for further improvements. The following are representative of the overall very positive feedbacks that were received.

- "Terrific educational experience at the Princeton summer school. Nothing motivates these young scientists more than the very hard work that all of you distinguished lecturers do. Even at fine universities they do not get such in-depth explanations of science from the people who personally created that new science."

  Nick Diskerud (PhD student, University of Michigan)

- "was a student union member in my previous institution; organizing events involving hundreds of students, and can only imagine, the amount of effort that was put into this event for such a wonderful and organized outcome. To me, the level of details you took care of was fascinating, from wonderful lecturers, to making sure foods available fits different diets; all of which allowed us to focus more on courses and therefore have a very fruitful experience."

  Adnan Darwish Ahmad (PhD student, University of Kentucky)

- "As I had my second-year experience in Princeton Combustion Summer School, I very learned and enjoyed my time again. I can confidently say that I realized the importance of this event more in my second year and realized points that I did not pay attention last year. For example, your emphasis on the importance of communication and collaboration with people from the same or even different fields helps me develop my skills in interaction with everybody. I can comfortably say that these two years in a row in Princeton helped me a lot at this point."

  Furkan Kodakoglu (PhD student, West Virginia University)

- "A logical extension of that big picture approach was the panel by the lecturers on Wednesday. It was a positive and reassuring experience. Personally, I do want to continue in Academia. I find that this world motivates me and challenges me continually. I liked the approach that was taken during the panel. Personal advice from successful professionals is invaluable. I believe this was an excellent idea and it was carried out perfectly"

  Simon Santamaria (PhD student, University of Edinburgh)

- "This is my first time to attend the Princeton summer school, and this is the first time to participate in so famous professor courses in our combustion community. I am great honor to come to Princeton, and I learn a lot."

  Gan Xiao (Postdoctoral Fellow, UC Berkeley)

- "Classes are unparalleled. Opportunities like this are not found in most other industries."

  Robert Leishear (Industrial Attendee)

Suggestions from Participants

Some common suggestions by the participants are noted below, and will be considered in the formulation for the programs in subsequent sessions.

1. Creation of interest groups: A participant requested for the creation of interest group (on Fire research). The organizers will help provide interested participants the possibilities to share contact.

2. Prolonged the Q&A session with professors. The organizers will pay attention and prolong the Q&A session of the career panel.

Program Organizers' Experience

This year's program was attended by 175 participants, which is at par with the attendance over last few summer schools. This sustained participation is a clear indicator of the robustness of the discipline. Luckily in Princeton, we have facilities available for accommodation and dining of such a large group of people.

Since 2016, we have introduced a poster session to our program. Since 2017 we have expanded it to a week-long event by keeping the posters available to all the attendees during the coffee and lunch breaks. We have experienced a much improved and engaging discussions among the participants which were not limited by time anymore. The participants also appreciated the ample opportunity to discuss and network through the posters.

Finally, as organizers, perhaps the most precious reward is to see the students come, enjoy and learn from this one-week experience, and bring it back to their own research environments as a continuing source of knowledge and inspiration. Just like the lecturers, the organizers derive immense pleasure and satisfaction in facilitating the education, networking and collaboration elements of the combustion enterprise.