



SATELLITE WORKSHOPS A GREAT SUCCESS!

A FOUNDATION FOR CONTINUED CONVERSATION AND COLLABORATION

Satellite workshops took place this weekend! Held at Politecnico di Milano, they served as great pre-Symposium warm up and generated fruitful discussions on the topics of **flame chemistry (FC)**, **sooting flames (ISF)**, **turbulent and premixed flames (PTF/TNF)**, and **rapid compression machines (RCM)**.

Notwithstanding airport strikes and technical and logistical flight issues, almost all the **415 registered participants** made it! (Some of them just a few minutes before their presentation!)

This year, all workshops shared the same location and main schedule so that participants could move freely and also connect over the breaks. The joint poster session on Saturday and the informal dinner were a great occasion for networking. Below is a photo of participants around posters.

See you on the other side of town soon, at the CI's 40th International Symposium - *Emphasizing Energy Transition!*



Attendees during the lunch break.

WORKSHOPS OVERVIEW *WHAT DID WE LEARN?*



FLAME CHEMISTRY (FC)

Two productive days were had at the FCW! The main research areas discussed were sustainable fuels, diagnostics, advanced diagnostics, plasma combustion, theoretical kinetics (AI-TST-ME), and kinetic mechanisms.

To boost discussions, each topic was structured with an initial keynote, then five minute presentations on more specific aspects, followed by a 30 minute panel discussion. The attendees were really involved, even taking the discussion well beyond coffee break time!

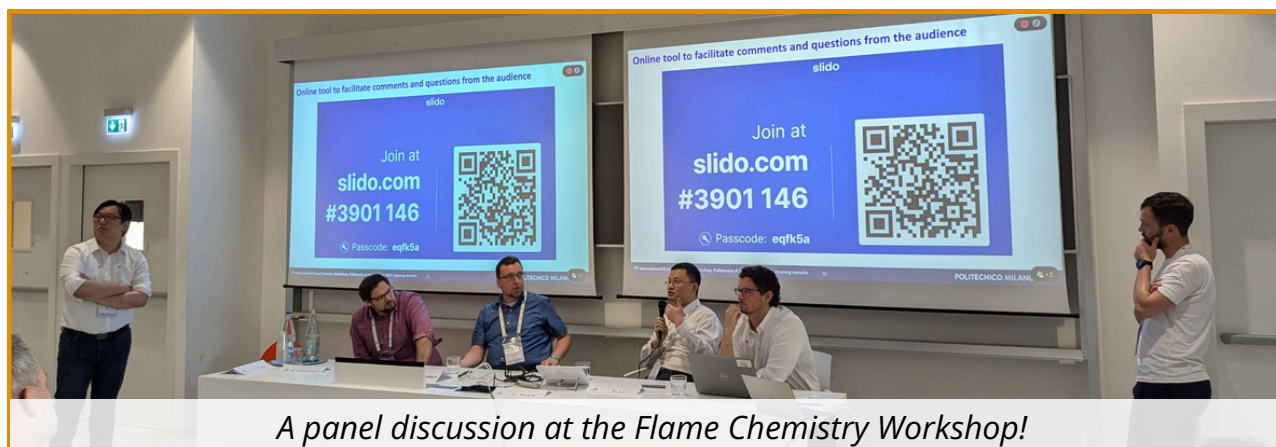
Discussion about sustainable fuels mostly focused on aviation. Common SAF component targets and close connection with industrial applications were the identified priorities. But let's not forget about science - we still have many doubts on cross reactions in fuel mixtures and non-thermal effects...

Exciting progress on diagnostics techniques was shared. Among the challenges, the community will focus on detection of radicals and on standardizing the type of info shared in publications, especially for new experimental techniques.

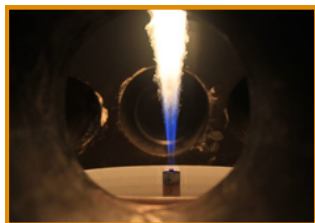
Many speakers presented their different plasma reactor setups. In the plasma-combustion community, modeling seems quite challenging especially when comparing different setups. Also in this field, more standardization is called for!

Theoretical kinetics and kinetic modeling sessions shared similar concerns: better integration with experiments, more efforts to standardize and provide machine-readable information when publishing, estimating uncertainties fairly. A long discussion on databases for both theoretical calculations and reactor data was held - it seems like it's time to take action!

The wrap up this morning at the end of the FC Workshop will lead to working groups - let's see what they come up with at the next workshop!



A panel discussion at the Flame Chemistry Workshop!



INTERNATIONAL SOOTING FLAME (ISF)

The satellite workshops of the CI Symposium have proven to be a great platform for reflecting on the latest achievements and identifying future directions and perspectives within our community.

During the two-day ISF workshop, about 80 participants have discussed advancements and emerging research opportunities on carbon-based particles produced in reacting flows. The event featured inspiring panel discussions on the pyrolysis and synthesis of carbon-based particles, the evolution of soot in fires and the latest advancement in measurement techniques. Presenters emphasized the potential to apply current knowledge to emerging sustainable fuels.

Discussions also extended to laminar and turbulent sooting flames, providing a comprehensive overview of current research and technological advancements. There were ten three minute pitches from young researchers and 25 posters that fostered interactions and discussion.

The event brought together young and leading researchers, engineers, and industry professionals, setting the stage for future breakthroughs in carbon-based particles.



RAPID COMPRESSION MACHINE (RCM)

With four sessions spanning over a wide range of topics, the 5th RCM workshop offered to participants an occasion to discuss technical challenges, opportunities, and future directions of research.

Highlights from the workshop included analysis on facility effects, the resulting uncertainties in ignition measurements and paths to reconcile data from different facilities. Different perspectives on RCM diagnostics were presented, especially in terms of species and pressure measurements and sensor calibration.

One of the sessions focused on sustainable fuels, providing indications on molecules and feedstocks relevant for future studies. A common trait of the fuels mentioned is their ability of producing a two stage ignition behavior. This feature has been studied for decades in RCMs, but still presents challenges when experiments and simulations need to be accurately compared. To help resolve these issues, a coordinated JSR-RCM study of dimethyl ether (an e-fuel of great interest), has been proposed. Other challenges mentioned throughout the day suggested the need for high pressure data on droplet dispersions.

Finally, a strong case for data reporting standards was made, since documented and complete raw datasets maintain their validity as processing techniques evolve in time.



TURBULENT (TNF)/PREMIXED (PTF) FLAME

The TNF/PTF joint satellite workshop featured collaborative discussions, where TNF talks focused on reviewing recent developments by various research groups over the past two years, while PTF talks concentrated on specific works.

Discussion on premixed hydrogen and hydrogen blend flames focused on high-pressure combustion and the effects of thermodiffusive instabilities, especially in combination with turbulence.

Instead, discussion on ammonia combustion kinetics focused more on the development of reaction mechanisms for ammonia combustion that provide good results in practical flame applications.

Results from LES (Large Eddy Simulation) studies of the HYLON burner conducted by over 20 different groups were compared, including plans to move forward with HYLON phase 2, which aims to explore combustion at higher pressures.

Afterwards, a review of the applications of artificial intelligence and machine learning in combustion research, both numerically and experimental, was presented.

On Sunday morning, the work done by various groups on near-wall combustion was reviewed, and future challenges and research directions in this area were discussed.

Following the joint sessions, a TNF-only session was held to discuss future plans for collaboration. The focus was on joint configurations and addressing specific problems such as near-wall combustion of hydrogen and issues related to flashback, as well as future target flames, especially in the context of hydrogen and ammonia combustion.

Overall, the workshop facilitated valuable discussions on the latest advancements and future directions in combustion research, emphasizing the importance of collaboration between different groups from all over the globe.

We are very grateful to all the organizers who made these workshops possible!

FC: Matteo Pelucchi, Bin Yang, Brandon Rotavera, Feng Zhang, Liming Cai, Andrea Comandini, (and the advisory team of Nils Hansen and Stephen Klippenstein!)

ISF: Gus Nathan, Bassam Dally, Klaus-Peter Geigle, Heinz Pitsch, Tiziano Faravelli, Chris Shaddix, Hope Michelsen, Michael Mueller, and more at:

<https://www.adelaide.edu.au/cet/isfworkshop/about-isf/>

RCM: Scott Goldsborough

PTF/TNF: Robert S. Barlow and his nice large team: <https://tnfworkshop.org/contact/>



TALENTED YOUNG RESEARCHERS ATTEND

MEET SOME OF THE PRIZE WINNERS AT THE WORKSHOPS!

There were a lot of new faces here at the workshops. Some are even excitedly attending their first conference! The organizers of the FC and ISF workshops selected two brilliant students for the Best Poster Award of the respective topics. Fil rouge of the awards - both relate to soot works.

Among the interesting works of the FC session, the committee was impressed by the work of the enthusiastic **Jasmin Bachmann** on the development of a fast screening method for soot tendency evaluation. Jasmin is a young PhD student at DLR working with Dr. Köhler and Nina Gaiser. Congratulations Jasmin, looking forward to witnessing your future research successes!

From the ISF Workshop, **Patrizia Crepaldi** impressed the committee with her work on the oxidation dynamics of soot accounting for its core-shell structure and pore network, conducted at ETH under the supervision of Prof. Pratsinis. Patrizia will start her PhD in CRECK Modeling Group soon. We are curious about your upcoming challenges, and congratulate you on this early, well-deserved award!



*Jasmin Bachmann (Left) and Patrizia Crepaldi (Right)
with their awards in front of their winning posters!*

What is the Symposium Tribune? It's a daily bulletin that will keep you updated on all the key highlights and events happening at the Symposium, including interesting scientific talks and interviews to speakers, organizers, awardees. You will also find opinions from participants, and insights into social events in case you can't make it!

Contributors: Luna Pratali Maffei (POLIMI), Fabiola Citrangolo Destro (LL-CNRS), Lauren Creadore (CUNY), Mario Di Taranto (SINTEF), Ali Elkhazraji (KAUST), Federica Ferraro (TU-Braunschweig), Alexander Konnov (Lund University), Yuyang Li (SJTU), Zhuyin Ren (Tsinghua University), Maria Virginia Manna (STEMS-CNR), Max Schneider (TU Darmstadt), Jungho Sohn (KAIST), Stephen Tse (Rutgers), Augustin Valera-Medina (Cardiff), Draven Marino (The Combustion Institute), Tiziano Faravelli (POLIMI)

Feedback is always welcome, and can be submitted via Telegram: <https://t.me/CombustionSymposium2024/2>