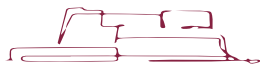




ISHPMIE 2024
Napoli, Italy



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Dipartimento
di Ingegneria Chimica,
dei Materiali e della
Produzione Industriale
Università degli Studi
di Napoli Federico II

Under the auspices of



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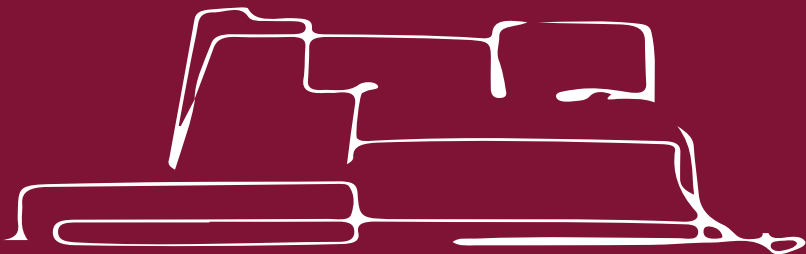


PROGRAM

15th INTERNATIONAL SYMPOSIUM ON HAZARDS,
PREVENTION AND MITIGATION OF INDUSTRIAL EXPLOSIONS

Napoli, Italy | June 10 - 14 2024

www.ishpmie2024.com



Dear Colleagues and Friends,

We are pleased to welcome you to the **15th International Symposium on Hazards, Prevention and Mitigation of Industrial Explosions (ISHPMIE)** and to Naples.

The event is organized by the University of Naples Federico II, in collaboration with the National Research Council, the University of Rome, the University of Bologna and the Polytechnic University of Turin.

We are glad to host in Naples around 200 Researchers and Scientists coming from all over the World.

We would like to thank you all for your outstanding contributions! We are privileged to have a diverse array of fascinating papers from around the globe, covering a wide range of significant topics. Here's what to expect:

- **Plenary Lectures:** Leading scientists will share their insights and the challenges they face on current topics.
- **Technical Sessions:** These sessions are organized into parallel tracks with three or four presentations each, focused on specific subjects and chaired by experts in the field.
- **Poster Session:** Join us during the coffee breaks: results from various research projects will be discussed and preliminary results from ongoing research projects are showcased.

We look forward to your participation and the enriching discussions!

In addition, we have organized an intensive social program and we hope you will enjoy our beautiful city.

Have a nice stay,



Prof. Almerinda Di Benedetto

Chair of ISHPMIE 2024

A handwritten signature in dark ink, appearing to read 'Almerinda Di Benedetto'.

LOCAL ORGANIZING COMMITTEE

A. Di Benedetto, *University of Naples Federico II, Symposium Chair*
L. Marmo, *Polytechnic University of Turin, Co-Chair*
P. Russo, *University of Rome La Sapienza, Co-Chair*
E. Salzano, *University of Bologna, Co-Chair*
E. Danzi, *Polytechnic University of Turin*
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M. Portarapillo, *University of Naples Federico II*
D. Russo, *University of Naples Federico II*
R. Sanchirico, *STEMS-CNR*

INTERNATIONAL ORGANIZING COMMITTEE

T. Skjold, *Norway, Chair*
P. Amyotte, *Canada*
M. Beyer, *Germany*
R. Dobashi, *Japan*
W. Gao, *P. R. China*
U. Krause, *Germany*
M. Nifuku, *Japan*
M. Pegg, *Canada*
I. Sochet, *France*
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HONORARY MEMBERS

R. Klemens, *Poland*
K. Lebecki, *Poland*

ORGANIZING SECRETARIAT



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PLENARY SPEAKERS



Why Do Dust Explosions Happen?

Paul Amyotte
Dalhousie University, Canada

Dr. Paul Amyotte, P.Eng. is a Distinguished Research Professor and Professor of Chemical Engineering at Dalhousie University in Halifax, Nova Scotia. He obtained his Bachelor's degree from the Royal Military College of Canada, Master's from Queen's University, and Doctorate from the Technical University of Nova Scotia (all in chemical engineering). Paul is a past-president of Engineers Canada and the Canadian Society for Chemical Engineering. He is the current editor of the Journal of Loss Prevention in the Process Industries. His teaching, research and practice interests are in the field of process safety, with specific expertise in dust explosions, inherently safer design, and risk management. In 2014, Dr. Amyotte received the Cybulski Medal from the Polish Academy of Sciences for significant and sustained contributions to the field of dust explosion research.



Understanding the Limitations of Using K_{St} to Define the Reactivity of Large-Scale Dust Explosion Tests

C. Regis Bauwens
FM Global, United States

Dr. C. Regis Bauwens is a Senior Lead Research Scientist at FM Global, where he currently serves as Technical Team Leader for the Explosion and Blast Research group and holds a Ph.D. in Mechanical Engineering from McGill University. Over his 17-year career at FM Global, he has gained extensive experience performing large-scale experimental studies and developing analytical and numerical modeling tools for industrial safety applications. In his work, Dr. Bauwens has conducted in-depth research on topics related to dust explosions, hydrogen safety, deflagration venting, vapor cloud explosions, dispersion analysis, and large-scale flame propagation. Dr. Bauwens is an active member of several professional committees, including the NFPA Technical Committee on Explosion Protection Systems, and serves on the board of directors of the Institute on the Dynamics of Explosions and Reactive Systems.



Safety of Batteries

Wei Gao
Dalian University of Technology, China

Prof. Wei Gao currently serves as a Professor in the School of Chemical Engineering at Dalian University of Technology in China. Prof. Gao's research focuses on safety and technology in the utilization of clean energy, specifically hydrogen and battery. With a publication record of approximately 150 papers in peer-reviewed journals, he also holds 8 authorized invention patents and has contributed to the development of 5 Chinese standards.



Advances in Hydrogen Safety Technologies

Vladimir Molkov

Ulster University, Northern Ireland

Professor Vladimir Molkov, MSc (Quantum Radiophysics), PhD (Chemical Physics), DSc (Fire and Explosion Safety), FHEA, CEng, FEI, Chartered Energy Engineer. Director of Hydrogen Safety Engineering and Research Centre (HySAFER) at Ulster University (Northern Ireland), a key provider of hydrogen safety research and education globally. Chair, Education Committee of International Association for

Hydrogen Safety. Membership: UN GTR#13; ISO/TC197; CEN/CLC/JTC6; BSI PVE/3/8, IEA Task 43 Hydrogen Safety, European Hydrogen Safety Panel, etc. Coordination and contribution to 41 national and EU projects in hydrogen safety totalling external funding income £12M. 390+ publications, including free download e-Book “Fundamentals of Hydrogen Safety Engineering” (www.bookboon.com), and 15 inventions, including explosion free in any fire self-venting (TPRD-less) type IV tanks for hydrogen storage.



Teaching process safety in the twenty-first century

Trygve Skjold





University of Bergen, Norway






Trygve Skjold is Associate Professor in Process Safety at University of Bergen (UiB). His research interests include dust and gas explosions, including hydrogen safety and strength of knowledge in risk assessments. Trygve is the Scientific Director for HySchool – Norwegian Research School on Hydrogen and Hydrogen-Based Fuels and Chair of the International Organising Committee for ISHPMIE.

PROGRAM AT A GLANCE



PROGRAM AT A GLANCE

	MONDAY, JUNE 10 th		
09.15 - 10.15	Registrations		
10.15 - 10.35	AULA MAGNA		
	Opening		
10.35 - 11.20	Plenary Lecture Why Do Dust Explosions Happen? Paul Amyotte, Dalhousie University, <i>Canada</i>		
11.20 - 12.00	 Coffee Break		
	AULA MAGNA	ROOM A	ROOM B
12.00 - 13.00	Risk Management	AI & databasing applied to explosions	
13.00 - 14.40	 Lunch		
14.40 - 16.00	Battery Safety	Flammability & inerting	
16.00 - 16.30	 Coffee Break		
16.30 - 17.30	Ignition & Extinction	Release & Dispersion	Explosion Modelling
17.30 - 19.00	Welcome reception		
20.00 - 23.00	 Meeting of the International Organizing Committee		





	TUESDAY, JUNE 11 th		
	AULA MAGNA		
09.00 - 09.45	Plenary Lecture Safety of Batteries Wei Gao, Dalian, University of Technology, <i>China</i>		
09.45 - 10.10	In memoriam of Professor Piotr Wolański Warsaw University of Technology, Poland		
	AULA MAGNA	ROOM A	ROOM B
10.10 - 11.10	Flammability & Inerting	Hydrogen and gas safety	Detonation & DDT
11.10 - 11.30	 Coffee Break		
11.30 - 12.30	Explosion venting & mitigation	Dust & hybrid explosions	
13.00 - 14.30	 Lunch		
14.30 - 15.30	Hydrogen and gas	Flame Propagation	Dust & Explosion Mitigation
15.30 - 16.00	 Coffee break & Work-in-progress posters 		
16.00 - 17.00	Explosion Mitigation	Dust & hybrid explosions	
	AULA MAGNA		
17.00 - 18.00	Round Table Chaired by Industrial Explosion Young Researchers Committee		
19.30 - 23.30	 Beach party		

PROGRAM AT A GLANCE

WEDNESDAY, JUNE 12 th			
AULA MAGNA			
09.00 - 09.45	Plenary Lecture Understanding the Limitations of Using K_{St} to Define the Reactivity of Large-Scale Dust Explosion Tests C. Regis Bauwens, FM Global, USA		
09.50 - 11.10	AULA MAGNA	ROOM A	ROOM B
	Runaway Reactions	Hydrogen and gas safety	
11.10 - 11.50	☕ <i>Coffee break & Work-in-progress posters</i> 📄		
11.50 - 12.50	Detonation & DDT	Dust & hybrid explosions	Hydrogen and gas safety
13.00 - 14.30	🍴 <i>Lunch</i>		
14.30 - 15.50	Dust & hybrid explosions	Hydrogen and gas safety	Explosion Prevention
15.50 - 16.20	☕ <i>Coffee break & Work-in-progress posters</i> 📄		
16.30 - 17.00	<i>Free time</i>		
17.00 - 18.30	👤 <i>Guided tour to "Galleria Borbonica"</i>		
19.00 - 21.00	🍕 <i>Pizza dinner</i>		

THURSDAY, JUNE 13 th			
AULA MAGNA			
09.00 - 09.45	Plenary Lecture Advances in Hydrogen Safety Technologies Vladimir Molkov, Ulster University, Northern Ireland		
09.50 - 11.10	AULA MAGNA	ROOM A	ROOM B
	Flammability, Inerting and Prevention	Dust & Hybrid Explosions	
11.10 - 11.50	☕ <i>Coffee break & Work-in-progress posters</i> 📄		
11.50 - 12.50	Dust & Hybrid Explosions	Hydrogen and battery safety	Case histories
13.00 - 14.30	🍴 <i>Lunch</i>		
14.30 - 15.30	Explosion Modelling	Hydrogen and gas safety	Dust, hybrid and spray explosions
15.30 - 16.20	☕ <i>Coffee break & Work-in-progress posters</i> 📄		
16.20 - 17.20	Dust & hybrid explosions	Hydrogen and gas safety	Detonation & DDT
19.00 - 23.00	👤 <i>Social dinner</i>		

PROGRAM AT A GLANCE


	FRIDAY, JUNE 14 th		
	AULA MAGNA		
09.00 - 09.45	Plenary Lecture Teaching process safety in the twenty-first century Trygve Skjold, University of Bergen, Norway		
	AULA MAGNA	ROOM A	ROOM A1
09.50 - 10.50	Hydrogen and gas safety	Battery Safety	
10.50 - 11.20	 <i>Coffee break</i>		
11.20 - 12.00			<i>Work-in-progress posters</i>  & Discussion 
13.00 - 14.30	 <i>Lunch</i>		
14.30 - 15.00	<i>Closing</i>		


PROGRAM




09.15 - 10.15	Registrations		
	AULA MAGNA		
10.15 - 10.35	Opening		
	AULA MAGNA		
10.35 - 11.20	Plenary Lecture Why Do Dust Explosions Happen? Paul Amyotte, Dalhousie University, Canada Chair: Almerinda Di Benedetto		
11.20 - 12.00	☕ Coffee Break		
	AULA MAGNA	ROOM A	ROOM B
12.00 - 13.00	Risk Management Chair: A. Krietsch	AI & databasing applied to explosions Chair: D. Russo	
12.00 - 12.20	The SAFEN ignition probability model for hydrogen I. Fossan, K. van Wingerden, Ø. Knudsen, J. Wiklund, A. Vagner Gaathaug, Norway	ML enhanced measurement of the electrostatic charge distribution of powder conveyed through a duct C. Wilms, W. Xu, G. Ozler, S. Jantac, S. Schmelter, H. Grosshans, Germany	
12.20 - 12.40	Ex-LOPA method for the assessment of explosion risks in hazardous areas R. Perbal, P. van Norden, J. van der Prijt, The Netherlands	Enhancing real-time metal dust concentration monitoring through a machine learning-based Kalman Filtering algorithm F. Zhao, W. Gao, H. Jiang, M. Bi, China	
12.40 - 13.00	Unravelling Explosion Risk Assessment: Insights from Driven Parameters and Case Studies F. De Rosa, G. Toraldo, P. Giacopinelli, A. Lebas, UK		
13.00 - 14.40	🍴 Lunch		







	AULA MAGNA	ROOM A	ROOM B
14.40 - 16.00	Battery Safety <i>Chair: G. Lecocq</i>	Flammability & inerting <i>Chair: C. Fouchier</i>	
14.40 - 15.00	Gas release from lithium-ion batteries and mitigation of potential consequences O. Willstrand, J. Hynnen, A. Karlsson, D. Brandell, Sweden	Fluid Motion and Heat Transfer in Autoignition Testing B. Davis, C. Fouchier J. Sheperd, USA	
15.00 - 15.20	Effects of Heating Rate on Thermal Runaway of LFP Lithium-ion Batteries: Vent Gas Quantification and Composition Analysis C.A. Almodovar, L.R. Boeck, C.R.L. Bauwens, USA	Small Scale Pool Fires: the Case of Toluene B. De Liso, G. Pio, E. Salzano, Italy	
15.20 - 15.40	Thermal Runaway of Lithium-Ion Batteries in Flameproof Enclosures: Effect of Internal Surface and Gas Mixture F.G.Daragan, S. Spörhase, A. Kianfar, B. Limbacher, A. Hahn, S. Essmann, Germany	ASTM E659 Standardized Test Analysis and Results for Synthetic Paraffinic Kerosene C. Fouchier, J. Shepherd, USA	
15.40 - 16.00	Explosivity of nanomaterials for lithium-ion battery electrodes S. Ubaldi, G. Binotto, A. Lecocq, G. Marlair, A. Aube, A. Bordes, P. Russo, Italy	Explosion properties of iron dust in pure oxygen at elevated pressure E. Leprette, C. Proust, V. Naudet, France	
16.00 - 16.30	 Coffee Break		



	AULA MAGNA	ROOM A	ROOM B
16.30 - 17.30	Ignition & Extinction <i>Chair: O. Willstrand</i>	Release & Dispersion <i>Chair: B. Li</i>	Explosion Modelling <i>Chair: H. Grosshans</i>
16.30 - 16.50	Investigation of the hot gas kernel expansion caused by a contact-break discharge during a hydrogen/air mixture ignition D. Bratek, C. Uber, N. Schüler, B. Barbu, R. Methling, D. Markus, S. Essmann, D. Uhrlandt, F. Berger, M. Hilbert, <i>Germany</i>	Experiments and Simulations of Hydrogen Dispersion in a 6-meter-long Channel M. Henriksen, H. Fossum, E. Åkervik, D. Bjerketvedt, <i>Norway</i>	Calibrated Tracer-LIF Spectra for Experimental Investigation of Ignition Processes J. Brunzendorf, V. Vasudevan, D. Markus, <i>Germany</i>
16.50 - 17.10	Assessing the Degree of Pyrophoricity for Gases M.H. Yang, K.Q. Cao, T.T. Nguyen, J.R. Chen, H.Y. Tsai, E.Y. Ngaib, <i>Taiwan</i>	Numerical modelling and validation for a methane leak from a buried pipeline S. Mohanty, S. Brennan, V. Molkov, <i>UK</i>	Systems Thinking for Explosion Safety Management J.A. Duenas Santana, E. Salzano, A. Di Benedetto, <i>Italy</i>
17.10 - 17.30	Reproduction of the pressure load due to the thermal runaway of an NMC cell in a flameproof enclosure by gas explosions S. Spörhase, I. Peschel, A. Kianfar, D. Markus, S. Essmann, <i>Germany</i>	Research on Jet Structure and the Virtual Nozzle Model for High-pressure Hydrogen Leakage from Rectangular Nozzles J. Shen, W. Gao, <i>China</i>	Some questions related to CFD modeling of pressurized tank burst in road tunnels G. Lecocq, L. Heudier, B. Truchot, A. Mos, C. Willmann, <i>France</i>
17.30 - 19.00	<i>Welcome reception</i>		
20.00 - 23.00	 <i>Meeting of the International Organizing Committee</i>		




09.00 - 09.45	AULA MAGNA		
	Plenary Lecture Safety of Batteries Wei Gao, Dalian University of Technology, <i>China</i> Chair: Paola Russo		
09.45 - 10.10	In memoriam of Professor Piotr Wolański - Warsaw University of Technology, <i>Poland</i>		
	AULA MAGNA	ROOM A	ROOM B
10.10 - 11.10	Flammability & Inerting Chair: E. Leprette	Hydrogen and gas safety Chair: D. Markus	Detonation & DDT Chair: L. Bauwens
10.10 - 10.30	Biomass minimum ignition temperature prediction through differential study of Thermogravimetric analysis R. Paredes, I. Amez, D. León, B. Castells, <i>Spain</i>	Quantitative risk assessment of aqueous formate for hydrogen storage: scale-up M. Calabrese, D. Russo, G. Capone, R. Andreozzi, R. Marotta, A. Di Benedetto, <i>Italy</i>	DDT in narrow channels for up to five step schemes L. Bauwens, J. Melguizo-Gavilanes, <i>The Netherlands</i>
10.30 - 10.50	Sustainable Alternatives to Reduce Emissions and Sound Pressure Level of Flash Powder D. León, I. Amez, R. Paredes, B. Castells, <i>Spain</i>	Hydrogen safety for systems at ambient and cryogenic temperature: a comparative study of hazards and consequence modelling D. Cirrone, D. Makarov, V. Molkov, <i>UK</i>	Dynamic response and non-shock initiation reaction of PBX-3 under ramp wave compression C. Tao, L. Tao, F. Hua, <i>China</i>
10.50 - 11.10	Investigation of the flash pyrolysis of biomass dusts: is there really a correlation between MIT, volatile point and LFL of the pyrolysis gases? M. Portarapillo, M. Pietraccini, R. Sanchirico, A. Di Benedetto, O. Dufaud, <i>Italy</i>	Explosion and Ignition behaviour of NH ₃ /H ₂ mixtures D. Gabel, D. Regler, U. Krause, <i>Germany</i>	Test set-up for reproducible shock wave generation M. Gerbeit, H. Seeber, D. Grasse, M. Donner, S. Grobert, D. Krentel, <i>Germany</i>
11.10 - 11.30	 Coffee break		





	AULA MAGNA	ROOM A	ROOM B
11.30 - 12.30	Explosion venting & mitigation <i>Chair: F. Paquet</i>	Dust & hybrid explosions <i>Chair: O. Dufaud</i>	
11.30 - 11.50	Explosion Suppression with Water Curtains Between Congested Regions D. Allason, D.M. Johnson, A. Pekalski, A. Dutertre, D. Mansfield, <i>UK</i>	Investigations on different distribution systems for dusts inside the 20L-sphere B. Janovsky, A. Pandal, M. Velasco Rodríguez, M. Schmidt, E. Danzi, O. Dufaud, S.H. Spitzer, <i>Germany</i>	
11.50 - 12.10	Vented ethanol-gasoline vapor explosions flame propagation in a channel with single and dual sparks C. Pan, X. Wang, T. Li, H. Fu, <i>China</i>	Polymer dust explosion part I: literature review and case studies L. Marmo, E. Danzi, A. Di Benedetto, M. Portarapillo, <i>Italy</i>	
12.10 - 12.30	Explosion venting in the energetic materials industry F. Paquet, M. Paquet, <i>Canada</i>	Metal Oxide Reducing Environment (MORE) Explosions: Initial Assessment A.J. Furlong, N.K. Bond, B.C. Strange, R.W. Hughes, M.J. Pegg, <i>Canada</i>	
13.00 - 14.30	 Lunch		
14.30 - 15.30	Hydrogen and gas safety <i>Chair: D. Gabel</i>	Flame Propagation <i>Chair: S. Dorofeev</i>	Dust & Explosion Mitigation <i>Chair:</i>
14.30 - 14.50	Influence of electrode distance on the ignition and combustion properties of ammonia/hydrogen/air mixtures J. Dymke, W. Liu, J. Höltkemeier Horstmann, D. Markus, S. Essmann, <i>Germany</i>	Linear contractions effect on the propagation of hydrogen and methane flames in large scale pipeline A. Auvray, J. Daubech, C. Proust, P. Montagne, <i>France</i>	Mitigation of confined gas explosions using ventilation grilles and access doors J. Daubech, E. Leprette, <i>France</i>
14.50 - 15.10	Study on hydrogen-ammonia explosion in a horizontal closed obstructed duct B. Liang, W. Gao, Y. Li, <i>China</i>	Hydrodynamic Coupling on Flame Acceleration in Methane-Hydrogen Fuel Blends K. Cheevers, H. Yang, S. Kia, C.R.L. Bauwens, M. Radulescu, <i>Canada</i>	A role of dust properties in turbulence generation by dust dispersion in the standard 1 m³ vessel W. Adamus, Z. Dyduch, <i>Poland</i>

	AULA MAGNA	ROOM A	ROOM B
15.10 - 15.30	Thermo-Mechanical Coupling Failure Analysis of Carbon Fiber Composite Layers in High-Pressure Hydrogen Storage Cylinders Under Fire Conditions <u>B. Li</u> , X. Wang, P. Liu, H. Yu, <i>China</i>	Stability of non-premixed methane flames: dependence on storage pressure and leak diameter <u>M. Kazemi</u> , S. Brennan, V. Molkov, <i>UK</i>	Experimental Determination of the Minimum Ignition Energy for Aerosols of Combustible Liquids <u>A. Toman</u> , W. Adamus, <i>Poland</i>
15.30 - 16.00	 Coffee break & Work in progress posters 		
16.00 - 17.00	Explosion Mitigation <i>Chair: T. Skjold</i>	Dust & hybrid explosions <i>Chair: A. Pekalski</i>	
16.00 - 16.20	Applicability of NFPA 68 for ESS Enclosures <u>S. Kraft</u> , A. Kapahi, <i>USA</i>	Undiscovering turbulence of dust particles in the Hartmann tube through the Image Subtraction Method <u>L. Marmo</u> , O. Dufaud, F. Franchini, E. Danzi, <i>Italy</i>	
16.20 - 16.40	Vented confined explosions of lean hydrogen/methane/air mixture E. Quartieri, E. De Leo, S. Minotti, S. Rossin, A. Postacchini, D. Becker, R. Bunse, <i>Italy</i>	Improving turbulence combustion modelling in FLACSDustEx <u>M. Ghaffari</u> , K. Van Wingerden, B.J. Arntzen, <i>Norway</i>	
16.40 - 17.00	Experimental investigation of the effect of dry water and solid chemical inhibitors on premixed hydrogen-air combustion <u>M. van Wingerden</u> , V. Kallestad Stople, E. Stankejevas, T. Skjold, <i>Norway</i>	Effect of Nickel and Silver Coating on Surface Functionalized Alumina Ceramic Foam as Explosion Suppressing Material <u>N.F. Hamzah</u> , <u>R. MdKasmani</u> , S. Chandren, <i>Malaysia</i>	
	AULA MAGNA		
17.00 - 18.00	Round Table Chaired by Industrial Explosion Young Researchers Committee		
19.30 - 23.30	 Beach party		

09.00 - 09.45	AULA MAGNA		
	Plenary Lecture Understanding the Limitations of Using K_{St} to Define the Reactivity of Large-Scale Dust Explosion Tests C. Regis Bauwens, FM Global, <i>USA</i> Chair: D. Markus		
	AULA MAGNA	ROOM A	ROOM B
09.50 - 11.10	Runaway Reactions Chair: G. Ciccarelli	Hydrogen and gas safety Chair: G. Lecocq	
09.50 - 10.10	Screening device for optimized safety characterization of catalytically driven multi-phase reactions M.A. Serrer, T. Christ, J. Schroeder, M. Goedde, R.J. Blanchard, <i>Germany</i>	Experimental Research Of A Tank For A Cryogenic Fluid With A Wall Rupture In A Fire Scenario R. Eberwein, A. Hajhariri, D. Camplese, G.E. Scarponi, V. Cozzani, F. Otremba, <i>Germany</i>	
10.10 - 10.30	Prediction of self-heating for direct reduced iron due to reoxidation C. Spijker, M. Hohenberger, R. Schanner, P. Glusnitz, <i>Austria</i>	Simulation of Joule-Thomson effect at PCV in a hydrogen refuelling station using dynamic mesh H. Ebne-Abbasi, D. Makarov, V. Molkov, <i>UK</i>	
10.30 - 10.50	Enhancing safety in the storage of hazardous molecules: the case of hydroxylamine G. Andriani, P. Mocellin, G. Pio, C. Vianello, E. Salzano, <i>Italy</i>	Large-Eddy Simulation of pressurized hydrogen releases: dispersion and fire stabilization mechanisms F. Garnier, T. Jaravel, Q. Douasbin, T. Poinso, <i>France</i>	
10.50 - 11.10	Investigation of an Organic Peroxide Explosion Incident Y.P. Huang, H.J. Chang, L.Y. Yeh, H.C. Peng, P.H. Huang, H.Y. Tsai, J.R. Chen, <i>Taiwan</i>	E Study the Impact of Spacer at Thermal Degradation Process of MLI-based Insulation in Fire Condition A. Hajhariri, R. Eberwein, L.P. Perrone, V. Cozzani, F. Otremba, H. Seidlitz, <i>Germany</i>	
11.10 - 11.50	 Coffee break & Work in progress posters 		






	AULA MAGNA	ROOM A	ROOM B
11.50 - 12.50	Detonation & DDT <i>Chair: R. Porowski</i>	Dust & hybrid explosions <i>Chair: M. Pegg</i>	Hydrogen and gas safety <i>Chair: R. Dobashi</i>
11.50 - 12.10	Detonation initiation by fast flame reflection from an obstacle M. Moran, <u>G. Ciccarelli</u> , <i>Canada</i>	Influence of explosion isolation systems on the reduced explosion pressure I. Garrido Ceca, <u>M. Puig Gamero</u> , <i>Spain</i>	Study of the behaviour of walls and doors of 20 ft ISO containers through real-scale explosion tests G. Lecocq, S. Amouzou, E. Leprette, B. Le Roux, S. Charrondière, L. Mathieu, <i>France</i>
12.10 - 12.30	Investigation of iso-propyl nitrate as a detonation improver <u>A.Mousse-Rayaleh</u> , M.Burnett, S. Abid, S. de Persis, A. Comandini, M. Wooldridge, N. Chaumeix, <i>France</i>	An Arrhenius reaction rate based burning model for simulation of dust explosions B.J. Arntzen, M. Lucas, M. Ghaffari, <i>Norway</i>	Visualization of Hydrogen Flames in the UV Region by ZnO-based Camera N. Sun, X. Han, J. Piao, C. Jiang, <u>S. Bi</u> , <i>China</i>
12.30 - 12.50	Investigation on analog system of detonation with two step chemical reaction model Y. Sun, <i>China</i>	Direct determination of turbulent burning velocity during aluminum flame propagation: comparison to the classical open-tube method C. Chanut, F. Saad Al Hadidi, F. Heymes, <u>E. Salzano</u> , <i>Italy</i>	The Effect of Fuel Concentration on Intrinsic Flame Instabilities and Flame Acceleration in Lean H ₂ -CO-Air Mixtures <u>K. Planötscher</u> , A. Jocher, <i>Germany</i>
13.00 - 14.30		 Lunch	
14.30 - 15.50	Dust & hybrid explosions <i>Chair: B. Arntzen</i>	Hydrogen and gas safety <i>Chair: S. Bi</i>	Explosion Prevention <i>Chair: S. Bernard</i>
14.30 - 14.50	Experimental Investigation of Direct Reduced Iron Dust Explosion Characteristics in the 20 L Sphere <u>A. Semenova</u> , T. Angerler, M. Hohenberger, H. Raupenstrauch, <i>Austria</i>	Review and evaluation of engineering models for simulating small hydrogen releases in large enclosures <u>A. Hildershavn</u> , T. Skjold, H. Hiskén, <i>Norway</i>	Assessment of Electrostatic Ignition Hazards during Water Spray Cleaning Processes above 50 MPa <u>F. Baumann</u> , M. Himstedt, D. Möckel, M. Beyer, <i>Germany</i>


	AULA MAGNA	ROOM A	ROOM B
14.50 - 15.10	Analysing the Impact of Solid Contaminants on Grease Viscosity and the theoretical Temperature Performance of Rolling Bearings <u>L. Siegle, A. Hilliger, S. Herbst, F. Engelmann, Germany</u>	Study on strength of plastic piping against detonation of hydrogen/oxygen mixture <u>J. Hosoi, T. Mogi, R. Dobashi, Japan</u>	Unmasking hidden ignition sources: A new approach to finding extreme charge peaks in powder processing <u>H. Grosshans, W. Xu, S. Jantac, G. Ozler, Germany</u>
15.10 - 15.30	Fire and Explosion risks of Maltodextrin <u>J. Snoeys, G. Van Laar, R. Dworschak, Belgium</u>	Provision for a safer performance of a standard tank-TPRD Systems in fire conditions <u>S. Kashkarov, D. Makarov, V. Molkov, UK</u>	Near-field overpressure and Impulse from small-scale BLEVE <u>E.M. Laamarti, A.M.Birk, F.Heymes, France</u>
15.30 - 15.50	Effects of particle size homogeneity on dust ignitability and explosibility <u>A. Tascón, B. Castells, L. Medic, F.J. Castillo-Ruiz, J. Arbizu-Milagro, Spain</u>	Hydrogen flammability and explosion concentration limits for a wide temperature range <u>V.P. Plaksin, I.A. Kirillov, Russia</u>	Large eddy simulations of flow electrification of liquid dielectrics <u>M. Calero, H. Grosshans, M.V. Papalexandris, Belgium</u>
15.50 - 16.20	 Coffee break & Work in progress posters 		
16.20 - 17.00	Free time		
17.00 - 18.30	 Guided tour to "Galleria Borbonica"		
19.00 - 21.00	 Pizza dinner		





	AULA MAGNA		
09.00 - 09.45	Plenary Lecture Advances in Hydrogen Safety Technologies Vladimir Molkov, Ulster University, Northern Ireland Chair: Ernesto Salzano		
	AULA MAGNA	ROOM A	ROOM B
09.50 - 11.10	Flammability, Inerting and Prevention Chair: C. Chanut	Dust & Hybrid Explosions Chair: H. Phylaktou	
09.50 - 10.10	Ignition sensitivity moderation of animal feed organic/mineral mixtures J. Serrano, F. Putier, L. Perrin, O. Dufaud, France	The lower explosion limit of a hybrid dust gas mixture of hydrogen and activated carbon D. Arulappan, F. Norman, V. Jankuj, S.H. Spitzer,UK	
10.10 - 10.30	Passive Ventilation of a Volatile Liquid Spill in an Enclosure S. Raghuram, V. Raghavan, A.S. Rangwala, USA	Effect of pipe diameter and volume ratio on dust explosion in interconnected vessels Z. Zhang, H. Jiang, W. Gao, China	
10.30 - 10.50	Ignition tests in explosive atmospheres using absorption of High Frequency Electromagnetic radiation based on tests of small hot components C. Schierding, F. Gellersen, M. Hau, K. Kuhlmann, M. Thedens, M. Beyer, Germany	Reactivity and Dynamics of Hybrid-Mixture Explosions at Large Scales L.R. Boeck, C.R.L. Bauwens, S.B. Dorofeev, USA	
10.50 - 11.10	The effect of water on the explosion characteristics of pure and diluted light alcohols R. Porowski, B. De Liso, G. Pio, T. Gorzelnik, E. Salzano, Italy	Experimental investigation of hybrid alumin, Franceium dust-methane-air mixture C. El Gadha, S. Bernard, M. Williams-Louis, France	
11.10 - 11.50	☕ Coffee break & Work in progress posters📄		

	AULA MAGNA	ROOM A	ROOM B
11.50 - 12.50	Dust & Hybrid Explosions <i>Chair: L. Boeck</i>	Hydrogen and battery safety <i>Chair: D. Allason</i>	Case histories <i>Chair: E. Acha</i>
11.50 - 12.10	Validation of a new standard for safety characteristics of hybrid mixtures: HYBRID II S.H. Spitzer, W. Adamus, E. Askar, A. Benke, S. D'Hyon, Z. Dyduch, O. Dufaud, F. Flemming, N. Gehle, M. Hohenberger, V. Jankuj, W. Jian, A. Krietsch, M. Mynarz, F. Norman, D. Osborne, M. Prodan, N. Sandsta, A. Toman, T. Skjold, J. Skrinsky, A. Vignes, M. van Wingerden, S. Zhong, <i>Germany</i>	Modelling the Influence of Location and Orientation of Low-Pressure Hydrogen Releases in a Room; Implications for Explosion Safety in Homes E. Tosolini, <u>H. Phylaktou</u> , <i>UK</i>	Case studies of reduced distances in chemical industry as a result of the implementation of safeguards A. Moreno, A. Lopez- Urionabarrenechea, E. Acha, <i>Spain</i>
12.10 - 12.30	Ignition of hybrid mixtures by brush discharges <u>S. Zakel</u> , M. Beyer, N. Tanwar, C. Schierding, <i>Germany</i>	Research on Fire Test of Liquid Hydrogen Dewar Storage Tank <u>Y. Sun</u> , W. Gao, <i>China</i>	Polymer dust explosion part II: Experimental tests <u>E. Danzi</u> , M. Portarapillo, L. Marmo, A. Di Benedetto, <i>Italy</i>
12.30 - 12.50	Pre-normative study for the limiting oxygen concentration of hybrid dust-gas-mixtures <u>A. Krietsch</u> , M. Schmidt, E. Salzano, U. Krause, S.H. Spitzer, <i>Germany</i>	Experimental Investigation of Dust Explosion Risks in Black Mass from Lithium-Ion Battery (LIB) Recycling Plants C. Huang, A. Lipatnikov, C. Löfström, <i>Sweden</i>	
13.00 - 14.30	 Lunch		

	AULA MAGNA	ROOM A	ROOM B
14.30 - 15.30	Explosion Modelling <i>Chair: C. Spijker</i>	Hydrogen and gas safety <i>Chair: F. Norman</i>	Dust, hybrid and spray explosions <i>Chair: S. Spitzer</i>
14.30 - 14.50	Towards the LES of large-scale explosions: study of a larger-than-laboratory-scale H₂/air vented explosion <u>F.A. Meziat Ramirez</u> , O. Dounia, T. Jaravel, Q. Douasbin, O. Vermorel, <i>France</i>	Full and Laboratory Scale Tests for the Assessment of Transient Thermal Effects from ignited Natural Gas Pipeline Ruptures <u>N. Cowling</u> , H. Phylaktou, D. Allason, G.E. Andrews, <i>UK</i>	Safety characteristics of hybrid mixtures: Applications related to the replacement of coal by hydrogen as reducing agent in the processing of metal ore <u>N. Sandstå</u> , M. van Wingerden, T. Skjold, <i>Norway</i>
14.50 - 15.10	CFD modelling of premixed flame propagation of cornstarch dust in the 20 L sphere A. Islas, A. Pandal, M. Portarapillo, R. Sanchirico, A. Di Benedetto, <i>Italy</i>	Reproduction of the pressure load due to the thermal runaway of an NMC cell in a flameproof enclosure by gas explosions <u>S. Spörhase</u> , I. Peschel, A. Kianfar, D. Markus, S. Essmann, <i>Germany</i>	Hybrid Mixture Explosions in an Industrial Polymer Production Process <u>A. Schrader</u> , K. Axani, M. Alauddin, A. Scott, C. Cloney, P. Amyotte, <i>Canada</i>
15.10 - 15.30		Incident Investigation of Hydrogen Explosion and Fire in a Residue Desulfurization Process T.C. Kao, Y.C. Lin, <u>H.N. Yang</u> , H.Y. Tsai, J.R. Chen, <i>Taiwan</i>	
15.30 - 16.20	 <i>Coffee break & Work in progress posters</i> 		

	AULA MAGNA	ROOM A	ROOM B
16.20 - 17.20	Dust & Hybrid Explosions <i>Chair:</i> S. Zakel	Hydrogen gas safety <i>Chair:</i> J.R. Chen	Detonation & DDT <i>Chair:</i> M. Radulescu
16.20 - 16.40	Simplifying standards, opening restrictions Part I: The influence of the test vessel volume on the maximum explosion pressure of dusts V. Jankuj, J. Sktrinky, A. Krietsch, M. Schmidt, U. Krause, R. Kuracina, Z. Szabová, S.H. Spitzer, <i>Germany</i>	Effect of initial pressure, temperature, and water vapor concentration on ignitability of hydrogen oxygen mixture S. Tokumitsu, T. Mogi, R. Dobashi, <i>Japan</i>	Pressure Dynamics from Head-on Reflections of High-Speed Combustion Waves: from Fast Flames to Detonations H. Yang, W. Rakotoarison, M. Radulescu, <i>Canada</i>
16.40 - 17.00	Preconditioning of the dust and the fluid in the 20 L chamber during ignition by chemical ignitor R. Friedrichova, J. Karl, B. Janovsky, <i>Czech Republic</i>	Study of the Suppression Mechanisms of Heptafluoropropane and Carbon Dioxide Mixtures on Hydrogen air Explosions B. Nie, M. Zhang, L. Chang, <i>China</i>	Pressure dynamics resulting from head-on reflection of detonation F. Zangene, H. Yang, M. Radulescu, <i>Canada</i>
17.00 - 17.20	Flame propagation of aluminum dust clouds under microgravity conditions W. Kim, R. Saeki, R. Dobashi, T. Endo, K. Kuwana, T. Mogi, M. Lee, S. Yazaki, M. Mikami, Y. Nakamura, T. Ishikawa, <i>Japan</i>		
19.00 - 23.00	 Social Dinner		

09.00 - 09.45	AULA MAGNA		
	Plenary Lecture Teaching process safety in the twenty-first century Trygve Skjold, University of Bergen, Norway Chair: Luca Marmo		
	AULA MAGNA	ROOM A	ROOM A1
09.50 - 10.50	Hydrogen and gas safety Chair: V. Molkov	Battery Safety Chair: A.W. Lach	
09.50 - 10.10	Requirements for Passive Fire Protection concerning blast resistance K. Nagendra, N. Wickham, R. Wade, UK	Laminar burning velocity of Lithium-ion battery vent gas during thermal runaway S. Ubaldi, P. Russo, Italy	
10.10 - 10.30	Delayed ignition of high-pressure hydrogen releases – experiments and engineering models V. Blanchetière, A. Armstrong, Y. Wang, R. Jambut, B. Wilkins, N. Salaün, France	Critical Peclet numbers for the onset of the intrinsic instabilities of Lithium-ion battery thermal runaway vent gas in air A. Ueda, T. Johzaki, T. Endo, Y. Kim, W. Kim, Korea	
10.30 - 10.50	Investigation of the thermal radiation from hydrogen jet flames C. Bernardy, A. Karim Habib, M. Kluge, B. Schalaus, H. Kant, M. Schulze, A. Orchini, Germany		
11.50 - 11.20	☕ Coffee break		
11.20 - 12.00			Work in progress posters & discussion  

	WORK-IN-PROGRESS POSTERS
P1	A model worth its salt for organic/mineral mixtures explosion? J. Serrano, F. Putier, O. Dufaud, <i>France</i>
P2	Significance of the chemical ignitors' explosion pressure on Pm and Pressure Ratio in the 20 L chamber B. Janovsky, J. Karl , P. Janovsky, <i>Czech Republic</i>
P3	Under-expanded hydrogen jets: Exploring shock patterns and flame propagation from delay ignition in obstacle - rich environment A.W. Lach, K. Vågsæther, <i>Norway</i>
13.00 - 14.30	 Lunch
14.30 - 15.00	Closing





GENERAL INFORMATION

SYMPOSIUM VENUE

Congress Centre, University of Naples Federico II
Address: Via Partenope, 36, 80121 Napoli

REGISTRATION/ INFORMATION DESK AND SYMPOSIUM SECRETARIAT

Location: Congress Centre, ground floor

Opening time:

June 10 th, 2024: from h. 09.00 to 18.00

June 11 th, 2024: from h. 08.30 to 18.00

June 12 th, 2024: from h. 08.30 to 17.00

June 13 th, 2024: from h. 08.30 to 18.00

June 14 th, 2024: from h. 08.30 to 15.00

Onsite Registration

Regular

 **1050,00€** vat 22% included

Student*

 **850,00€** vat 22% included

***Student Registration Fees:** undergraduate, postgraduate, PhD.

The registration fee includes:

- Admission to the technical sessions
- Name badge
- Certificate of attendance
- Coffee breaks and lunches according to the technical program
- Welcome cocktail on June 10
- Beach party on June 11
- Guided Tour & Pizza on June 12
- Social dinner on June 13

Name Badge

For identification purpose and admission to the Symposium venue and to social events, badges are expected to be worn at all times during the conference.

Internet Wireless

Connection is available at the Symposium venue and the account for login will be provided during the conference.

Internet Wireless

Coffee breaks and lunches will be served according to the program schedule at the Congress Centre, First Floor.



Dress Code

Smart casual is suggested for academic sessions.

Casual and light wear, hat and comfortable shoes are appropriate for excursion.

T-shirt, short pants, sandals are inappropriate for Welcome Cocktail and Social Dinner.

Electricity

The voltage is 220V in Italy.

Tips and Tax

Tipping is welcome but not mandatory for taxi and restaurants.

Airport and Flight

It is advised that you leave the hotel or the Symposium venue 3 hours in advance for international flights, and 2 hours and a half in advance for domestic flights.

PRESENTER INSTRUCTIONS

Oral Presentation

Presentations should last no longer than 15 minutes to allow 5 minutes for questions and changeover to the next speaker. All screens are in widescreen (16:9) format. Each presenter is strongly encouraged to arrive at the assigned presentation room a minimum of 10 minutes before the commencement of the session to meet with the session chair.

Each speaker is requested to bring along with them the presentation on a USB pen and to upload the presentation in the room which is assigned to his/her presentation at least 1 hour before the session starts.

Audio-Visual Equipment

Presentation rooms are equipped with projectors for computerbased presentations. Presentations should be prepared in PowerPoint or PDF. Presenters will be provided with a remote controller, with integrated laser pointer that can be used to advance slides in PowerPoint. Slides with movies (format .MOV or MP4) must be checked for playback on the laptop.

For Mac users: Power Point slides are normally compatible. If you use “Keynote” please take care that the file is converted in PDF.

The use of one's personal Laptop is strongly discouraged.

Poster Presentation

Posters are to be printed at the cost of the author(s) and to be brought already printed (Format A0). Each participant for poster presentation will be provided with pins or self-adhesive tape. Posters can be displayed all day starting from Monday June 10 from h. 12.00. The poster session will take place on June 14 from h. 11.20 to 12.00. At least one author should be available to present the poster during the session slot.

SOCIAL PROGRAM INFORMATION



Welcome Cocktail June 10th

Time: 17.30-19.00

Venue: Catering Area | Congress Centre University Federico II
(Symposium venue)

Address: Via Partenope, 36



Beach Party June 11th

Time: 19.30-23.00

Venue: **Terrazza Flegrea**

Address: Via Coroglio, 20 Napoli

Transportation: Buses will leave from the **Congress Centre Federico II** at h. 19.30 and will return to the same meeting point at the end of the Party.

We kindly suggest to take advantage of the transportation arranged by the Symposium organization as public transportation is not comfortable.



Guided Tour and Pizza dinner June 12th

-Guided Tour

Time: 17.00-18.30

Venue: **Galleria Borbonica**

Meeting point: Entrance of Galleria Borbonica h. 17.00 (**please be on time**)

Address: Via D. Morelli, 61

After some free time, all participants are invited to join the nice guided tour at the **Galleria Borbonica**. The site is located at walking distance from the Symposium Venue

Info: The tour is an historical and emotional journey through the Underground of Naples. Our guides will take you on a fascinating experience bringing the space to life with the story of The Bourbon Tunnel, a small masterpiece of civil engineering designed by architect Errico Alvino in 1853. Surrounded by the aqueduct of the Renaissance, the Tunnel was built for Ferdinand II of Bourbon to provide him a safe route in case of riots. It was used then by the citizens as a bomb shelter during the second world war, and later became an impound lot for cars and motorcycles until 1970. In addition, you will see pieces of sculptures and vintage artifacts.

-Pizza dinner

Time: 19.00-21.00

Venue: Pizzeria Antonio & Antonio

Address: Via Partenope, 26, Napoli

After the Guided tour all participants will be accompanied to the Pizzeria which is located, anyway, just close to the Congress centre on the seafront.



Social Dinner June 13th

Time: 19.00-23.00

Venue: **Cenacolo Belvedere Carafa**

Address: Via Aniello Falcone 122, Napoli

Meeting point: Buses will depart from the **Congress Centre Federico II** at 19.00 and will come back at the same meeting point at about h. 23.00.

The Venue

The Villa Carafa of Belvedere, formerly known as Palazzo Vandeneynden, and also known as Villa Belvedere, is a monumental villa in Naples, located in the hilly Vomero district. Villa Belvedere represents a unique example of the oldest history of its neighborhood, Vomero. It is around this structure, in fact, that the ancient Villaggio del Vomero developed. Over the centuries, there were numerous travellers who became fascinated with it, to the point of immortalizing it in painting, drawings and sketches. The Villa faces the wonderful Gulf of Naples.



Excursions (with tickets only)

Discover Pompeii ruins and the Sanctuary June 11th

Time: 09.00-16.30

Departure by bus from Congress Centre Federico II, Via Partenope, 36

Meeting Point: **Symposium Secretariat desk, ground floor**

Price: euro **150,00 per person** lunch included



Napoli Historical Centre June 13th

Time: h. 09.00-13.00

Departure by bus from Congress Centre Federico II, Via Partenope, 36

Meeting Point: **Symposium Secretariat desk, ground floor**

Price: euro **65,00 per person**

Tickets can be purchased till availability of seats at the Symposium Secretariat Desk no later than June 10 at h. 12.00

MAPS FOR REFERENCE



SCAN THE CODE

Map &
sites of interest

SPONSORS

The organizers wish to thank the following Institutions and Companies for their support to the organization of the Symposium

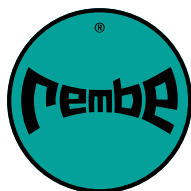


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Notes

This image shows a full page of white paper with horizontal dashed lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

Organizing Secretariat



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