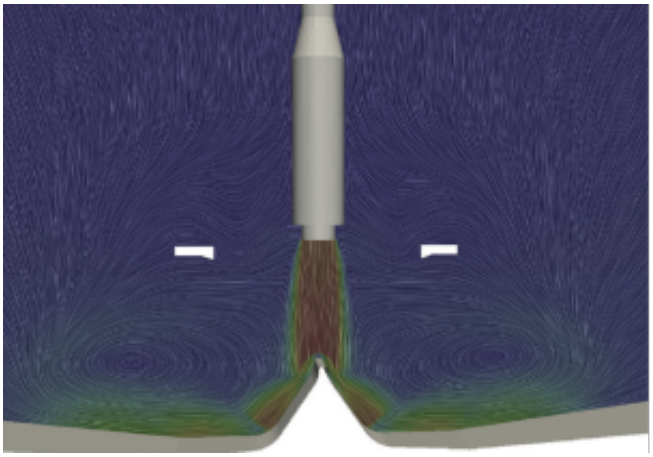

ETC18

18th European Turbulence Conference
4-8 September 2023, Valencia, Spain

Program

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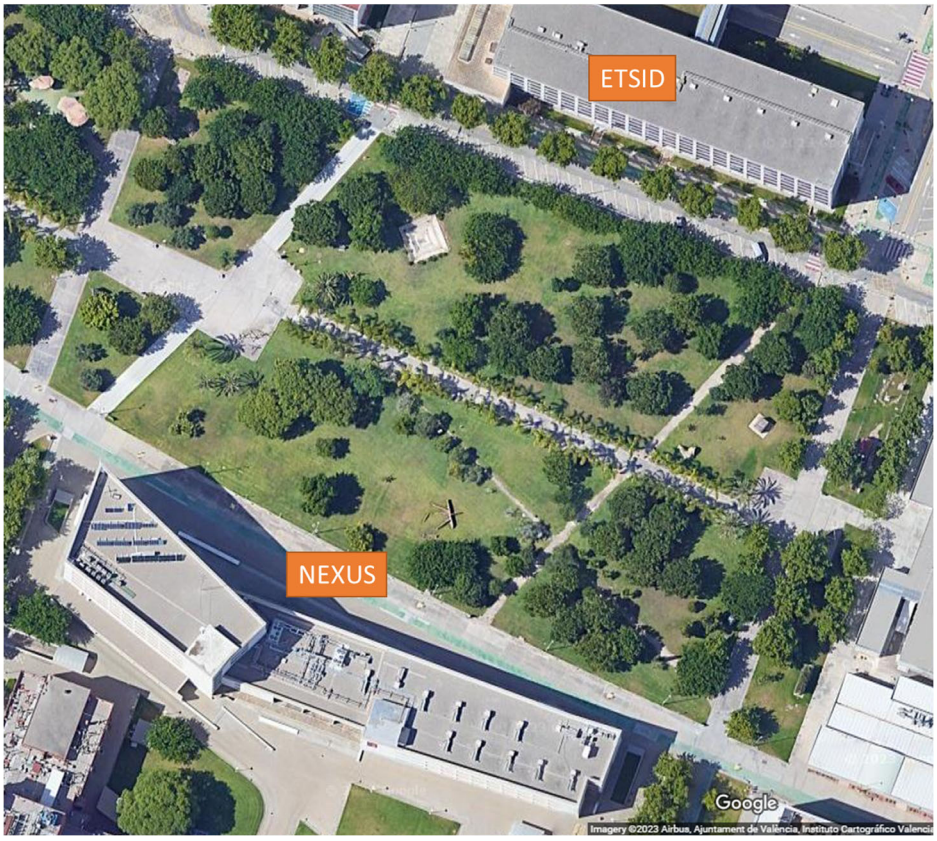
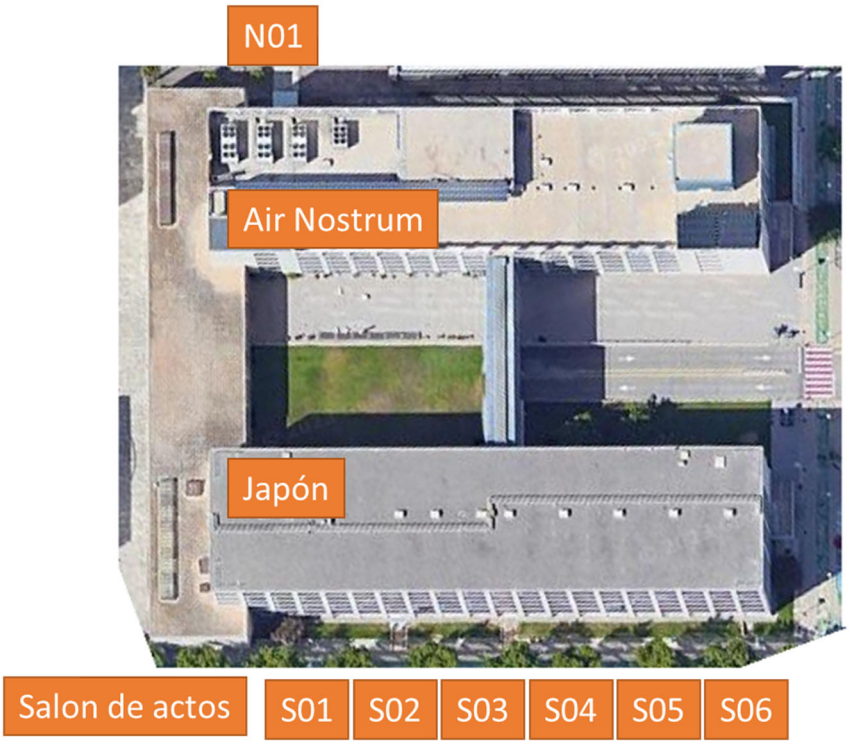
Location on Campus



ROOMS



Monday, 4th 2023.		
Time	Location	Activity
09:15-09:30	NEXUS	**Inauguration** Prof. Dr. Dolores Salvador, Deputy Chancellor for Employment and Lifelong Learning
09:30-10:15	NEXUS	**Keynote Speaker 1** *Soledad Le Clainche, Universidad Politécnica de Madrid* Modal decompositions and other machine learning tools in fluid dynamics
10:15-11:00	NEXUS	**Keynote Speaker 2** *Shervin Bagheri, Royal Institute of Technology (KTH)* Functionality and stability of liquid-infused surfaces in shear flows
11:00-11:30	ETSID	Coffee-Break
11:30-13:30	ETSID	**Parallel Session 1** • Boundary Layers I, Salón de actos. • Atmospheric flows I. Room S01. • Geophysical flows I. Room S02. • Multiphase and Non-Newtonian I, Room S03. • Control of Turbulent flows I. Room S04. • Vortex Dynamics I. Room S05. • Geophysical Flows II. Room S06. • Transport and Mixing I. Room N01. • Instability and Transition I. Room AirNostrum.
13:30-15:00	UPV	Giant Paella, see map
15:00-15:45	NEXUS	**Keynote Speaker 3** *María Vittoria Salvetti, University of Pisa* Dynamics of separating and reattaching flows
15:45-16:30	NEXUS	**Keynote Speaker 4** *Ricardo Vinuesa, Royal Institute of Technology (KTH)* Modeling and controlling turbulent flows through deep learning
16:30-17:00	ETSID	Coffee-Break
17:00-19:00	ETSID	**Parallel Session 2** • Wall-Bounded Flows - Theory I. Room Salon de actos. • Boundary Layers II. Room S01. • Geophysical Flows III. Room S02. • Multiphase and Non-Newtonian II. Room S03. • Control of Turbulent flows II. Room S04. • Vortex Dynamics II. Room S05. • Acoustic. Room S06. • Transport and Mixing II. Room N01. • Instability and Transition II. Room AirNostrum.
End of Day 1		

Tuesday, 5th 2023.		
Time	Location	Activity
09:30-10:15	NEXUS	**Keynote Speaker 5** *Leonie Canet, University Grenoble Alpes.* Functional renormalisation group approach to turbulence.
10:15-11:00	NEXUS	**Keynote Speaker 6** *Paul Williams, University of Reading.* Forecasting atmospheric turbulence from hours to decades ahead.
11:00-11:30	ETSID	Coffee-Break
11:30-13:30	ETSID	**Parallel Session 3** • Boundary Layers III. Salón de actos. • Vortex Dynamics III. Room S01. • Geophysical Flows IV. Room S02. • Multiphase and Non-Newtonian III. Room S03. • Control of Turbulent flows III. Room S04. • Lagrangian turbulence I. Room S05. • Magneto Hydrodynamics I. Room S06. • Transport and Mixing III. Room N01. • Instability and Transition III. Room AirNostrum.
13:30-15:00	ETSID	LUNCH
15:00-17:00	NEXUS	**Parallel Session 4** • Intermittency and scaling I - Salón de actos. • Vortex Dynamics IV. Room S01. • Geophysical Flows V. Room S02. • Multiphase and Non-Newtonian IV. Room S03. • Control of Turbulent flows IV. Room S04. • Lagrangian turbulence II. Room S05. • Magneto Hydrodynamics II. Room S06. • Transport and Mixing IV. Room N01. • Instability and Transition IV. Room AirNostrum. • Wall Bounded Flows - Simulation. Room Aula Japón.
17:00-17:30	ETSID	Coffee-Break
17:00-19:10	ETSID	**Parallel Session V** • Intermittency and scaling II. Room Salón de actos. • Vortex Dynamics V. Room S01. • Wall-Bounded Flows - Theory II. Room S02. • Multiphase and Non-Newtonian V. Room S03. • Control of Turbulent flows V. Room S04. • Artificial Intelligence I. Room S05. • LES I. Room S06. • Multiphase and Non-Newtonian VI. Room N01. • Instability and Transition V. Room AirNostrum.
GALA DINNER Hotel Las Arenas 20-30-11:00		

Wednesday, 6th 2023.		
Time	Location	Activity
09:30-10:15	NEXUS	**Keynote Speaker 7** *Marc Ávila, University of Bremen* Drop breakup in turbulent flows
10:15-11:00	NEXUS	**Keynote Speaker 8** *Massimo Cencini, Italian National Research Council* Microorganisms swimming in turbulence
11:00-11:30	ETSID	Coffee-Break
11:30-13:30	ETSID	**Parallel Session 6** • Wall-Bounded turbulence III. Room Salón de actos. • Turbulence in Superfluids. Room S01. • Geophysical Flows VI. Room S02. • Multiphase and Non-Newtonian VII. Room S03 • Artificial Intelligence II. Room S04. • Lagrangian turbulence III. Room S05. • LES II. Room S06 • Reacting Turbulent Flows. Room N01. • Instability and Transition VI. Room AirNostrum.
13:30-15:00	ETSID	LUNCH
15:00-17:00	ETSID	**Parallel Session 7** • Intermittency and scaling III. Room Salón de actos. • Vortex Dynamics VI. Room S01. • Geophysical Flows VII. Room S02. • Wall-Bounded turbulence IV. Room S03. • Wall-Bounded turbulence V. Room S04. • Lagrangian turbulence IV. Room S05. • Atmospheric Flows II. Room S06. • Reacting Turbulent Flows II. Room N01. • Instability and Transition VII. Room AirNostrum.
End of meeting		

Parallel Sessions

Monday Morning, ETSID, 11:30-13:30								
Session	**11:30:00**	**11:45:00**	**12:00:00**	**12:15:00**	**12:30:00**	**12:45:00**	**13:00:00**	**13:15:00**
Boundary Layers I Room Salón de actos Chair: Hassan Nagib, IIT	**Id12** Streamwise evolution of the interface between freestream turbulence and a turbulent boundary layer. *Masoud Asadi, Pim Bullee and R. Jason Hearst*	**Id24** Importance of Achieving Convergence for Computation of Turbulence Through Pipes and Other Ducts. *Marcus Piedrabuena, Segio Hoyas, Ricardo Vinuesa and Hassan Nagib*	**Id33** Reynolds-number effects on the outer region of adverse-pressure-gradient turbulent boundary layers. *Aron van den Bogaard, Ricardo Vinuesa, Ivan Marusic and Rahul Deshpande*	**Id38** Non-monotonic heat flux in mixed vertical convection. *Christopher Howland, Roberto Verzicco and Detlef Lohse*	**Id100** High-accuracy turbulence statistics from particle images using a deep optical flow neural network. *Esther Mäteling, Wolfgang Schröder and Christian Lagemann*	**Id130** Characteristics of Turbulent Boundary Layers Over Heterogeneous Roughness. *Vidya Vishwanathan, Ioannis Kaminaris, Ralph Volino, Elias Balaras and Michael Schultz*	**Id145** Turbulent ship air-wake with ship motion. *Ke Zheng, Heri Setiawan, Kevin Kevin, Junghoon Lee and Jason Monty*	**Id173** Self-similar energy-containing eddies in a turbulent natural convection boundary layer immersed in a stably stratified medium. *Krishna Reddy Maryada, Steve Armfield, Priyanka Dhopade and Stuart Norris*
Atmospheric Flows I Room S01 Chair:	**Id34** Reservoir computing of a three-dimensional turbulent atmospheric boundary layer. *Florian Heyder, Juan Pedro Mellado and Jörg Schumacher*	**Id59** Turbulent mixing in the bulk of a cumulus cloud. *Vladyslav Pushenko and Jörg Schumacher*	**Id107** Impact of freestream turbulence on the recirculation region downstream of a backward-facing step. *Srikar V. Yadala, Girish K. Jankee, Leon Li, Nicholas A. Worth and R. Jason Hearst*	**Id131** The influence of spanwise heterogeneous surfaces on forced, mixed and natural convection. *Kay Schäfer, Juan Pedro Mellado and Bettina Frohnapfel*	**Id180** An experimental study on the influence of gusts and suspended particles on the wake flow characteristics of wind turbines. *Babak Ranjbaran, Yuri Kanash, Raúl Bayoán Cal and Ármann Gylfason*	**Id185** Turbulent Scalar Dispersion in the wake of an Individual Tall Building. *Tomos Rich and Christina Vanderwel*	**Id254** Large eddy simulations of forced plumes subjected to volumetric heating. *Vamsi Krishna Chalamalla, Nitin Kumar and Anupam Dewan*	
Geophysical Flows I Room S02 Chair: Jim Thomas, Tata Institute	**Id6** Upscale transfer of waves in one dimensional rotating shallow water. *Jim Thomas*	**Id11** Geophysical turbulent characteristics of the remotely-sensed submesoscale surface currents and chlorophyll concentrations. *Sung Yong Kim*	**Id18** Relation among zonal flow, Rossby radius, and triple cascade in two-dimensional equivalent barotropic vorticity turbulence. *Masanori Takaoka, Naoto Yokoyama and Eiichi Sasaki*	**Id19** Numerical investigation of rotating cylindrical annulus with bi-directional temperature gradients. *Shivam Swarnakar, Amitabh Bhattacharya and Sridhar Balasubramanian*	**Id43** Energy Spectra and Cascades in the Global Ocean: Planetary Scales to Mesoscales, Surface to the Abyssal Ocean. *Michele Buzzicotti, Benjamin Storer, Hemant Khatri, Stephen Griffies and Hussein Aluie*	**Id63** On the diffusion-free regime in turbulent rapidly rotating convection and magnetoconvection. *Xiaojue Zhu, Olga Shishkina, Jiaxing Song and Shujaut Bader*	**Id82** The transition from wall modes to quasi-geostrophic rapidly rotating Rayleigh-Benard convection. *Robert E. Ecke, Xuan Zhang and Olga Shishkina*	**Id96** Phenomenon of Ekman pumping in rotating Rayleigh-Be´nard convection with boundary roughness. *Vinay Tripathi and Pranav Joshi*
Multiphase and Non-Newtonian I Room S03 Chair: Christian Marchioli. U. Udine	**Id28** Numerical study of natural convection of an air-water system with evaporation across the free surface. *Julien Carlier and Miltiadis Papalexandris*	**Id36** Numerical study on a turbulent bubbly pipe flow. *Ingu Lee, Jaehee Chang and Haecheon Choi*	**Id50** Flexible fibers in turbulent channel flow. *Cristian Marchioli and Davide Di Giusto*	**Id64** Flocking turbulence of microswimmers in confined domains. *Leonardo Puggioni, Guido Boffetta and Stefano Musacchio*	**Id66** Giant vortex dynamics in confined bacterial turbulence. *Stefano Musacchio, Leonardo Puggioni and Guido Boffetta*	**Id69** Polymer-induced turbulence in 2D micro-serpentine channel. *Himani Garg, Christer Fureby and Lei Wang*	**Id83** Effect of fluid-inertial torque on the orientation of tiny spheroidal particles in turbulent channel flow. *Zhiwen Cui, Jingran Qiu, Xinyu Jiang and Lihao Zhao*	**Id85** Sea Water Freezing Modes in a Natural Convection System. *Chao Sun, Yihong Du, Ziqi Wang, Linfeng Jiang and Enrico Calzavarini*
Control of Turbulent flows I Room S04 Chair: Maurizio Quadrio. P. Milano	**Id25** Turbulent channel flow under large amplitude streamwise travelling waves. *Mohammad Umair and Sedat Tardu*	**Id67** Full trajectory optimizing operator inference for reduced-order modeling using differentiable programming. *Arvind Mohan, Surya Chakrabarti, Datta Gaitonde and Daniel Livescu*	**Id106** Direct Numerical Simulation of Microramp Vortex Generators for Shock Wave/Boundary Layer Interaction Control. *Giacomo Della Posta, Emanuele Martelli, Francesco Salvadore and Matteo Bernardini*	**Id125** Effect of control discretization on streamwise traveling waves of spanwise wall velocity. *Emanuele Gallorini and Maurizio Quadrio*	**Id126** Influence of Machine Learning-based active flow control on the turbulent statistics of the flow over a circular cylinder. *Alessandro Scala, Carlo Salvatore Greco, Gerardo Paolillo, Tommaso Astarita and Gennaro Cardone*	**Id132** Large-eddy simulations of turbulent drag reduction by spanwise wall forcing up to Re_tau = 4000. *Amirreza Rouhi, Matt Fu, Dileep Chandran, Andrea Zampiron, Alexander Smits and Ivan Marusic*	**Id137** A comparative study of artificial and natural streamwise vortices in the near-wall region of turbulent boundary layers. *Weiqi Sun, Jimmy Philip, Wolfgang Schroeder and Joseph Klewicki*	**Id169** Pressure drag reduction via imposition of spanwise wall oscillations on a rod-roughened wall. *Rahul Deshpande, Aman G. Kidanemariam and Ivan Marusic*

Monday Morning, ETSID, 11:30-13:30								
Sesion	**11:30:00**	**11:45:00**	**12:00:00**	**12:15:00**	**12:30:00**	**12:45:00**	**13:00:00**	**13:15:00**
Vortex Dynamics I Room S05 Chair: Gerrit Elsinga. TU Delft	**Id1** Flow Structure Dynamics in Arrays of Undulated Cylinders. *Ondrej Fercak, Zein Sadek, Trevor Dunt, Christin Murphy, Jennifer Franck and Raúl Bayoán Cal*	**Id7** Generalized Betchov relations for vector fields and their applications in turbulent flows. *Ping-Fan Yang, Zhideng Zhou, Jian Fang, Le Fang, Haitao Xu, Guowei He and Alain Pumir*	**Id8** Emergence of Order in 2D Euler Turbulence, an Isolated System. *Mahendra Verma and Soumyadeep Chatterjee*	**Id42** Flow instability under an elongated plate above the ground. *Masahiro Suzuki and Nobuyuki Okura*	**Id46** Two-dimensional turbulence with local interactions: statistics of the condensate. *Anton Svirsky, Corentin Herbert and Anna Frishman*	**Id60** Turbulent Rapidly Rotating Rayleigh-Benard Convection: Cyclones Vs Anti-Cyclones. *Veeraraghavan Kannan and Xiaojue Zhu*	**Id72** Nusselt-Rossby scaling in high-frequency harmonic modulation of rotating Rayleigh-Benard convection. *Bernard Geurts, Liesbeth Klein Kranenbarg, Stijn Peereboom and Rudie Kunnen*	**Id75** Point-vortex statistical mechanics applied to turbulence without vortex stretching. *Tong Wu and Wouter Bos*
Geophysical Flows II Room S06 Chair: Louis Couston. ENS Lyon	**Id428** Experiment on turbulence developing under surface waves. *Olav Rømcke, Benjamin K. Smeltzer, Inger Skundberg Løvvig, Johannes Djupesland, R. Jason Hearst and Simen Å. Ellingsen*	**Id434** The probability density behind thermal stratifications sustained by uncertain and heterogeneous forcing. *Paul Mannix, David Ham and John Craske*	**Id448** The effects of ocean turbulence and double-diffusive layering on the melting of ice shelves. *Catherine Vreugdenhil, Nicholas Wilson, Bishakhdatta Gayen and Eric Hester*	**Id465** Kinetic Helicity in the Turbulent Stratified Flows. *Victor Avsarkisov, Niklas Dusch, Michael Gerding, Jens Söder and Claudia Stolle*	**Id482** Numerical modeling of air flows in an underground cavity connected to the surface by a shaft. *Georges Edde, Georges Sadaka, Raphaël Antoine and Ionut Danaila*	**Id429** Study of atmospheric turbulence characteristics in Northwest Bohemia. *Petr Michalek, Stanislav Pospisil and Pavel Sedlak*	**Id489** Turbulence in particle-laden gravity currents trough iLES. *Sara Mata, Bruno Scapin and Jorge Silvestrini*	
Transport and Mixing I Room N01. Chair: Geert Brethouwer. KTH	**Id21** On the Effect of Centrifugal Force in Turbulent Thermal Convection. *Ke-Qing Xia, Yun-Bing Hu and Lin Sun*	**Id35** Numerical study of H2-air turbulent mixing processes using a selective permeable injection technique. *David Rodríguez-Gutiérrez, Andrea Gruber, Raquel Gómez-Miguel, Mario Sánchez-Sanz and Eduardo Fernández-Tarrazo*	**Id51** Effect of background turbulence on the scalar entrainment into a jet: width of the scalar interface and evidence of detrainment. *Khashayar Feizbakhshian Kohan and Susan Gaskin*	**Id93** Spatial evolution of the turbulent/turbulent interface geometry and turbulent momentum entrainment. *Jiangang Chen and Oliver Buxton*	**Id103** The interplay between horizontal heat transfer and large scale circulation in turbulent Rayleigh-Benard convection. *Lu Zhang, Jing Dong and Ke-Qing Xia*	**Id121** Turbulence fields generated by a flapping active grid: Comparing hot-wire and particle image velocimetry. *Ingrid Neunaber, Masoud Asadi, Leon Li and R. Jason Hearst*	**Id199** The effect of rotation on heat and momentum transport and structures in plane Couette and Taylor-Couette flow. *Geert Brethouwer*	
Instability and Transition I Room: AirNostrum. Chair: Marc Avila. U. Bremen	**Id4** Unified dynamic and aeroacoustic theories for the ring-mode coherent structures in all flow regions of a subsonic turbulent jet. *Zhongyu Zhang and Xuesong Wu*	**Id14** Linear and nonlinear instability of supersonic boundary layers over a rotating cone. *Ming Dong and Runjie Song*	**Id15** The flow regimes in the short Taylor-Couette configurations with independently rotating cylinders, aspect ratio 0.5. *Ewa Tuliszka-Sznitko*	**Id31** From Low-Frequency Oscillations to Markovian Bistable Stall Dynamics. *Ivan Kharsansky Atallah, Luc Pastur, Romain Monchaux and Laurent Zimmer*	**Id41** Heat transport and flow morphology of geostrophic rotating Rayleigh-Bénard convection in the presence of boundary flow. *Guang-Yu Ding and Ke-Qing Xia*	**Id45** Transition to turbulence of pulsatile flow in flexible pipes. *Till Zeugin, Daniel Morón, Marc Avila and Markus Holzner*	**Id52** Characteristics of turbulent flow past a vertical flat plate. *Daeun Song and Haecheon Choi*	**Id55** The Re-scaling of the propagation speed of turbulent fronts in pipe flow. *Haoyan Wu and Baofang Song*

Monday Evening, ETSID, 17:00-19:00								
Session	**17:00:00**	**17:15:00**	**17:30:00**	**17:45:00**	**18:00:00**	**18:15:00**	**18:30:00**	**18:45:00**
Wall-Bounded Flows - Theory I Room Salón de actos Chair: Julio Soria, Monash U.	**Id26** A local mechanism linked to the emergence of extreme events in the turbulent channel flow. *Nicola Ciola, Pietro De Palma, Jean-Christophe Robinet and Stefania Cherubini*	**Id30** Perron-Frobenius analysis of bursting in wall turbulence. *Javier Jimenez*	**Id113** Composition of resolvents enhanced by random sweeping for large-scale structures in turbulent channel flows. *Guowei He and Ting Wu*	**Id140** Interscale transport mechanisms in the spatial evolution of energy-containing eddies. *Ezhilsabareesh Kannadasan, Callum Atkinson and Julio Soria*	**Id142** Canonical inflow adverse pressure gradient turbulent boundary layers at high Reynolds number. *Luka Lindic, Rahul Deshpande and Ivan Marusic*	**Id158** Heat and mass transfer of flow inside pipes with large relative roughness height. *Mariangela De Maio, Beatrice Latini, Francesco Nasuti and Sergio Pirozzoli*	**Id168** Predictability of puff decay in pipe flow. *Daniel Morón Montesdeoca, Alberto Vela-Martín and Marc Avila*	**Id408** A Dynamical Transport Theory of Wall-Bounded Turbulent Flows. *T.-W. Lee and J.E. Park*
Boundary Layers II Room S01 Chair: S. Hoyas UPV	**Id182** Influence of Streamline Curvature on Compressible Turbulent Boundary Layers. *Jason Appelbaum and Christoph Wenzel*	**Id189** Modifications of the friction drag and coherent structures in turbulent boundary layers via local polymer solution ejection. *Jia-Qi Ma, Sheng-Hong Peng, Wen-Feng Li and Heng-Dong Xi*	**Id222** On the development of an optical MEMS sensor for instantaneous wall-shear stress measurements in wall-bounded turbulent flows. *Joseph Barrow, Tao Liu, Michael Wilkes, Barry Gallacher and Richard Whalley*	**Id240** Stochastic modeling of heated turbulent coaxial pipe flow prescribing different thermal boundary conditions. *Pei-Yun Tsai, Heiko Schmidt and Marten Klein*	**Id244** Scaling of turbulence statistics for three velocity components and turbulence kinetic energy in pipe flow. *Marie Ono, Noriyuki Furuichi and Yoshiyuki Tsuji*	**Id301** Self-similarity of moments of concentration fluctuations in a plume. *Miaoyan Pang and Kapil Chauhan*	**Id316** Nano-scale sensors for wall-shear-stress measurements. *Keshanjali Gaur*	**Id334** A spatial-resolution correction scheme for disturbance profiles in a developing zero-pressure-gradient turbulent boundary layer. *Fahrettin Gökhan Ergin, Frederik Zafiryadis, Bo Watz and Knud Erik Meyer*
Geophysical Flows III Room S02 Chair: Berenger Dubrulle, CNRS	**Id146** Turbulent diffusion of heat near the equator and its connection with helicity segregation in geodynamo simulations. *Avishek Ranjan and Peter Davidson*	**Id175** Three-dimensional structure of transport by ocean mesoscale turbulence. *Julie Meunier, Basile Gallet and Benjamin Miquel*	**Id176** Ultimate regime of rapidly rotating convection: experimental and numerical assessment of the `geostrophic turbulence' scaling predictions. *Gabriel Hadjerci, Vincent Bouillaut, Benjamin Miquel, Sébastien Aumaître and Basile Gallet*	**Id287** Experimental observation of the geostrophic turbulence regime of rapidly rotating convection. *Basile Gallet, Vincent Bouillaut, Gabriel Hadjerci, Benjamin Miquel, Keith Julien and Sébastien Aumaître*	**Id364** Decomposing weather maps into interpretable patterns using Latent Dirichlet Allocation. *Lucas Fery, Bérengère Dubrulle, Bérengère Podvin, Flavio Pons and Davide Faranda*	**Id371** Heat transport in rotating convection captured by invariant solutions. *Jean-Clément Ringenbach, Tobias Schneider and Steven Tobias*	**Id417** Quasi-two dimensionality and the Magnetic Taylor-Proudman constraint in rotating magneto-convection. *Alban Potherat, Rishav Agrawal and Aujogue Kelig*	
Multiphase and Non-Newtonian II Room S03 Chair: Filippo Coletti. ETH Zurich	**Id91** Elastic range scaling in polymeric turbulence at large Reynolds and Deborah numbers. *Marco Edoardo Rosti, Prasad Perlekar and Dhrubaditya Mitra*	**Id94** Inertial particles Rayleigh-Taylor turbulence. *Simone Tandurella, Guido Boffetta, Stefano Musacchio and Marco E. Rosti*	**Id98** Turbulence modulation by finite-size spherical particles. *Alessandro Chiarini, Ianto Cannon and Marco E. Rosti*	**Id101** Scale-to-scale energy transfer in the turbulence near a free surface. *Daniel Ruth and Filippo Coletti*	**Id110** Particle-resolved simulations of positively-buoyant particles in the open channel flow. *Wei Gao, Matteo Parsani and Pedro Costa*	**Id111** Solid Particle Dispersion in a Turbulent Jet. *Alessandro Capone, Giorgio Moscato and Giovanni Paolo Romano*	**Id112** Dynamics of flexible fibres immersed in viscoelastic fluids. *Aswathy M S and Marco E Rosti*	**Id117** Sediment transport measurements with a multi-component ultrasonic profiler. *Stéphane Fischer and Marie Burckbuchler*
Control of Turbulent flows II Room S04 Chair: Ian Jacobi, Technion	**Id171** A study of drag reduction on rough walls using spanwise opposed wall-jet forcing. *Sina Nozarian, Mahdi Abkar and Pourya Forooghi*	**Id184** Large-scale motion in a baffled von Kármán tank. *Paweł Baj*	**Id192** Drag reduction in wall-bounded flows using deep reinforcement learning. *Luca Guastoni, Jean Rabault, Hossein Azizpour and Ricardo Vinuesa*	**Id196** Scale-Interactions in the Wake of an Actuated Cylinder. *Alex Zhelebovskiy, Guangyao Cui, Siddhartha Verma, Beni Cukurel and Ian Jacobi*	**Id197** Experimental analysis of pulsatile flow in a transitional-type cavity. *Justas Šereika, Paulius Vilkinis and Nerijus Pedišius*	**Id198** Investigation of flow over triangular roughness elements in a cavity. *Paulius Vilkinis, Justas Šereika and Nerijus Pedišius*	**Id205** Chirality of particles doesn't matter in strong turbulence. *Giulia Piumini, Martin P. A. Assen, Detlef Lohse and Roberto Verzicco*	**Id220** A jetting grid driven by temporally and spatially coherent 4-D gradient noise. *Dennis van Gils, Duco van Buuren, Gert-Wim Bruggert and Dominik Krug*

Monday Evening, ETSID, 17:00-19:00								
Session	**17:00:00**	**17:15:00**	**17:30:00**	**17:45:00**	**18:00:00**	**18:15:00**	**18:30:00**	**18:45:00**
Vortex Dynamics II Room S05 Chair: Wouter Bos, CNRS	**Id76** Role of internal structures within a vortex in helicity dynamics. *Weiyu Shen, Jie Yao, Fazle Hussain and Yue Yang*	**Id79** Evolution of dissipative fluid flows with imposed helicity conservation. *Zhaoyuan Meng, Weiyu Shen and Yue Yang*	**Id114** Inverse energy cascade in confined three-dimensional turbulence. *Guido Boffetta, Stefano Musacchio, Andrea Mazzino and Marco Edoardo Rosti*	**Id115** Evolution of flow topology with Prandtl number in turbulent Rayleigh-Bénard convection. *Zehao Wang, Xin Chen and Hengdong Xi*	**Id118** The structural unit of oscillatory large-scale circulation. *Andrei Teimurazov, Sanjay Singh, Sylvie Su, Sven Eckert, Tobias Vogt and Olga Shishkina*	**Id138** Reservoir computing for prediction of intermittent reversals of large-scale vortex in two-dimensional thermal convection. *Daigaku Katsumi, Masanobu Inubushi and Naoto Yokoyama*	**Id141** Evolution of near-wall backflow region in wall-bounded flows. *Xue Chen, Yongmann Chung and Minping Wan*	**Id148** Effects of Nozzle Shapes and Compressibility on Formation of Synthetic Jets. *Jihyeon Park, Junsung Choi, Ji Hun Song and Minsuk Choi*
Acoustic Room S06 Chair: Omri Ram, Technion	**Id256** Dual-PIV coupled with dynamic mode decomposition to unravel the structure and dynamics of a supersonic free-jet. *Alexis Duddridge, Vishal Chaugule, Callum Atkinson and Julio Soria*	**Id315** Two mechanisms of sound radiation by instability waves on a subsonic jet. *Yihong Fang and Jiaming Hu*	**Id377** Jet flow feature estimation with snapshot PIV and fast probes. *Luca Franceschelli, Marco Raiola and Stefano Discetti*	**Id384** Statistics and spatio-temporal correlations of flow-induced wall pressure noise beneath an impinging round jet boundary layer. *Jonathan Stocking and Roger Oba*	**Id395** Influence of wall impedance and temperature on the stability of turbulent high Mach number boundary layers. *Lara De Broeck, Simon Görtz, Patrick Alter, Jan Baumgärtner and Martin Oberlack*	**Id396** Instability triggering by acoustic waves in a turbulent compressible shear layer. *Simon Goertz, Lara De Broeck, Paul Hollmann, Jan-Benedikt Baumgärtner, Patrick Alter and Martin Oberlack*		
Transport and Mixing II Room N01. Chair: Guillaume Roullet. U Brest	**Id202** Effects of crowd density on scalar dispersion in indoor spaces. *Desmond Lim and Christina Vanderwel*	**Id231** Modeling and Simulation of Materials Mixing with Practical Scale-Resolving Simulation Model. *Filipe Pereira, Samuel Pellone, Tiffany Desjardins, John Charonko and Forrest Doss*	**Id251** Effects of polymer additives on the entrainment of turbulent water jet. *Sheng-Hong Peng, Yi-Bao Zhang and Heng-Dong Xi*	**Id279** Simoultaneous velocity and thermal field measurment using Thermochromic Liquid Crystal. *Elian Bernard*	**Id280** Properties of vertical plumes emanating from oceanic hydrothermal springs using LES. *Cyprien Lemaréchal, Guillaume Roullet and Jonathan Gula*	**Id297** Experimental detection of large-scale flow structures in a Rayleigh-Taylor instability. *Stefan S. Nixon, Stuart B. Dalziel and Romain Watteaux*		
Instability and Transition II Room AirNostrum. Chair: Baofang Song. Peking U.	**Id73** Mechanisms for three-dimensional instabilities in the wake behind a cylinder. *Andrey Aleksyuk and Matthias Heil*	**Id108** Simulations of reversible Navier-Stokes equation on logarithmic lattices. *Guillaume Costa, Amaury Barral and Bérengère Dubrulle*	**Id123** Dynamics of turbulent structures in Couette-Poiseuille flow. *Benoît Semin, Tao Liu, Ramiro Godoy-Diana and José Eduardo Wesfreid*	**Id128** Nonlinear dynamics of closed axisymmetric rotor-stator flow. *Artur Gesla, Laurent Martin Witkowski, Yohann Duguet and Patrick Le Quéré*	**Id147** Parametric study on the effects of cylindrical cavities on transition in the Falkner-Skan-Cooke boundary layer. *Kosuke Nakagawa, Takahiro Ishida and Takahiro Tsukahara*	**Id152** Description of boundary layer transition from laminar to turbulent state using directed percolation. *Tom T. B. Wester, Joachim Peinke and Gerd Gülker*	**Id425** The Myth of URANS. *Daniel Israel*	

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Boundary Layers III Room Salón de actos Chair: Martin Oberlack, TU Darmstadt	**Id381** Global and local organization of the convective heat flux in turbulent Rayleigh-Bénard convection. *Berengere Podvin, Laurent Soucasse, Philippe Rivière, Anouar Soufiani and Francois Yvon*	**Id410** 3D LES of free convection from a side-heated vertical wall with cryogenic helium up to Ra~10^15. *Davide Duri, Alain Girard, Nicolas Luchier, Etienne Studer, Ulrich Bieder and Songzhi Yang*	**Id412** Identification of dissipative flow structures using dissipation-optimized proper orthogonal decomposition. *Peder J. Olesen, Azur Hodzic, Søren J. Andersen and Clara M. Velte*	**Id419** Water sloshing experiments in a circular tank with submerged topography. *Franz-Theo Schön, Ion Dan Borcia, Uwe Harlander, Rodica Borcia, Sebastian Richter and Michael Bestehorn*	**Id422** From wall measurements to three-dimensional turbulent-flow fields. *Antonio Cuéllar Martín, Alejandro Güemes, Andrea Ianiro, Ricardo Vinuesa, Óscar Flores and Stefano Discetti*	**Id439** A comparison of spatially and temporally accelerating flows. *Matthew Falcone and Shuisheng He*	**Id446** Multiscale DNS modelling of turbulent destratification of open channel flow for Pr = 0.71 and 7. *Bahare Jahani, Michael MacDonald and Stuart Norris*	**Id452** Predicting Water Surface Elevation Based on the Turbulent Airflow Overlying the Waves: a Novel Machine Learning Approach. *Mordechai Abu, Meital Geva, Lizeth Rubio, Krishanu Kumar and Mark Last*
Vortex Dynamics III Room S01 Chair: Rodolfo Ostilla-Monico. U. Cádiz	**Id159** Frozen-turbulence hypothesis in wind-tunnel model of atmospheric boundary layer. *Klara Jurcakova and Radka Kellnerova*	**Id167** Energy transfer and vortex structures: Visualizing the incompressible turbulent energy cascade. *Rodolfo Ostilla Monico, Ryan McKeown, Shmuel Rubinstein, Michael Brenner and Alain Pumir*	**Id204** Wake behind a step cylinder from laminar to turbulent. *Cai Tian, Jianxun Zhu and Lars Erik Holmedal*	**Id207** Free-stream turbulence generation at low Reynolds number: a comparison between synthetic and grid-induced turbulence. *Juan Manuel Catalán Gómez, Stefano Olivieri, Manuel García-Villalba and Oscar Flores Arias*	**Id216** Turbulent patterns and the underlying invariant solutions in a continuum model of active fluids. *Savyaraj Deshmukh, Alessia Ferraro and Tobias Schneider*	**Id218** Numerical investigation on Honji instability for oscillatory flow past a step cylinder. *Xinru Wang, Cai Tian, Jianxun Zhu, Jiaqi Wang and Lars Erik Holmedal*		
Geophysical Flows IV Room S02 Chair: Mahendra Verma, IIT Kampur	**Id32** Asymptotic Ultimate Regime of Homogeneous Rayleigh-Bénard Convection on Logarithmic Lattices. *Amaury Barral and Berengere Dubrulle*	**Id39** Highly stratified compressible turbulent convection. *John Panickacheril John and Joerg Schumacher*	**Id44** Scaling regimes in rapidly rotating turbulent convection. *Jiaxing Song, Olga Shishkina and Xiaojue Zhu*	**Id81** Model for the transition between the buoyancy and rotation dominance in rotating Rayleigh-Benard convection. *Olga Shishkina and Robert E. Ecke*	**Id346** Thermal waves and heat transfer efficiency enhancement in harmonically modulated turbulent thermal convection. *Pavel Urban, Tomáš Králík, Věra Musilová, Pavel Hanzelka, David Schmoranzer and Ladislav Skrbek*	**Id380** Transition from shear-dominated to Rayleigh-Taylor turbulence. *Stefano Brizzolara, Jean-Paul Mollicone, Maarten van Reeuwijk, Andrea Mazzino and Markus Holzner*	**Id474** Exploring Jump Rope Vortex Dynamics in Turbulent Liquid Metal Rayleigh-B\'enard Convection Under Diverse Mechanical Boundary Conditions. *Shahzad Sarwar and Susanne Horn*	**Id480** Bolgiano-Obukhov Scaling in Two-Dimensional Rayleigh-Bénard Convection. *Roshan Samuel and Mahendra Verma*
Multiphase and Non-Newtonian III Room S03 Chair: Shervin Bagheri, KTH	**Id188** Particle Transport in Compressible Turbulent Vertical Channel Flows. *Tingting Li, Zhiwen Cui, Ying Zhang, Qiang Zhou and Lihao Zhao*	**Id124** Breakup of inertial aggregates in homogeneous and isotropic turbulence. *Alessandra Sabina Lanotte, Matthaus Baebler, Luca Biferale and Graziano Frungieri*	**Id133** Rheology-based wall function approach for wall-bounded turbulent non-Newtonian flows. *Bilal Khan Yusufi, Zoran Kapelan and Dhruv Mehta*	**Id150** On the structure of turbulence in shear-thinning planar jets. *Christian Amor, Giovanni Soligo, Andrea Mazzino, Soledad Le Clainche and Marco Edoardo Rosti*	**Id160** Experimental study on friction drag modification induced by a Liquid-Infused Surface in a turbulent flow. *Sofia Saoncella, Fredrik Lundell and Shervin Bagheri*	**Id172** Polymer additives induced axial-aligned small-scale structures in a turbulent von Kármán swirling flow. *Feng Wang, Yi-Bao Zhang and Heng-Dong Xi*	**Id183** Suspensions of finite-size elastic fibers in ideal turbulence. *Stefano Olivieri, Andrea Mazzino and Marco E. Rosti*	
Control of Turbulent flows III Room S04 Chair: Anne-Marie Schreyer, RWTH Aachen	**Id233** Accurate and efficient direct numerical simulation of turbulent drag reduction via riblets. *Davide Gatti, Stefano Cipelli, Federica Gattere, Alessandro Chiarini, Paolo Luchini and Maurizio Quadeio*	**Id235** On the detection and characterisation of intermittent low-drag behaviour in turbulent boundary-layer flows. *Tao Liu, Michael Wilkes, David Swailes and Richard Whalley*	**Id238** The investigation of friction velocity determination techniques for turbulent boundary layers influenced by miniature vortex. *Jiahao Kong, Luke Bennetts, Bagus Nugroho, Chiip Chan and Rey Chin*	**Id265** Thermo electro hydrodynamic convection at moderate Rayleigh numbers in rectangular cavity. *Peter Haun and Christoph Egbers*	**Id275** The amazing possibilities in generating user-defined turbulent flows using active grids. *Michael Hölling, Lars Neuhaus and Joachim Peinke*	**Id289** Effect of a pintle orifice on planar turbulent jet flows: a DNS study. *Prince Charles, Karthikeyan Jagadeesan and Vagesh D. Narasimhamurthy*	**Id293** Spanwise forcing for turbulent drag reduction: the meaning of the optimal oscillation period. *Maurizio Quadrio, Alessandro Chiarini, Andrea Conforti and Federica Gattere*	**Id294** Optimized transition of buoyancy-suppressed turbulence in vertical pipe flow. *Shijun Chu, Ashely Willis and Elena Marensi*

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Lagrangian turbulence I Room S05 Chair: Massimo Cencini, CNR	**Id9** A scale-independent observable for turbulent pair-dispersion. *Ron Shnapp*	**Id29** Characterising spontaneous stochasticity in turbulence with path entropy. *Antoine Barlet, André Considera, Simon Thalabard and Alexei Mailybaev*	**Id61** Optimal strategies to catch a drifting target in turbulence. *Chiara Calascibetta, Luca Biferale, Francesco Borra, Antonio Celani and Massimo Cencini*	**Id80** On local isotropy and scale dependence of pair dispersion in a wind tunnel canopy flow. *Ron Shnapp, Yardena Bohbot-Raviv, Eyal Fattal and Alex Liberzon*	**Id87** Lagrangian data generation by Machine Learning. *Luca Biferale, Michele Buzzicotti, Fabio Bonaccorso and Martino Scarpolini*	**Id506** Free flying cluster of miniaturized radiosondes for multi-parameter atmospheric fluctuation observations. *Shahbozbek Abdunabiev, Mina Golsham, Antonella Abba and Daniela Tordella*		
Magneto Hydrodynamics I Room S06 Chair: Luca Moriconi, Universidade Federal do Rio de Janeiro	**Id2** Relaxation of the turbulent magnetosheath. *Francesco Pecora, Yan Yang, Alexandros Chasapis, Sergio Servidio, Manuel Cuesta, Sohom Roy, Rohit Chhiber, Riddhi Bandyopadhyay, Daniel J. Gershman, Barbara Giles, Jim L. Burch and William H. Matthaeus*	**Id86** Flow regimes of natural convection in a horizontal magnetic field. *Long Chen, Haitao Zhu and Mingjiu Ni*	**Id48** A lattice-Boltzmann multiple-relaxation-time model for the induction equation of magnetohydrodynamics at low magnetic Reynolds numbers. *Bruno Magacho da Silva, Hugo Saraiva Tavares, Luca Moriconi and Juliana Loureiro*	**Id54** Two channels of energy transfer due to the Hall term in turbulent dynamos. *Arijit Halder, Supratik Banerjee, Anando Gopal Chatterjee and Manohar Kumar Sharma*	**Id58** Magnetic-field-gradient and sidewall effects in magnetoconvection. *Shashwat Bhattacharya, Thomas Boeck, Dmitry Krasnov and Jörg Schumacher*	**Id70** A new principle for the turbulent relaxation of fluids and plasmas: looking beyond the principle of selective decay. *Supratik Banerjee, Arijit Halder and Nandita Pan*	**Id74** Signature of pressure-balanced relaxed states in binary fluid turbulence. *Nandita Pan, Supratik Banerjee and Arijit Halder*	
Transport and Mixing III Room N01. Chair: Enrico Stalio, Università degli Studi di Modena e Reggio Emilia	**Id303** Mixing and entrainment in polymer-laden jet. *Sheng-Hong Peng, Yi-Bao Zhang and Heng-Dong Xi*	**Id328** Effects of large density contrasts in Unstably Stratified Homogeneous Turbulence. *Joël Petit, Antoine Briard, Benoît-Joseph Gréa and Luminita Danaila*	**Id330** Turbulent mixing induced by surface waves in stratified fluids. *Andrés Castillo-Castellanos, Benoît-Joseph Gréa, Antoine Briard and Louis Gostiaux*	**Id333** Non-intrusive and simultaneous measurements of the Lagrangian dynamics and the fluid temperature field applied to study of the thermal plumes in turbulent Rayleigh–Bénard convection.. *Bahadır Turkyilmaz, Elian Bernard, Jesus Oscar Rodríguez García, Mickaël Bourgoin and Ármann Gylfason*	**Id344** Viscous droplet mixing enhancement using an acoustically oscillating bubble. *Woochan Kim, Kang Yong Lee and Sang Kug Chung*	**Id356** Surface attached vortices as a proxy for mass transfer in free-surface turbulent flow. *Omer Babiker, Ivar Bjerkebæk, Anqing Xuan, Lian Shen and Simen Å Ellingsen*	**Id379** On the role of large-anisotropic and small-isotropic motions on turbulent entrainment and mixing. *Andrea Cimarelli, Gabriele Boga and Enrico Stalio*	**Id423** A wall-model LES methodology for complex geometries and particulate transport. *Federico Dalla Barba, Pedro Costa and Francesco Picano*
Instability and Transition III Room AirNostrum. Chair: Jeremy Parker, EPFL	**Id155** Linear instability of pulsatile polymer channel flow. *Haihan Liu, Baofang Song and Duo Xu*	**Id163** Ghost hunting: finding solutions which don't exist. *Jeremy Parker, Zheng Zheng, Pierre Beck, Omid Ashtari and Tobias Schneider*	**Id166** Instabilities in boundary layers featuring a strong localised viscosity gradient. *Benjamin Bugeat, Pietro Boldini and Rene Pecnik*	**Id213** Quantitative spatio-temporal measurements of the dissipation rate by Diffusing-Wave Spectroscopy. *Enzo Francisco and Sébastien Aumaître*	**Id217** Adjoint-based variational method for constructing invariant solutions of wall-bounded fluid flows. *Omid Ashtari, Zheng Zheng and Tobias M. Schneider*	**Id247** The relevance of secondary instabilities in spots nucleation on a flat plate boundary layer. *José Manuel Faúndez Alarcón, Ardeshir Hanifi, André Cavalieri and Dan Henningson*	**Id261** On the conditional stability of shear flows. *Péter Tamás Nagy*	

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Intermittency and scaling I Room Salón de actos Chair: Jason Hearst, NTNU	**Id13** Efficiency of Turbulence and weak dissipative solutions of Navier-Stokes. *Berengere Dubrulle, Guillaume Costa, Amaury Barral, Quentin Pikeroen, Giorgio Krstulovic, Vishwanath Shukla and Simon Thalabard*	**Id37** Experimental investigation of the circulation in quasi-2D turbulence. *Hang-Yu Zhu, Jin-Han Xie and Ke-Qing Xia*	**Id65** Statistical field theory for a stochastic linear advection-stretching model for turbulence. *Lukas Bentkamp, Maurizio Carbone and Michael Wilczek*	**Id88** The effects of freestream turbulence on cylinder wakes. *Leon Li and R. Jason Hearst*	**Id92** Departure from the statistical equilibrium of large scales in three-dimensional hydrodynamic turbulence. *Mengjie Ding, Jin-Han Xie and Jianchun Wang*	**Id136** Scaling properties of irreversibility indices in fully developped turbulence. *Francois Schmitt*	**Id151** Diagnostic of Fourier triad-phase synchronisation via a phase-frozen model in 1D Burgers and 3D Navier-Stokes flows. *Chuhan Wang, Le Fang, Zhan Wang and Chunxiao Xu*	**Id157** Turbulence decay in a von Kármán swirling flow. *Farid Aligolzadeh, Pawel Baj and James R. Dawson*
Vortex Dynamics IV Room S01 Chair: Kai Schneider, Aix-Marseille University	**Id241** Controlling the reversal of the large-scale circulation in thermal turbulence. *Yi-Zhen Li, Ao Xu and Heng-Dong Xi*	**Id245** Hierarchy of coherent vortices and energy cascade in turbulence behind a cylinder. *Yutaro Motoori, Jun Fujino and Susumu Goto*	**Id252** Two Fundamental Relations for Turbulent Flows. *Perry Johnson*	**Id255** Wavy modes in forced rotating turbulence cause bursting. *Arupjyoti Das, Manohar K Sharma, Avishek Ranjan and Mahendra K Verma*	**Id262** Measured three-dimensional flow structure in aspect ratio 1/10 turbulent Rayleigh-Benard convection. *Hao Zheng, Xin Chen, Yi-Bao Zhang and Hengdong Xi*	**Id271** Numerical and experimental direct observation of vortex reconnection in a turbulent swirling flow. *Abhishek Paraswarar Harikrishnan, Adam Cheminet, Damien Geneste, Antoine Barlet, Christophe Cuvier, François Daviaud, Jean-Marc Foucaut, Jean-Philippe Laval, Vincent Padilla, Cécile Wiertel-Gasquet, Caroline Nore, Melvin Creff, Hugues Faller, Loïc Cappanera, Jean-Luc Guermond, Benjamin Musci, Jean Le Bris and Bérengère Dubrulle*	**Id277** Turbulent transition of helical vortices. *Yuji Hattori, Ivan Delbende and Maurice Rossi*	**Id283** Enstrophy flux and physical-space locality in three-dimensional turbulence. *Ryo Araki, Wouter Bos and Susumu Goto*
Geophysical Flows V Room S02 Chair: Daniella Tordella, POLITO	**Id10** Ice melting in salty water: layering and non-monotonic dependence on the mean salinity. *Detlef Lohse, Rui Yang, Christopher Howland, Hao-Ran Liu and Roberto Verzicco*	**Id17** Shape effect of ice melting in flow. *Rui Yang, Christopher Howland, Hao-Ran Liu, Roberto Verzicco and Detlef Lohse*	**Id22** Strongly non linear wave turbulence in stratified water. *Costanza Rodda, Clément Savaro, Vincent Bouillaut, Pierre Augier, Joel Sommeria and Nicolas Mordant*	**Id77** The catalytic effect of near-inertial waves on beta-plane zonal jets. *Lin-Fan Zhang and Jin-Han Xie*	**Id134** Turbulent mixing in subglacial ocean flows. *Louis-Alexandre Couston*	**Id507** Microphysical time scales, supersaturation fluctuations and at a warm Cloud Top Boundary intemporal decay. *L Fossa, Shahbozbek Abdunabiev, Mina Golsham and Daniela Tordella*	**Id144** Effect of Topography on Wake Steering In Wind Farms. *Alok Mishra, Nitish Arya and Amitabh Bhattacharya*	**Id490** Novel orifice configurations for aerodynamically and acoustically optimised acoustic liner geometries. *Haris Shahzad, Stefan Hickel and Davide Modesti*
Multiphase and Non-Newtonian IV Room S03 Chair: Marco Crialesi, Università degli Studi di Modena e Reggio Emilia	**Id191** Heat transfer of inertial particles in homogeneous isotropic turbulence. *Shuojin Li, Chunxiao Xu and Lihao Zhao*	**Id194** Intermittency in turbulent emulsions. *Marco Crialesi Esposito, Guido Boffetta, Luca Brandt, Sergio Chibbaro and Stefano Musacchio*	**Id206** Passive scalar spectra in turbulent suspensions of bubbles. *Niklas Hidman, Henrik Ström, Srdjan Sasic and Gaetano Sardina*	**Id215** Stochastic deformations of bubbles in turbulence. *Aliénor Rivière, Laurent Duchemin, Christophe Josserand and Stéphane Perrard*	**Id236** Disks falling in turbulent air. *Amy Tinklenberg, Michele Guala and Filippo Coletti*	**Id243** Unsteady flow feature extraction of flapping events. *Adrián Corrochano, Rodrigo Abadía-Heredia, Marco Crialesi-Esposito, Luca Brandt and Soledad Le Clainche*	**Id246** Particle-volume-fraction effect on width of re-shocked Richtmyer-Meshkov mixing. *Qi Wu, Yousheng Zhang, Baoqing Meng, Yipeng Shi and Baolin Tian*	**Id250** Turbulent viscoelastic mixing layers. *Jean-Paul van Woensel and Marco Rosti*
Control of Turbulent flows IV Room S04 Chair: Lars Erik Holmedal, NTNU	**Id306** Numerical investigation of homogeneous blowing and suction on transonic airfoils. *Annika Frede and Davide Gatti*	**Id310** Flow measurements in the wake of screen cylinders in shallow water. *Ibrahim Mert Hakligor, Gokturk Memduh Ozkan and Huseyin Akilli*	**Id321** Turbulent drag reduction with streamwise travelling waves in compressible regime. *Federica Gattere, Alessandro Chiarini, Massimo Zanolini, Davide Gatti, Matteo Bernardini and Maurizio Quadrio*	**Id327** Surrogate-based optimization of actuation parameters for active drag reduction in turbulent boundary layer flows. *Fabian Hübenthal, Marian Albers, Matthias Meinke and Wolfgang Schröder*	**Id332** Flow patterns in turbulent cardiac flows using computational fluid dynamics and classical analysis tools. *Eneko Lazpita, Mahesh Nagargoje, Jesús Garicano, Eusebio Valero, Maria Villalba-Orero, Enrique Lara-Pezzi and Soledad Le Clainche*	**Id340** Drag modulation in two-phase Taylor-Couette flow with droplets. *Jinghong Su, Junwu Wang and Chao Sun*	**Id341** A novel approach to characterize the degradation of a superhydrophobic surface in a turbulent channel flow. *Linsheng Zhang, Colin Crick, and Roob Poole*	

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Lagrangian turbulence II Room S05 Chair: Luca Biferale, University of Rome Tor Vergata	**Id104** Investigation and multifractal description of a Lagrangian irreversibility indicator in an experimental Von Karman turbulent flow. *Adam Cheminet*	**Id105** Lagrangian particle dynamics in weakly ageostrophic surface ocean turbulence. *Michael Maalouly, Gilmar Mompean and Stefano Berti*	**Id224** Particle Pair Dispersion in Free Surface Turbulence: On Intermittency and Divergence. *Yaxing Li, Yifan Wang and Filippo Coletti*	**Id156** Prediction of sling events at high Reynolds numbers. *Tobias Bätge, Itzhak Fouxon and Michael Wilczek*	**Id174** Microswimmers in surface gravity waves. *Francesco Michele Ventrella, Guido Boffetta, Filippo De Lillo, Jean-Luc Thiffeault, Massimo Cencini and Nimish Pujara*	**Id161** Dense Particle Suspensions in Quasi-2D Turbulence. *Seunghwan Shin and Filippo Coletti*		
Magneto Hydrodynamics II Room S06 Chair: Alban Potherat, Coventry University	**Id90** On Magnetohydrodynamics , Fluctuations, Structures, and Turbulence. *Gary Zank, Lingling Zhao, Laxman Adhikari, Masaru Nakanatoni, Alex Pitna and Daniele Telloni*	**Id193** Connecting buoyancy dominated and magnetically dominated regimes in magnetoconvection. *Matthew McCormack, Andrei Teimurazov, Olga Shishkina and Moritz Linkmann*	**Id203** Transition in channel flow with a spanwise magnetic field. *Mattias Brynjell-Rahkola, Yohann Duguet and Thomas Boeck*	**Id267** The turbulent magnetic Rayleigh-Taylor instability. *Antoine Briard and Benoît-Joseph Gréa*	**Id409** Characterisation of confined Alfvén waves at low magnetic Reynolds number. *Samy Lalloz, Alban Potherat, Laurent Davoust and François Debray*	**Id453** Effect of cross-helicity on the forced two-dimensional MHD turbulence. *Soumyadeep Chatterjee, Rodion Stepanov and Mahendra Verma*	**Id484** The Elbert Range of Turbulent Rotating Magnetoconvection. *Susanne Horn and Jonathan M. Aurnou*	
Transport and Mixing IV Room N01. Chair: Clara Velte, Technical University of Denmark	**Id433** Effect of airflow rate on CO2 concentration in downflow indoor ventilation. *Guru Sreevanshu Yerragolam, Rui Yang, Richard Stevens, Roberto Verzicco and Detlef Lohse*	**Id435** The Challenge of Non-equilibrium Turbulence. *Clara Velte, Azur Hodzic, Haim Abitan, Peder J. Olesen, Martin Schiødt, Simon L. Ribergaard and Preben Buchhave*	**Id436** Study of turbulence development by induced oscillatory modes. *Buchhave Preben, Rasmus K. Schlander, Margherita Dotti, Mengjia Ren and Clara Velte*		**Id451** Spectral scaling of velocity and temperature in the Rayleigh-Bènard Convection at Pr = 7. *Sergio Chibbaro, Andrea Cimarelli, Andrea Fregni and Enrico Stalio*	**Id469** Phase proper orthogonal decomposition for analysis of spatio-temporal modal dynamics in a co-axial jet. *Yisheng Zhang, Azur Hodzic and Clara Velte*	**Id470** Influence of the sampling direction on Conditional Statistics at the TNTI of Variable Viscosity Jets. *Francisco Patino, Léa Voivenel, Michael Gauding, Fabien Thiesset, Luminita Danaila and Émilien Varea*	
Instability and Transition IV Room AirNostrum. Chair: Santiago Benavides, University of Warwick	**Id264** Extraction of secondary instability of streaks in turbulent boundary layer using linear response. *Izumi Watanabe, Koki Matsui, Tomoya Kikugawa, Kentaro Kato and Masaharu Matsubara*	**Id268** Capturing the edge of chaos as a spectral submanifold in pipe flows. *Bálint Kaszás and George Haller*	**Id274** Roughness-enhanced turbulent transition in a rough Rayleigh-Bénard cell filled with Fluorocarbon. *Lyse Brichet, Lucas Méthivier, Francesca Chillà and Julien Salort*	**Id278** Exact invariant solutions and their bifurcations in transitional vertical natural convection. *Zheng Zheng, Laurette Tuckerman and Tobias Schneider*	**Id282** Transition to the Ultimate Regime in Boussinesq and Non-Boussinesq conditions. *Julien Salort, Philippe-E. Roche, Bernard Castaing and Francesca Chillà*	**Id290** Influence of the ratio of boundary layer thickness to roughness height in the turbulence transition caused by spatially localized disturbances. *Patrick Keuchel, Daniel Morón and Marc Avila*	**Id292** The role of large surface roughness in transition of three-dimensional boundary layers. *Bo Yuan and Xuesong Wu*	
Wall-Bounded Flows – Simulation. Room Japón Chair: Bettina Frohnapfel, KIT	**Id47** Data-driven identification of drag-relevant roughness scales. *Jiasheng Yang, Alexander Stroh, Sangseung Lee, Shervin Bagheri, Bettina Frohnapfel and Pourya Forooghi*	**Id53** Flapping states of clamped fibres in wall turbulence. *Giulio Foggi Rota, Morie Koseki, Riya Agrawal, Stefano Olivieri and Marco Edoardo Rosti*	**Id358** Reynolds number effects in the turbulent flow around a rectangular cylinder. *Roberto Corsini, Andrea Cimarelli and Enrico Stalio*	**Id179** Effects of rotation rates on roll-cells in ribbed channel flows. *Karthikeyan Jagadeesan, Vagesh D. Narasimhamurthy, Helge I. Andersson and Leo R. M. Mass*	**Id187** Direct numerical simulations of turbulent flow over the converging and diverging riblets. *Hao Wang, Yitong Fan and Weipeng Li*	**Id214** Direct numerical simulations of high-speed turbulent boundary layers over rough surfaces. *Matteo Bernardini, Michele Cogo, Davide Modesti and Francesco Picano*	**Id249** Transition to Turbulence in Thermoelectric convection in planar and cylindrical capacitors. *Changwoo Kang and Innocent Mutabazi*	**Id496** DNS of forced turbulent convection in circular pipes. *Sergio Pirozzoli*

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Session	**17:30:00**	**17:45:00**	**18:00:00**	**18:15:00**	**18:30:00**	**18:45:00**	**19:00:00**	
Intermittency and scaling II Room Salón de actos Chair: Leonie Canet, Université Joseph Fourier Grenoble Alpes	**Id165** Large-scale shear layers affect the scaling exponents for dissipation and enstrophy beyond Re_lambda = 250. *Gerrit Elsinga, T. Ishihara and J.C.R. Hunt*	**Id200** Kelvin-Filtered Turbulence and Relation to Space Locality. *Xi-Yuan Yin, Ryo Araki and Wouter Bos*	**Id212** Turbulent Circulation Statistics on Non-Planar Contours. *Luca Moriconi, Rodrigo Pereira and Victor Valadão*	**Id230** Anomalous dissipation in turbulence. *Georgy Zinchenko and Jörg Schumacher*	**Id276** A linear stochastic model of turbulent cascades and fractional fields. *Gabriel B. Apolinário, Geoffrey Beck, Laurent Chevillard, Isabelle Gallagher and Ricardo Grande*	**Id505** Turbulent dispersion analysis via distance-neighbor graphs inside a top cloud boundary in temporal decay. *Shahbozbek Abdunabiev, Niccolo Gallino, Antonella Abba and Daniela Tordella*		
Vortex Dynamics V Room S01 Chair: Alfredo Pinelli, City, University of London	**Id291** On singularities in vortex sheets in 2D Euler flows using a high resolution characteristic mapping method. *Julius Bergmann, Thibault Maurel Oujia, Xi Yuan Yin, Jean-Christophe Nave and Kai Schneider*	**Id325** On the effect of solidity and Reynolds number on canopy flows. *Alfredo Pinelli, Muhammad Omidyeganeh, Giorgio Cavallazzi and Shane Nicholas*	**Id336** Forward energy cascade in 2D turbulence with curvature. *Wesley Agoua, Wouter Bos and Benjamin Favier*	**Id339** Multiscale coherent dynamics in wind turbine wakes. *Neelakash Biswas and Oliver Rh Buxton*	**Id354** The intense vortices in non-equilibrium turbulence. *Afonso Ghira, Gerrit Elsinga and Carlos da Silva*	**Id357** Information depth of surface attached vortices in deformable free-surface turbulent flows. *Jørgen R. Aarnes, Omer Babiker and Simen A. Å. Ellingsen*	**Id450** Wind Tunnel Study of Tandem Wind Turbines with Counter-Rotating Rotors: Performance Analysis. *Paul Bayron, Richard Kelso and Rey Chin*	
Wall-Bounded Flows - Theory II Room S02 Chair: Davide Modesti, TU Delft	**Id190** The global drag of heterogeneously rough surfaces. *Carola Schmidt, Lars von Deyn, Davide Gatti, Jonathan Neuhauser and Bettina Frohnapfel*	**Id195** Predicting Phase Relationships Between VLSM Velocities and Reynolds Stresses via Resolvent Modes. *Guangyao Cui and Ian Jacobi*	**Id208** Heat flux and wall shear stress in turbulent natural convection in a differentially heated vertical channel. *Emily S.C. Ching*	**Id226** Spanwise vortex structure and orbital instability of unstable periodic orbit in plane Couette turbulence. *Eiichi Sasaki, Genta Kawahara and Javier Jimenez*	**Id227** Simulating Turbulent Inflow and Wind Tunnel Experiments: Reproducing TKE Decay and Developing a Digital Twin for a Wind tunnel. *Rishabh Mishra, Emmanuel Guilmineau, Ingrid Neunaber and Caroline Braud*	**Id467** Turbulent forced convection of air-cooled and\\ air-heated channels. *Davide Modesti and Sergio Pirozzoli*	**Id414** The effect of the quiescent core of turbulent channel flows on the wall skin friction via Renard-Deck decomposition. *Bihai Sun, Ezhilsabareesh Kannadasan, Callum Atkinson and Julio Soria*	
Multiphase and Non-Newtonian V Room S03 Chair: Manuel Garcia-Villalba, TU Wien	**Id258** Emergent elastic inertial range from smooth velocity fields in low Re polymeric flows. *Rahul Kumar Singh, Prasad Perlekar, Dhrubaditya Mitra and Marco Edoardo Rosti*	**Id263** Sidewall-induced secondary currents and coherent structures over mobile sediment beds. *Markus Scherer, Markus Uhlmann, Yoshiyuki Sakai and Genta Kawahara*	**Id266** Effects of inertial particles on flow structures and heat transfer in Rayleigh-Bénard convection. *Yuhong Dong*	**Id314** Physics-informed data-driven RANS turbulence modelling for particle-laden jet flows with various Stokes numbers. *Xinchen Zhang, Zhen Zhang, Alfonso Chinnici, Zhiwei Sun, Qinfeng Shi, Graham Nathan and Rey Chin*	**Id298** Turbulence of dilute polymer solutions. *Francesco Serafini, Francesco Battista, Paolo Gualtieri and Carlo Massimo Casciola*	**Id308** Wall-bounded thermal turbulent convection driven by heat-releasing point particles. *Yuhang Du and Yantao Yang*		
Control of Turbulent flows V Room S04 Chair: Fethi Sedat Tardu, Grenoble Alpes University	**Id345** Single-Time and Spectral Linear Stochastic Estimation of Flow Over a Backward Facing-Step – A Comparison. *Mahmoodreza Hashemi and Joseph Hall*	**Id352** On the characterization of a modular active turbulence generator for the independent control of turbulence intensity and scales. *Federico Bertelli, Sergio Lavagnoli and Koen Hillewaert*	**Id355** The influence of inflow and flow control on the instability and reattachment process of separated flow over a bump. *Himpu Marbona, Daniel Rodríguez, Alejandro Martínez-Cava and Eusebio Valero*	**Id375** Reynolds number induced growth of large-scale rolls in plane Couette flow and invariant scaling laws for added wall-transpiration using resolvent analysis. *Toni Dokoza and Martin Oberlack*	**Id383** Distributed Actuation of Turbulent Flow Around a Cylinder using Deep Reinforcement Learning. *Pedro Ivo Almeida, Ian Jacobi, Beni Cukurel and Siddhartha Verma*	**Id392** Direct numerical simulation for turbulent boundary layer flow over a flat plate with two side-by-side dimples. *Jianxun Zhu, Cai Tian and Lars Erik Holmedal*		

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Session	**17:30:00**	**17:45:00**	**18:00:00**	**18:15:00**	**18:30:00**	**18:45:00**	**19:00:00**	
Artificial Intelligence I. Room S05 Chair: Ricardo Vinuesa, KTH	**Id23** Towards interpretable data-driven turbulence models. *Hannes Mandler and Bernhard Weigand*	**Id62** Promoting Numerical Stability on Neural Surrogate Models of Turbulent Flows. *Fernando Gonzalez, Francois-Xavier Demoulin and Simon Bernard*	**Id68** Reservoir computing for spatial reconstruction of Rayleigh–Bénard convection. *Mohammad Sharifi Ghazijahani, Florian Heyder, Jörg Schumacher and Christian Cierpka*	**Id71** Data-driven olfactory search in a turbulent flow. *Robin Heinonen, Fabio Bonaccorso, Luca Biferale, Antonio Celani and Massimo Vergassola*	**Id78** Generative Adversarial Networks to infer velocity components in rotating turbulent flows. *Tianyi Li, Michele Buzzicotti, Luca Biferale and Fabio Bonaccorso*	**Id201** Machine-aided initial guesses for unstable periodic orbits. *Pierre Beck, Jeremy Parker, Omid Ashtari and Tobias Schneider*	**Id248** Developing explicit turbulence models by combining gene expression programming and artificial neural network. *Haochen Li, Yaomin Zhao, Fabian Waschkowski and Richard D. Sandberg*	
LES I Room S06 Chair: Bernard Geurts, University of Twente	**Id27** Recent Progress on Coarse Grained Simulations of Turbulent Mixing. *Fernando Grinstein*	**Id89** New exact Betchov-like relation for the helicity flux in homogeneous turbulence. *Damiano Capocci, Perry Johnson, Sean Oughton, Luca Biferale and Moritz Linkmann*	**Id127** A vorticity-based closure for LES. *Guillaume Roullet, Markus Reinert and Louis Thiry*	**Id162** Optimal LES filtering for Approximate Deconvolution in LES with dissipative and non-dissipative discretization methods. *Lena Caban, Artur Tyliszczak, Bernard J. Geurts and Julian A. Domaradzki*	**Id221** Effects of Morphed Trailing Edges on Aerodynamic and Aeroacoustic Performance. *Hasan Kamliya Jawahar, Sh Sankarasarma Vemuri and Mahdi Azarpeyvand*	**Id223** LES OpenFOAM and ELMM model simulations of a scalar transport and dispersion within the 3D street canyon structure. *Jelena Radovic, Vladimír Fuka and Štěpán Nosek*	**Id438** In-situ analysis of backflow events in the turbulent boundary layer of a wing and their relation with flow separation. *Fermin Mallor, Jiahui Liu, Adam Peplinski, Marco Atzori, Ricardo Vinuesa, Tino Weinkauf and Philipp Schlatter*	
Multiphase and Non-Newtonian VI Room N01. Chair: Hengdong Xi, Northwestern Polytechnical University	**Id454** Clustering formation of inertial particles in high Reynolds number isotropic turbulence. *Keigo Matsuda, Thibault Maurel–oujia and Kai Schneider*	**Id473** Resolving the dynamics of inertial solid particles approaching a contraction in a turbulent circular pipe using index-matched tomographic imaging. *Dvir Feld, Gal Friedmann, Jibu Jose and Omri Ram*	**Id476** Closure modelling of inertial particle-pair behaviour using the kinetic PDF approach. *Christopher Stafford, David Swailes and Michael Reeks*	**Id485** Experimental characterisation of elasto-inertial turbulence and flow at maximum drag reduction asymptote. *Sarath Sankar Suresh and Bjoern Hof*	**Id503** Sub-Hinze bubble production in turbulence. *Stephane Perrard, Alienor Riviere, Daniel J. Ruth, Wouter Mostert, Laurent Duchemin, Christophe Josserand and Luc Deike*			
Instability and Transition V Room AirNostrum. Chair: Sébastien Gomé, Technion	**Id295** Search for unstable relative periodic orbits in plane Poiseuille flow using symmetry-reduced dynamic mode decomposition. *Matthias Engel, Omid Ashtari, Tobias Schneider and Moritz Linkmann*	**Id296** Acoustic receptivity of the supersonic boundary layer subject to spanwise-periodic surface heating. *Sheng Yang and Xuesong Wu*	**Id305** Characterization of turbulent and non-turbulent parts in visualization images of channel flow. *Ryo Takai, Sattaya Yimprasert, Kentaro Kato and Masaharu Matsubara*	**Id329** Global stability analysis of flows around laminar airfoil. *Matthias Plath, Florent Renac, Olivier Marquet and Christian Tenaud*	**Id337** Mechanism for turbulence proliferation in transitional shear flows. *Sébastien Gomé, Dwight Barkley, Tobias Grafke and Anna Frishman*	**Id349** Modeling turbulent bands in planar shear flows. *Santiago Benavides, Laurette Tuckerman and Dwight Barkley*	**Id135** The Mixing Dynamics of the Blast-Driven Instability. *Benjamin Musci, Samuel Petter, Britton Olson, Gokul Pathikonda and Devesh Ranjan*	

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Wall-Bounded turbulence III. Room Salón de actos Chair: Yongyun Hwang, Imperial College London	**Id253** Streamwise evolution of the interscale transport of energy-containing eddies in turbulent boundary layers. *Antonio Matas, Ezhilsabareesh Kannadasan, Callum Atkinson and Julio Soria*	**Id260** Importance of anisotropic subgrid-scale stress in large-eddy simulation of turbulent channel flows. *Kazuhiro Inagaki and Hiromichi Kobayashi*	**Id299** Intrinsic compressibility effects in wall-bounded turbulent flows - understanding the physical mechanism. *Asif Manzoor Hasan, Johan Larsson, Sergio Pirozzoli and Rene Pecnik*	**Id311** Reduced-order models of turbulent channel flow. *Igor Maia, Petrônio Nogueira and André Cavalieri*	**Id312** On the organization of coherent structures in turbulent Couette-Poiseuille transition channels. *Sergio Gandía Barberá and Sergio Hoyas*	**Id361** On the relation between the scalar spectrum and the Stanton number in rough ducts. *Jurriaan Peeters*	**Id365** Symmetries in Second Moment Turbulence Modeling. *Felician Constantin Putz and Martin Oberlack*	**Id373** Logarithmic lattice models for flows with boundaries. *Ciro Campolina and Alexei Mailybaev*
Turbulence in Superfluids. Room S01. Chair: Ionut Danaila, University of Rouen Normandy	**Id3** Spectrum and histogram of vorticity in a superfluid grid experiment. *Eric Woillez, Jérôme Valentin and Philippe-E Roche*	**Id431** Higher-order statistics and intermittency of a two-fluid HVBK quantum turbulent flow. *Zhentong Zhang, Ionut Danaila, Emmanuel Lévêque and Luminita Danaila*	**Id99** Quantum computing of fluid dynamics using the hydrodynamic Schrödinger equation. *Yue Yang and Zhaoyuan Meng*	**Id164** Inverse energy cascade in two-dimensional dissipative quantum turbulence. *Alessandra Sabina Lanotte, Riccardo Panico, Paolo Comaron, Michal Matuszewski, Daniele Sanvitto and Dario Ballarini*	**Id367** Mutual friction coupling of Gross-Pitaevskii and Navier-Stokes equations. *Ionut Danaila, Georges Sadaka, Zhentong Zhang, Victor Kalt and Marc-Etienne Brachet*	**Id186** Lagrangian dynamics and second sound vorticity measurements in oscillating grid turbulence of cryogenic normal/superfluid 4He. *Clément Bret, Pantxo Diribarne, Jérôme Duplat and Bernard Rousset*		
Geophysical Flows VI Room S02 Chair: Miguel Bustamante, University College Dublin	**Id232** Breaking of short-crested waves and induced vorticity. *Ayoub Mansar and Frederic Dias*	**Id285** Direct numerical simulation of non-breaking gravity waves: transition to turbulence in the wave boundary layer. *Marco Mazzuoli and Aman G. Kidanemariam*	**Id304** The role of density interfaces in mixing strongly stratified turbulent flows. *Nicolaos Petropoulos and Colm-Cille P. Caulfield*	**Id338** Anisotropic energy-flux vector in stratified turbulence. *Naoto Yokoyama and Masanori Takaoka*	**Id351** Comprehensive open datasets of stratified turbulence forced in vertical vorticity or wave modes. *Pierre Augier, Vincent Labarre, Giorgio Krstulovic and Sergey Nazarenko*	**Id360** Extending the Gibbon-Fokas-Doering stagnation-point-type ansatz to finite-energy initial conditions: A solution to the Navier-Stokes Millennium Prize Problem?. *Miguel Bustamante*	**Id369** Mixing by breaking of internal waves. *Julie Deleuze, Sylvain Joubaud and Philippe Odier*	**Id388** A data-driven method for modelling dissipation rates in stratified turbulence. *Colm-Cille Caulfield and Samuel Lewin*
Multiphase and Non-Newtonian VII Room S03 Chair: Francesco Zonta, Vienna University of Technology	**Id309** Comparison of phase-field method formulations for simulations of bubbly flows. *Davide Procacci, Alessio Roccon, Alfredo Soldati and Jannike Solsvik*	**Id273** Time-dependent dynamics of 3D states in viscoelastic pressure-driven channel flow. *Martin Lellep, Moritz Linkmann and Alexander Morozov*	**Id320** Transport and mixing of passive and active scalars in turbulent viscoelastic jets and wakes analysed by DNS. *Mateus Guimarães, Fernando Pinho and Carlos Silva*	**Id324** Interaction between capillary waves and hydrodynamic turbulence in a two-layer oil-water flow. *Georgios Giamagas, Francesco Zonta, Alessio Roccon and Alfredo Soldati*	**Id389** Study of particle-wall interaction in pneumatic conveying in a vertical pipe. *Sarita V. Casas-Urrunaga, Evan B. Banadyga and D. J. Bergstrom*	**Id400** Turbulence attenuation by finite-size spherical particles. *Susumu Goto and Yutaro Motoori*	**Id401** Sustaining mechanism of turbulence in a rotating container partially filled with liquid. *Daiki Watanabe and Susumu Goto*	**Id424** Lift-induced drag increase in turbulent wall transport of small inertial particles. *Pedro Costa, Wei Gao and Matteo Parsani*

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Artificial Intelligence II Room S04 Chair: Soledad Le Clainche, UPM	**Id234** Offline optimal sensor positioning for time-resolved flow field estimation with point probes. *Junwei Chen, Stefano Discetti and Marco Raiola*	**Id494** Machine Learning approach POD-LSTM and reconstruction to reduced order modelling for aerodynamic turbulent flows. *Abderahmane Marouf, Thomas Lampert, Marianna Braza and Yannick Hoarau*	**Id390** Reynolds Stress Anisotropy Tensor Predictions using Neural Networks. *Jiayi Cai, Pierre-Emmanuel Angeli, Jean-Marc Martinez, Guillaume Damblin and Didier Lucor*	**Id403** Separation control in adverse-pressure-gradient turbulent boundary layers. *Francisco Alcántara-Ávila, Marcial Sanchis Agudo, Lucas Gasparino, Jordi Muela Castro, Bernat Font Garcia, Jean Rabault, Oriol Lehmkuhl and Ricardo Vinuesa Motilva*	**Id442** Synthesis of preferential concentration of particles in isotropic turbulence using neural networks. *Thibault Maurel-Oujia, Suhas Jain, Keigo Matsuda, Kai Schneider, Jacob West and Kazuki Maeda*	**Id443** Inverse identification of the relationship between intermittency in scalar dissipation rate and energy dissipation rate. *Aishwarya Nair, Luis Vila Castro and Siddhartha Verma*	**Id458** Vortex detection with machine learning. *Sergio de María-García, Òscar Garibo-i-Orts, Alba Baeza-Boscá, Albert Ferrando, J. Alberto Conejero and Miguel Ángel García-March*	**Id509** Learning turbulent model from sparse data through data assimilation and machine learning.. *Raphael Villiers, Vincent Mons, Denis Sipp, Éric Lamballais and Marcello Meldi*
Lagrangian turbulence III Room S05 Chair: Maurizio Carbone, University of Bayreuth	**Id225** Non-Gaussianity and incompressibility in turbulent relative dispersion. *Benjamin Devenish and David Thomson*	**Id229** Effects of anisotropy on the geometry of tracer particle trajectories in turbulent flows. *Y. Hengster, M. Lellep, J. Weigel, M. Bross, J. Bosbach, D. Schanz, A. Schröder, F. Huhn, M. Novara, D. Garaboa Paz, C. J. Kähler and M. Linkmann*	**Id239** Revisiting Taylor's Hypothesis for Homogeneous Turbulent Shear Flow. *Frank Jacobitz and Kai Schneider*	**Id269** An experimental study on particle-pair dispersion in bubble-induced turbulence. *Tian Ma, Shiyong Tan, Hendrik Hessenkemper, Anna Sommer, Kerstin Eckert, Rui Ni and Andrew Bragg*	**Id326** Lagrangian curvature statistics from Gaussian sub-ensembles in von Kármán flow and Rayleigh-Bénard convection. *Yasmin Hengster and Moritz Linkmann*	**Id342** Insights into bubble--particle collisions with gravity from point-particle simulations. *Timothy Chan and Dominik Krug*	**Id362** Spontaneous stochasticity in the presence of intermittency. *André Considera and Simon Thalabard*	**Id387** Turbulence effect on the bubble-particle collision efficiency. *Linfeng Jiang and Dominik Krug*
LES II Room S06 Chair:	**Id270** A zonal RANS/LES method for rotor-stator wakes. *Jannik Borgelt, Matthias Meinke and Wolfgang Schröder*	**Id272** Approximate Deconvolution vs. Unresolved Scale Estimation Model - Burgers turbulence analysis. *Andrzej Boguslawski and Karol Wawrzak*	**Id300** Subgrid-scale modelling towards large-eddy simulation of laminar-turbulent transitional flows: methodology and application. *Zuoli Xiao and Xiaole Wang*	**Id404** Study of the contribution of noise sources during rocket take-off using LES. *Mara S. Escarti-Guillem, Sergio Hoyas Calvo and Luis M. García-Raffi*	**Id413** Tensorial viscosity model for LES of complex flows. *Antonella Abbà, Andrea Cimarelli and Massimo Germano*	**Id498** Synchronisation between large eddy simulations and direct numerical simulations via sequential data assimilation. *Jian Li, Mengdan Tian and Yi Li*		
Reacting Turbulent Flows I Room N01. Chair:	**Id84** Modeling the boundary-layer flashback of premixed hydrogen enriched swirling flames at high pressures. *Shiming Zhang, Zhen Lu and Yue Yang*		**Id97** Skin friction law in the compressible turbulent channel flows. *Yubin Song, Peng Zhang and Zhenhua Xia*	**Id149** Direct numerical simulation of supersonic turbulent skin-friction reduction via the boundary-layer combustion. *Chuhan Wang and Chunxiao Xu*	**Id288** Supersonic hydrogen combustion induced by shock waves. *Francesco De Vita, Mario Di Renzo and Giuseppe Pascazio*	**Id398** Impact of a bluff-body design on dynamics of turbulent non-premixed hydrogen flame. *Agnieszka Wawrzak, Lena Caban, Artur Tyliszczak and Epaminondas Mastorakos*		
Instability and Transition VI Room AirNostrum. Chair: Dongdong Xu, The University of Sheffield	**Id350** Transition to turbulence without large-scale flow. *Sebastien Gome, Alienor Riviere, Laurette Tuckerman and Dwight Barkley*	**Id353** Analysis of turbulent bands in planar shear flows. *Santiago Benavides, Laurette Tuckerman and Dwight Barkley*		**Id370** Three-dimensional laminar-turbulent transition mechanisms downstream of a bioprosthetic aortic valve. *Karoline-Marie Bornemann and Dominik Obrist*	**Id376** Helical Turbulence - the Transition between 2D and 3D Turbulence. *Schahin Akbari and Martin Oberlack*	**Id378** Excitation and evolution of subsonic Gortler vortices excited by elevated frees-tream vortical disturbances. *Dongdong Xu and Pierre Ricco*	**Id407** Effect of neutrally buoyant particles on transitional pipe flow characteristics.. *Rishav Raj, Alban Potherat and Chris Pringle*	**Id411** Stall cells identification through global stability of turbulent mean-flows: a data-assimilation approach. *Konstantinos Sarras, Cynthia Tayeh, Vincent Mons, Olivier Marquet and Denis Sipp*

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Intermittency and scaling III Room Salón de actos Chair: Carlos B. Silva, IDMEC	**Id302** DNS data analysis of the velocity-gradient tensor in high Reynolds number isotropic turbulence. *Takashi Ishihara, Masashi Miyamoto and Yukio Kaneda*	**Id348** Turbulent/non-turbulent interfaces bounding regions of equilibrium and non-equilibrium turbulence. *Marco Zecchetto, Tomoaki Watanabe, Nagata Kouji and Carlos B. da Silva*	**Id386** Symmetry-induced high-moment turbulent scaling laws of a spatially evolving turbulent round jet. *Cat Tuong Nguyen and Martin Oberlack*	**Id394** Isotropy and a finite dimensional eigenvalue problem from the Lundgren hierarchy of turbulence. *Simon Goertz, Johannes Conrad, Dominik Plümacher and Martin Oberlack*	**Id432** Inertial range scaling of inhomogeneous turbulence. *Wouter Bos and Ryo Araki*	**Id449** Three-dimensional kinetic energy spectrum analysis of homogenous turbulence using Shake-The-Box LPT. *Tom Buchwald, Philipp Godbersen, Daniel Schanz and Andreas Schröder*	**Id477** Tracking complex singularities of fluids on log-lattices. *Quentin Pikeroen and Berengere Dubrulle*	**Id491** Assessing non-Oberbeck-Boussinesq effects of convection in cryogenic helium. *Michal Macek, Georgy Zinchenko, Jakub Urban, Vera Musilaova, Pavel Urban and Joerg Schumacher*
Vortex Dynamics VI Room S01 Chair:	**Id393** A hot-wire anemometry guide on where to or not to measure.. *Patricia Sujar-Garrido, Carola Schmidt, Bettina Frohnapfel and Ramis Örlü*	**Id420** Effect of Turbulence Modeling on Rotor Performance Prediction for NASA's Tiltwing Air Taxi Concept. *David Garcia Perez, Patricia Ventura Diaz and Seokkwan Yoon*	**Id456** Modal Analysis of the Wake of a Supercritical Two-Dimensional Airfoil in Transonic Buffet Conditions. *Yin Yi Kwong, Christopher Schauerte and Anne-Marie Schreyer*	**Id462** Effect of free-stream turbulence on wake flows of an array of square cylinders. *Saad Inam, Cung Nguyen, Davide Lasagna, Marco Placidi and Zheng-Tong Xie*	**Id471** 1D Chain of Coupled Pendulum in a Turbulent Flow. *Jishen Zhang and Stéphane Perrard*	**Id475** On the evolution of flow, pressure, lift, and moment during dynamic stall of an oscillating airfoil. *Jibu Jose, Yuhui Lu, Karuna Agarwal and Joseph Katz*		
Geophysical Flows VII Room S02 Chair: Marten Klein, BTU Cottbus-Senftenberg	**Id397** Drag reduction with wall-attached ferrofluid films in a turbulent channel flow. *Marius Mihai Neamtu-Halic, Markus Holzner and Laura Maria Stancanelli*	**Id418** Investigating dissipative roughness effects on turbulent drag using a stochastic turbulence model. *Juan A. Medina M., Marten Klein and Heiko Schmidt*	**Id455** Laminarisation and turbulence enhancement of non-uniform body force influenced flows. *Stephen Jackson and Shuisheng He*	**Id483** Control of shock-induced separation over compliant surfaces. *Anne-Marie Schreyer and Deepak Prem Ramaswamy*	**Id497** Cardiac-cycle inspired drag reduction in turbulent pipe flow. *Davide Scarselli, Jose M. Lopez, Atul Varshney and Björn Hof*			
Wall-Bounded turbulence IV Room S03 Chair: Angela Busse, University of Glasgow	**Id102** Drag prediction of rough-wall turbulent flows via data-driven methods. *Zhaoyu Shi, Sangseung Lee, Seyed Morteza Khorasani, Heesoo Shin and Shervin Bagheri*	**Id211** High-fidelity simulations of simplified urban flows. *Gerardo Zampino, Marco Atzori, Soledad Le Clainche, Sergio Hoyas and Ricardo Vinuesa*	**Id347** Data-driven optimization of rough surfaces for convective heat transfer enhancement. *Rafael Diez Sanhueza, Ido Akkerman and Jurriaan Peeters*	**Id366** A physics-informed data-driven Immersed Boundary Method using online sequential Data Assimilation. *Miguel M. Valero and Marcello Meldi*	**Id368** Investigation of turbulent flows over regular roughness in the limit of low planform and frontal solidity. *Angela Busse and Oleksandr Zhdanov*	**Id402** Direct numerical simulation of the interaction between collinear gravity waves and turbulence in open-channel flows. *Aman G. Kidanemariam, Jason Monty and Ivan Marusic*	**Id405** Large eddy simulation of fluid/structure interaction of two in-line cylinders in a turbulent flow. *Pierre-Emmanuel Angeli and Maria Adela Puscas*	**Id444** Extremely causal events of turbulent channel flow. *Kosuke Osawa and Javier Jiménez*

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Wall-Bounded turbulence V Room S04 Chair: Javier Jiménez, UPM	**Id508** The structure of large events in the production mechanisms of enstrophy and strain rate in the transitioning and recirculating flow around a wing. *Juan Carlos Bilbao-Ludena and George Papadakis*	**Id391** Integral identities for the study of the skin-friction coefficient of incompressible and compressible boundary layers. *Pierre Ricco, Dongdong Xu, Lian Duan and Martin Skote*	**Id468** Wall-bounded turbulence without self-sustaining process. *Carlos Hernandez, Qiang Yang and Yongyun Hwang*	**Id493** Interactions between large-scale coherent and small-scale incoherent structures in turbulent pipe flow. *Amir Shahirpour and Jörn Sesterhenn*				
Lagrangian turbulence IV Room S05 Chair: Romain Volk, Ecole Normale Supérieure de Lyon	**Id399** Anomalous Dissipation and Spontaneous Stochasticity in Surface Quasi-Geostrophic Flow. *Nicolas Valade, Simon Thalabard and Jérémie Bec*	**Id406** Alignment of inertial fibers in turbulence and two-way coupling effects. *Alessandro Gambino, Stefano Brizzolara, Marius Mihai Neamtu Halic, Ron Shnapp, Andrea Mazzino and Markus Holzner*	**Id416** Modal characterization of the temporal dynamics in particle-laden turbulence. *Martin Schiødt, Azur Hodzic, Fabien Evrard, Max Hausmann, Berend Van Wachem and Clara Velte*	**Id440** Settling of moderately dense inertial particles in turbulence. *Romain Volk, Benjamin Laplace, Nicolas Plihon and Mickael Bourgoin*	**Id441** Lagrangian properties of Rayleigh-Benard convection in large aspect ratio containers. *Stephan Weiss, Daniel Schanz, Andreas Schroeder and Johannes Bosbach*	**Id459** On forward-backward dispersion in anisotropic turbulence. *Sebastian Gallon, Fabio Feraco, Alessandro Sozza, Raffaele Marino and Alain Pumir*	**Id461** A generative model of the velocity gradient dynamics in turbulence based on normalizing flows. *Maurizio Carbone, Vincent Peterhans, Alexander Ecker and Michael Wilczek*	
Atmospheric Flows II Room S06 Chair: Oliver Buxton, Imperial College London	**Id307** Balanced non-equilibrium turbulence. *Konstantinos Steiros*	**Id318** Analysis of upstream wake induced loads to optimize the design layout of an array of cylinders. *Francisco Oliveira, Zahra Khodaei and Oliver Buxton*	**Id343** A spectral-element solver for LES of the atmospheric boundary layer. *Timofey Mukha, Linnea Huusko, Geert Brethouwer, Philipp Schlatter and Gunilla Svensson*	**Id363** Performance of algebraic subgrid-scale models in LES of the stable boundary layer. *Vladimír Fuka*	**Id421** Investigation on wall-resolved and wall-modeled large-eddy simulations of a barotropic convective boundary layer. *Tariq Ridwan, David Pino and Adeline Montlaur*	**Id486** Do marginally-stable manifolds chart chaos? *Alessia Ferraro, Gregory Chini and Tobias M. Schneider*	**Id463** Detection of organised flow structures in real atmosphere. *Radka Kellnerová and Klára Jurčáková*	**Id487** Impact of Negative Geostrophic Wind Shear on Wind Farm Performance. *Anja Stieren, Jens Kasper, Srinidhi Nagarada Gadde and Richard Stevens*
Reacting Turbulent Flows II Room N01. Chair: David Rodríguez, Instituto Nacional de Técnica Aeroespacial	**Id313** Data Augmentation for Turbulent Combustion Modelling by using PCA-GAN. *Tota Kobayashi and Mamoru Tanahashi*	**Id317** Compressible turbulent boundary layers with heat transfer and pressure gradients. *Tobias Gibis and Christoph Wenzel*	**Id331** Turbulent flame structure of steam-diluted oxygen and hydrogen non-premixed combustion on a multi-cluster burner. *Yuki Tochinai, Ryuta Miyashita, Masayasu Shimura and Mamoru Tanahashi*	**Id385** Turbulent Rankine-Hugoniot Relations. *Jesse Canfield, Len Margolin and Kendra Van Buren*	**Id426** Turbulence and combustion performance for space propulsion applications. *Daniel Martinez-Sanchis, Andrej Sternin and Oskar Haidn*	**Id427** Flame-generated turbulence in combustion for space propulsion. *Andrej Sternin, Daniel Martinez-Sanchis and Oskar Haidn*	**Id502** The vKHM Relation for Energy Transfer in Isothermal Compressible Turbulence. *Alexei Kritsuk*	**Id430** Subgrid-scale modelling of premixed flames using artificial neural networks in large eddy simulations. *Jian Teng, Zelong Yuan and Jianchun Wang*
Instability and Transition VII Room AirNostrum. Chair: Julien Salort, CNRS	**Withdrawn**	**Id447** Prediction of turbulent systems from limited measurements by using data assimilation methods. *Vikrant Gupta and Minping Wan*	**Id457** Spatial stability of a heated falling film down slippery plane. *Arnab Choudhury and Arghya Samanta*	**Id460** Experimental Investigation of the Turbulent Boundary Layer Over Rough Young Wavy Water Surface. *Lizeth Rubio and Meital Geva*	**Id464** The building blocks of spiral defect chaos above the onset of Rayleigh-Bénard convection. *Chi Hin Chan, Mohammad Hossain, Yongyun Hwang and Spencer Sherwin*	**Id492** The onset of fully turbulent pipe flow. *Elena Marensi and Björn Hof*	**Id499** Optimal orientation of oblique turbulent stripes in planar shear flows. *Roger Ayats, Gökhan Yalnız, Fernando Mellibovsky, Alvaro Meseguer and Björn Hof*	**Id504** Turbulence maintenance limitation at low Reynolds number in annular Couette flow with very small radius ratios. *Kazuki Kohyama and Takahiro Tsukahara*

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