

Thursday 29

09:00 – 09:20

Registration

09:20 – 11:00

Senior plenary lectures

Aula Magna Chair: Simone Morganti, Lorenzo Tamellini, Pietro Zanotti

09:20 – 09:30 **Welcome**

09:30 – 10:15 **Antonia Larese** *The Material Point Method and beyond*

10:15 – 11:00 **Giancarlo Sangalli** *Space-time IGA*

11:00 – 11:30

Coffee break

Cortile Sforzesco

11:30 – 13:30

Junior plenary lectures

Aula Magna Chair: Luca Formaggia, Giorgio Fotia, Giovanni Garcea, Sonia Marfia

11:30 – 12:00 **Francesco Regazzoni** *Automatic discovery of low-dimensional dynamics underpinning time-dependent PDEs by means of Neural Networks*

12:00 – 12:30 **Alessia Patton** *Advanced isogeometric methods with a focus on composite laminated structures*

12:30 – 13:00 **Giulia Bertaglia** *Uncertainty quantification methods for PDEs with applications to biomathematics*

13:00 – 13:30 **Lorenzo Tentarelli** *A mathematical model for quantum technologies*

13:30 – 15:00

Lunch break

Cortile Sforzesco

Thursday 29**15:00 – 16:45****Minisymposia session 1**

Aula Scarpa **MS 15 - Computational models as enabling technologies for (bio)printing design and tissue engineering applications - Part 1**
Chair: Gianluca Santesarti

15:00 – 15:20	Anand	<i>In silico Approaches Towards Biofabrication of Human Eardrum Scaffolds</i>
15:20 – 15:40	Di Gravina	<i>Computational modelling of a milli-scale perfusion bioreactor for vascular applications</i>
15:40 – 16:00	Chiesa	<i>Computational framework for 4D bioprinting</i>
16:00 – 16:20	D'Andrea	<i>Finite Element Models of Bio-ceramic Scaffolds for Bone Tissue Engineering: design and characterization</i>
16:20 – 16:40	Santelli	<i>Modelling and simulation of macroscopic flows of dense suspensions</i>

Aula Magna **MS 08 - Physics-based Machine Learning for Engineering Simulation and Digital Twin - Part 1**
Chair: Caterina Millevoi, Nicolò Spiezia

15:00 – 15:20	Fresca	<i>Deep learning-based reduced order models for the real-time approximation of parametrized PDEs</i>
15:20 – 15:40	Cicci	<i>Deep learning-enhanced model order reduction in nonlinear structural mechanics</i>
15:40 – 16:00	Millevoi	<i>PINN-based models for coupled hydro-poromechanics simulations</i>
16:00 – 16:20	Strazzullo	<i>Physics-informed Neural Networks for parametric partial differential equations and optimal control</i>

Aula Foscolo **MS 17 - Isogeometric methods - Part 1**
Chair: Alessia Patton, Michele Torre

15:00 – 15:20	Fraschini	<i>Stability of space-time isogeometric methods for wave propagation problems</i>
15:20 – 15:40	Ignesti	<i>An improved isogeometric collocation formulation for spatial multi-patch shear-deformable beams with arbitrary initial curvature</i>
15:40 – 16:00	Nitti	<i>Neuromechanical features of jellyfish propulsion: a mixed isogeometric/finite-difference model</i>
16:00 – 16:20	Divi	<i>Topology-preservation, residual-based error estimation and adaptivity for scan-based immersed isogeometric analysis</i>
16:20 – 16:40	Torre	<i>Isogeometric collocation method for cardiac muscle simulations</i>

Aula Volta **MS 01 - Efficient linear solvers for coupled geophysical simulations.**
Chair: Andrea Franceschini, Laura Gazzola

15:00 – 15:20	Boon	<i>A solution technique for Darcy flow in fractured porous media that ensures local mass conservation</i>
15:20 – 15:40	Durastante	<i>Scalability Results for the Solution of the Richards Equation</i>
15:40 – 16:00	Grappein	<i>An iterative solving strategy for 3D-1D coupled problems under an optimization based approach</i>
16:00 – 16:20	Tavelli	<i>A high order parallel semi-implicit DG scheme for linear elasticity on staggered unstructured meshes</i>

Aula Studentesse **MS 16 - Kernel methods for computational sciences and simulation**
Chair: Francesco Marchetti

15:00 – 15:20	Karimnejad Esfahani	<i>Moving Least Square Approximation using Variably Scaled Discontinuous Weight Functions</i>
15:20 – 15:40	Perracchione	<i>Kernels and parametric fitting for first hard X-ray imaging results by Solar Orbiter STIX</i>
15:40 – 16:00	Piazzola	<i>Comparing Multi-Fidelity Radial Basis Function and Multi-Index Stochastic Collocation surrogates for ship resistance uncertainty quantification</i>
16:00 – 16:20	Santin	<i>Probabilistic sampling for high dimensional kernel based approximation</i>
16:20 – 16:40	Taddei	<i>Registration-based model reduction of parameterized advection-dominated PDEs</i>

16:45 – 17:15**Coffee break****Cortile Sforzesco**

Thursday 29**17:15 – 19:00****Minisymposia session 2**

Aula Scarpa **MS 15 - Computational models as enabling technologies for (bio)printing design and tissue engineering applications - Part 2**
Chair: Franca Scocozza

17:15 – 17:35	Borgiani	Multiscale agent-based model to investigate the mechano-biological regulation of bone fracture healing inflammatory stage
17:35 – 17:55	Loi	FEM analysis for supporting the design of a bioreactor to burst in-vitro skeletal muscle differentiation of 3D bioprinted construct
17:55 – 18:15	Bonatti	Artificial intelligence for quality control and parameter optimization in extrusion based bioprinting
18:15 – 18:35	Santesarti	A computational framework for cells extrusion in bioprinting

Aula Magna **MS 08 - Physics-based Machine Learning for Engineering Simulation and Digital Twin - Part 2**
Chair: Caterina Millevoi, Nicolò Spiezia

17:15 – 17:35	Romor	<i>Nonlinear manifold Reduced Order Models with Convolutional Autoencoders and Reduced Over-Collocation method</i>
17:35 – 17:55	Schotthöfer	<i>Neural network-based, structure-preserving entropy closures for the Boltzmann moment system</i>
17:55 – 18:15	Mezzadri	<i>Physics-informed neural networks on parameterized shapes: a new tool for surrogate modeling for shape optimization</i>
18:15 – 18:35	Pintore	<i>Variational Physics-Informed Neural Networks: an a posteriori error analysis</i>

Aula Foscolo **MS 17 - Isogeometric methods - Part 2**
Chair: Alessia Patton, Michele Torre

17:15 – 17:35	Sande	<i>Application of optimal spline spaces for the removal of spurious outliers in isogeometric discretizations</i>
17:35 – 17:55	D'Inverno	<i>Hierarchical matrices techniques for Helmholtz problem in IgABEM setting</i>
17:55 – 18:15	Tesini	<i>Upwinding IgA</i>
18:15 – 18:35	Loli	<i>Isogeometric multi-patch C^1-mortar coupling for the bilaplace equation</i>

Aula Volta **MS 18 - Applied mathematics and computational mechanics**
Chair: Lorenzo Tamellini, Pietro Zanotti

17:15 – 17:35	Rinaldi	<i>Modelling for bread preparation to avoid energy waste</i>
17:35 – 17:55	Pu	<i>An analytical framework to compute elastic waves propagation along finite-size metasurfaces</i>
17:55 – 18:15	De Reggi	<i>Numerical investigation of the stability of age-structured models with nonlocal diffusion of Dirichlet type</i>

Aula Studentesse **MS 14 - Young developments on dynamical low-rank approximation**
Gianluca Ceruti, Jonas Kusch

17:15 – 17:35	Schrammen	<i>Dynamical low-rank integrators for second-order matrix differential equations</i>
17:35 – 17:55	Sulz	<i>Rank-adaptive time integration of tree tensor networks</i>
17:55 – 18:15	Stammer	<i>A robust collision source method for rank adaptive dynamical low-rank approximation in radiation therapy</i>
18:15 – 18:35	Cassini	<i>Efficient 6D Vlasov simulation using the dynamical low-rank framework Ensign</i>
18:35 – 18:55	Zangrando	<i>Dynamical low-rank training of neural networks</i>

Friday 30**09:00 – 9:30****Meet GIMC & SIMAI****Aula Magna** Chair: Luca Formaggia, Giorgio Fotia, Giovanni Garcea, Sonia Marfia**09:30 – 11:15****Minisymposia session 3****Aula Scarpa** **MS06 - Enabling Technologies for Uncertainty Quantification and Optimization in Real-World Applications - Part 1**
Chair: Riccardo Pellegrini, Chiara Piazzola

09:30 – 09:50	Marcati	<i>Operator network approximations for some elliptic parametric PDEs</i>
09:50 – 10:10	Franco	<i>Uncertainty Quantification for parametrized PDEs using Deep Orthogonal Decomposition</i>
10:10 – 10:30	Cracco	<i>Deep-learning based ROMs for fast transient dynamics</i>
10:30 – 10:50	Pradovera	<i>Non-intrusive surrogate modeling of frequency response surfaces via locally adaptive sparse grids</i>
10:50 – 11:10	Lei	<i>State augmentation method for buffeting analysis of structures subjected to non-stationary wind</i>

Aula Magna **MS09 - Mechanics of Biological Systems: Models and Experiments - Part 1**
Chair: Luca Bellino, Giulio Lucci

09:30 – 09:50	Ballatore	<i>A continuum multiphase model to predict growth and invasion of brain tumours</i>
09:50 – 10:10	Bertaglia	<i>On mathematical models and methods for 1D fluid-structure interaction problems in computational hemodynamics</i>
10:10 – 10:30	Di Stefano	<i>Multi-scale modelling of cell-matrix interactions</i>
10:30 – 10:50	F. Dal Poggetto	<i>Harnessing tonotopy: bio-inspired spiral structures</i>
10:50 – 11:10	Pozzi	<i>T-cell therapy against cancer: a predictive diffuse-interface mathematical model informed by pre-clinical studies.</i>

Aula Foscolo **MS 11 - Computational methods for nonlinear solid mechanics - Part 1**
Chair: Domenico Magisano, Nicola Nodargi

09:30 – 09:50	Fu	<i>A new Lagrangian-Eulerian Particle Finite Element Method (PFEM) with automatic interface detection</i>
09:50 – 10:10	Rizzieri	<i>A PFEM numerical model for the simulation of 3D concrete printing</i>
10:10 – 10:30	Liguori	<i>Thermoelastic analysis of geometrically nonlinear shells using an isogeometric model</i>
10:30 – 10:50	Magisano	<i>A generalized path-following analysis for tracing the sensitivity curve in shell buckling</i>

Aula Volta **MS 12 - Poromechanics and fluid flows**
Chair: Nicolas Barnafi, Pietro Zanotti

09:30 – 09:50	Barré	<i>A fully dynamic poromechanics model for incompressible and nearly-incompressible materials: existence of solutions and projection scheme</i>
09:50 – 10:10	Botti	<i>Multiphysics wave propagation in porous media with polytopal Discontinuous Galerkin methods</i>
10:10 – 10:30	Busetto	<i>Virtual Element based geometric multigrid solvers for the Poisson Equation</i>
10:30 – 10:50	Franceschini	<i>A contact mechanics and fracture flow: a stabilized formulation and a scalable preconditioning framework mechanics</i>
10:50 – 11:10	Levi	<i>Variational principles for the linear viscoelastic problem</i>
11:10 – 11:30	Rott	<i>Pressure robust a-posteriori bounds with error-dominated oscillation</i>

Aula Studentesse **MS04 - Largescale Linear Algebra Problems: Solvers for Scientific Challenges**
Chair: Fabio Durastante, Isabella Furci

09:30 – 09:50	Massei	<i>Improved parallel-in-time integration via low-rank updates and interpolation</i>
09:50 – 10:10	Ferrari	<i>Symbol-based multigrid methods for linear systems in saddle-point form</i>
10:10 – 10:30	Pes	<i>Minimal-norm Gauss-Newton method for large scale problems</i>
10:30 – 10:50	Faccio	<i>A comparison of different graph-theoretic measures for identifying low- and high-density forms of liquid water</i>
10:50 – 11:10	Benedusi	<i>Monolithic solution strategies for large-scale computational problems from physiology and astrophysics</i>

Aula Lauree **MS10 - Advanced methods and computational approaches for the mechanics of heterogeneous materials – Part 1**
Chair: Daniele Bianchi, Elisabetta Monaldo

09:30 – 09:50	Lenarda	<i>Multi-phase field approach to tensile and compressive failures in granular materials</i>
09:50 – 10:10	Zoboli	<i>Multiscale And Multiphysics Computational Mechanics of Nuclear Fusion Magnet Systems</i>
10:10 – 10:30	Ricci	<i>Unsupervised discovery of constitutive laws: experimental validation for hyperelastic materials</i>
10:30 – 10:50	Gavazzoni	<i>Mesh adaptation-driven inverse homogenization for multi-physics architected lattices</i>
10:50 – 11:10	Gaziano	<i>Osteon failure mechanics: a multi-scale computational model</i>

11:15 – 11:45**Coffee break****Cortile Sforzesco**

Friday 30

11:45 – 13:30

Minisymposia session 4

Aula Scarpa **MS06 - Enabling Technologies for Uncertainty Quantification and Optimization in Real-World Applications - Part 2**
Chair: Riccardo Pellegrini, Chiara Piazzola

11:45 – 12:05	Sgattoni	<i>Retrieval of surface emissivity from FORUM-EE9 simulated measurements: optimization of constraints</i>
12:05 – 12:25	Di Fiore	<i>Multifidelity Optimization for Engineering Design: Space Application</i>
12:25 – 12:45	Pehlivan Solak	<i>Aft form optimization of ships using surrogate models</i>
12:45 – 13:05	Gander	<i>Space-time shape uncertainties in the forward and inverse problem of electrocardiography</i>
13:05 – 13:25	Gazzola	<i>A sequential data-integration approach to reduce uncertainty on land subsidence modeling</i>
13:25 – 13:45	Di Giovacchino	<i>Stochastic Korteweg-de Vries equation: structure-preserving numerical issues</i>

Aula Magna **MS09 - Mechanics of Biological Systems: Models and Experiments - Part 2**
Chair: Vincenzo Fazio, Giulio Lucci

11:45 – 12:05	Giammarini	<i>A biphasic elasto-plastic model for the compression-release test of multicellular aggregates</i>
12:05 – 12:25	Greco	<i>Experimental nanomechanics of natural or artificial spider silks</i>
12:25 – 12:45	Recrosi	<i>On the interplay between activity, elasticity and diffusion in self-contractile biopolymer gels</i>
12:45 – 13:05	Serpelloni	<i>Mechanobiological insights into receptor dynamics</i>
13:05 – 13:25	Vitucci	<i>Predictive multi-scale models for hysteresis, induced anisotropy and residual stretches in soft biomaterials</i>
13:25 – 13:45	Bulai	<i>Modeling metastatic tumor evolution, numerical resolution and growth prediction</i>

Aula Foscolo **MS 11 - Computational methods for nonlinear solid mechanics - Part 2**
Chair: Nicola Nodargi, Francesco Liguori

11:45 – 12:05	Marengo	<i>Phase-field modeling of brittle fracture in plane stress conditions</i>
12:05 – 12:25	Corrado	<i>Large displacement elastoplastic analysis of beams and shells: Finite elements and mixed iterative solution</i>
12:25 – 12:45	Cornaggia	<i>A novel Linear Complementarity Problem implementation for elastic-plastic structural optimisation of cable-rib satellite antennas</i>
12:45 – 13:05	Nodargi	<i>Static limit analysis of masonry vaults: A generalized thrust network analysis</i>

Aula Volta **MS02 - Polygonal and polyhedral methods: theory and applications – Part 1**
Chair: Lorenzo Mascotto

11:45 – 12:05	Frittelli	<i>The virtual element method for bulk-surface PDEs and its application to battery modeling</i>
12:05 – 12:25	Borio	<i>Hybrid mimetic finite-difference and virtual element formulation for coupled poromechanics</i>
12:25 – 12:45	Marcon	<i>A stabilization free virtual element method</i>
12:45 – 13:05	Montardini	<i>Virtual Element Method for image-based domain approximation</i>
13:05 – 13:25	Crippa	<i>Artificial Neural Network evaluation of Poincaré constant for Voronoi polygons</i>

Aula Studentesse **MS07 - Mathematical model in biomedicine: from optimization to machine learning – Part 1**
Chair: Sabrina Gustavino, Sara Sommariva

11:45 – 12:05	Erb	<i>Data-optimized models for reconstruction in Magnetic Particle Imaging with realistic magnetic fields</i>
12:05 – 12:25	Amerighi	<i>Sparse optimization of neural cross-power spectrum from indirect electromagnetic data</i>
12:25 – 12:45	Razzetta	<i>Biomedical Ultrasound Beam Patterns Optimization: from a stochastic approach to neural networks.</i>
12:45 – 13:05	Morotti	<i>A new converging approach for learnt optimization in CT image reconstruction</i>
13:05 – 13:25	Franchini	<i>Neural architecture search via standard machine learning methodologies</i>

Aula Lauree **MS10 - Advanced methods and computational approaches for the mechanics of heterogeneous materials – Part 2**
Chair: Daniele Bianchi, Elisabetta Monaldo

11:45 – 12:05	Sangiorgio	<i>Algorithmic processes to generate building components with complex or heterogeneous fillings</i>
12:05 – 12:25	Bertani	<i>A simple procedure for the definition of masonry strength domain</i>
12:25 – 12:45	Bonari	<i>Indentation of coated deformable layers analyzed via a new FE contact scheme</i>
12:45 – 13:05	Marulli	<i>An efficient computational approach for indentation-induced fracture based on the phase-field approach and interface finite elements with embedded roughness</i>

13:30– 15:00

Lunch break

Cortile Sforzesco

Friday 30**15:00 – 16:45****Minisymposia session 5****Aula Magna MS13 - In silico approaches to advance and personalize cardiovascular medicine**
Chair: Alessandro Caimi, Francesco Sturla

15:00 – 15:20	Carbonaro	<i>Self-expandable transcatheter aortic valves: Impact of Nickel-Titanium super-elastic material properties on the device mechanical performance</i>
15:20 – 15:40	Danielli	<i>A comprehensive study to develop a numerical model of the left atrial appendage occlusion</i>
15:40 – 16:00	Ceserani	<i>Patient-specific computational fluid dynamics simulation before and after surgery in stenotic carotid arteries</i>
16:00 – 16:20	Collia	<i>Evaluation of the Double Outlet Right Ventricle (DORV) through numerical simulations</i>
16:20 – 16:40	Saitta	<i>Non-invasive pressure estimation in abdominal aortic aneurysm: comparison among 4D flow MRI, CFD and 4DVar</i>

Aula Foscolo MS05 - Advances in spline constructions for geometric modeling & processing and numerical simulations
Chair: Antonella Falini, Sofia Imperatore

15:00 – 15:20	Kreusser	<i>An interpolatory view of spline weighted least squares approximation</i>
15:20 – 15:40	Sacco	<i>3D data stream interpolation with PH quintic splines for path planning applications</i>
15:40 – 16:00	Belhachmi	<i>A spline-based regularized method for the reconstruction of geological models from sparse data</i>
16:00 – 16:20	Verhelst	<i>A Quantitative Comparison of Smooth Multi-patch Constructions for Isogeometric Analysis</i>
16:20 – 16:40	Farahat	<i>Isogeometric Analysis with C1-smooth functions for multi-patch Kirchoff-Love shells</i>
16:40 – 17:00	Marsala	<i>Construction and Analysis of a G1-smooth polynomial family of Approximate Catmull-Clark Surfaces</i>

Aula Volta MS02 - Polygonal and polyhedral methods: theory and applications – Part 2
Chair: Michele Botti

15:00 – 15:20	Visinoni	<i>A family of Virtual elements for 3D elasticity problems</i>
15:20 – 15:40	Manuzzi	<i>Machine Learning based refinement strategies for polytopal grids with applications to Virtual Element and Discontinuous Galerkin methods</i>
15:40 – 16:00	Gomez	<i>A space-time virtual element method for the heat equation</i>
16:00 – 16:20	Bonetti	<i>Discontinuous Galerkin approximation of the fully-coupled thermo-poroelastic problem</i>
16:20 – 16:40	Bevilacqua	<i>BDDC preconditioners for 3D divergence free virtual element discretizations of the Stokes equations</i>

Aula Studentesse MS07 - Mathematical model in biomedicine: from optimization to machine learning – Part 2
Chair: Sabrina Gustavino, Sara Sommariva

15:00 – 15:20	Cama	<i>Quantitative imaging and radiomics: assessment of radiomics feature reliability in medical imaging</i>
15:20 – 15:40	Benfenati	<i>LearnedSVD approach for Diffuse Optical Tomography</i>
15:40 – 16:00	Bubba	<i>Deep Neural Networks for Inverse Problems with Pseudodifferential Operators: An Application to Limited Angle Tomography</i>
16:00 – 16:20	Candiani	<i>Classification of strokes in electrical impedance tomography: from the inverse problem to a neural networks approach</i>
16:20 – 16:40	Marchetti	<i>Optimizing while training: Score Oriented Losses (SOLs)</i>

Aula Lauree MS03 - Additive Manufacturing: Challenges and Perspectives
Chair: Massimo Carraturo

15:00 – 15:20	Oster	<i>Defect prediction in laser powder bed fusion based on thermographic features utilizing convolutional neural networks</i>
15:20 – 15:40	Magarò	<i>Multi-scale approach for the estimation of the stress-strain response of laser powder bed fusion lattice structure</i>
15:40 – 16:00	Chiappetta	<i>Uncertainty Quantification for Additive Manufacturing</i>
16:00 – 16:20	Mazzullo	<i>An Ontology-based Approach to Defect Detection in Additive Manufacturing</i>
16:20 – 16:40	Kopp	<i>Space-time hp-finite elements for heat evolution in laser powder bed fusion additive manufacturing</i>

16:45 – 17:15**Closing coffee break****Cortile Sforzesco**