

Sunday, November 5, 2023

18:30 - 20:30 **Welcom Reception (and pre-registration) - Location: Snodo/OGR (www.snodo.com); Corso Castelfidardo 22, Torino**

Monday, November 6, 2023

8:15 - 9:00 **Registration: Politecnico of Torino, Main Campus, Corso Duca degli Abruzzi, 24**

9:00-9:10 **MEMRISYS 2023 welcome: Greetings from the Rector of the Politecnico of Torino (AULA MAGNA)**

9:10-9:20 **MEMRISYS 2023 opening: Fernando Corinto, Daniele Ielmini, Carlo Ricciardi, Sabina Spiga**

Plenary session - AULA MAGNA

9:30 - 10:15 **Plenary Leon Chua** **Homemade \$ 10 Chua Corsage Memristor: Workhorse for Poor Man's Biological Neuron** *Chair: Fernando Corinto*

Coffe break - FOYER AULA MAGNA

10:45 - 11:30 **Plenary Heike Riel** **Quantum Computing – The Path to Quantum Advantage** *Chair: Sabina Spiga*

Parallel sessions

Room AULA MAGNA

Room EMMA STRADA

11:40 - 13:05 **Session 1: Memristive devices and networks; Chairs: A. Sebastian and H. Wu**

Session 2: Memristive networks I; Chairs: Andrea Redaelli and Elliot Fuller

11:40 - 12:05 **Invited 188 Damien Querlioz** Towards Self-Powered AI: Harnessing Memristor-Based Bayesian and Binarized Neural Networks for Edge Computing

11:40-12:05 **Invited 183 Shinhyun Choi, Hakcheon Jeong, See-On Park, Taehoon Park, Seokho Seo and Seok-man Hong** Development and Application Demonstration of Highly Reliable Memristors

12:05 - 12:20 **Oral-S 27 Olga Krestinskaya, Mohammed E. Fouda, Ahmed Eltawil and Khaled N. Salama** Neural Architecture Search for Memristor-based In-memory Computing Applications

12:05-12:30 **Invited 156 John Paul Strachan, D. Strukov, M. Hizzani, G. Hutchinson, A. Heitmann, D. Dobrynin, T. Bhattacharya, G. Pedretti, T. Van Vaerenbergh, I. Rozada, F. de Haas and R. Beausoleil** Using memristors for in-memory, mixed analog-digital computing in optimization problems

12:20-12:35 **Oral 103 M. Csontos, Y. Horst, N. J. Olalla, U. Koch, I. Shorubalko, A. Halbritter and J. Leuthold** Resolving the dynamics of picosecond time-scale resistive switching

12:30-12:45 **Oral 185 Rui Wang, Tuo Shi, Xumeng Zhang, Jinsong Wei, Jian Lu, Jiaxue Zhu, Zuheng Wu, Qi Liu and Ming Liu** Implementing in-situ Self-organizing Maps with Memristor Crossbar Arrays

12:35-12:50 **Oral 106 Boris Hudec, Che-Chia Chang and Tuo-Hung Hou** Probing degradation mechanisms of oxide analog memristors by a combination of thin film spectroscopy techniques

12:45-13:00 **Oral 31 Tobias Kirchner, Taha Soliman and Luca Parrini** Flexible but precise Analog in-Memory Compute Design with current mode ADCs

12:50-13:05 **Oral 145 Andras Halbritter, A. Nyary, B. Santa, L. Posa and Z. Balogh** Noise spectroscopy of memristive devices: from steady state fluctuations to nonlinear noise diagnostics

Lunch break - FOYER AULA MAGNA

14:30-16:35 **Session 3: Memristive networks II; Chairs: Melika Payvand and Ronald Tetzlaff**

Session 4: Three-terminal memristors; Chairs: D. Kuzum and Y. van de Burgt

14:30 - 14:55 **Invited 150 Abu Sebastian** Continual learning using neuro-vector symbolic architectures and memristive in-memory computing

14:30 - 14:55 **Invited 121 Bilge Yildiz** Time-dependent programming of electrochemical synapses enabled by nonlinear voltage kinetics

14:55 - 15:20 **Invited 4 Andrea Redaelli** Embedded PCM: an enabler for IMC in AI accelerators

14:55 - 15:20 **Invited 74 Elliot Fuller** More is different: physical computing discovery

15:20 - 15:35 **Oral 10 Yubiao Luo and Zhong Sun** Compensation methods for in-memory computing

15:20 - 15:35 **Oral 48 Peng Lin, Peng Chen, Fenghao Liu and Gang Pan** Accurate Training of Neural Networks in Electrochemical Memristive Device Arrays

15:35 - 15:50 **Oral 136 Piergiulio Mannocci and Daniele Ielmini** In-memory singular value decomposition for next-generation massive MIMO

15:35 - 15:50 **Oral 66 Hisashi Inoue, H. Tamura, A. Kitoh, X. Chen, Z. Byambadorj, T. Yajima, Y. Hotta, T. Iizuka, G. Tanaka and I. H. Inoue** Tailoring oxygen diffusion dynamics in three-terminal devices for spiking reservoir computing

15:50-16:05 **Oral 86 Seokjin Oh, Rina Yoon, Seungmyeong Cho and Kyeong-Sik Min** Unconventional Computing Memristor Circuits Towards On-Edge Learning

15:50-16:05 **Oral-S 16 Himadri Nandan Mohanty, Tohru Tsuruoka, Jyoti Ranjan Mohanty and Kazuya Terabe** Proton-gated synaptic transistors, based on an EBL patterned Nafion electrolyte

16:05 - 16:20 **Oral-S 144 Sebastian Werner, Schmid, Z. Balogh, B. Santa, L. Posa and A. Halbritter** Noise diagnostics of nanoscale VO₂ Mott memristor devices

16:05 - 16:20 **Oral-S 126 Mila Lewerenz, E. Passerini, B. Cheng, M. Fischer, A. Emboras, M. Luisier, U. Koch and J. Leuthold** Pulsed Atomic-Scale Three-Terminal Memristor

16:20 - 16:35 **Oral 53 Woon Hyung Cheong and Kyung Min Kim** Molybdenum-based Stochastic 1T1M device for Homomorphic Encryption Accelerator

16:20 - 16:35 **Oral 61 Max Talanov** Memristive CPG simulation

16:40 - 17:40 **Round Table: "History of Memristors". Plenary Speakers: Masakazu Aono, Leon Chua, Rainer Waser; Chair: Carlo Ricciardi (EMMA STRADA)**

18:00-20:00 **classic music concert (optional)**

Oral-S Student papers are eligible for the **Best Oral Award** and are highlighted in grey

| Tuesday, November 7, 2023 | | | | | | | |
|--|---------|---|--|---|---------|---|---|
| 8:15 - 9:00 Registration | | | | | | | |
| Plenary session - AULA MAGNA | | | | | | | |
| 9:00 - 9:45 | Plenary | Saptarshi Das | 2D Memtransistors for Bio-inspired Computing | | | Chair: Daniele Ielmini | |
| 9:45 - 10:30 | Plenary | Wilfred van der Wiel | Materializing Cognition: Information Processing in Cognitive Matter | | | Chair: Carlo Ricciardi | |
| 10:30-11:00 Coffe break | | | | | | | |
| Parallel sessions | | | | | | | |
| Room AULA MAGNA | | | | Room EMMA STRADA | | | |
| Session 5: Neuromorphic and reservoir computing; Chairs: Stephan Menzel and Suin Yi | | | | Session 6: In-materia computing; Chairs: Gianluca Milano and Zdenka Kuncic | | | |
| 11:00-11:25 | Invited | 207 Duygu Kuzum | Integration of RRAM Crossbars and Mott ReLU Neurons for Efficient Implementation of Deep Neural Networks in Hardware | 11:00-11:25 | Invited | 7 Simon Brown | Brain-like Computation with Percolating Networks of Nanoparticles |
| 11:25-11:50 | Invited | 70 Melika Payvand | Structure-function duality in memristive intelligent systems | 11:25-11:50 | Invited | 202 Hirofumi Tanaka | In-sensor AI computing devices by random network of nanomaterials |
| 11:50-12:05 | Oral | 23 Ayoub Jaafar, Neil Kemp and Ruomeng Huang | Diffusive Memristors-Based Neuromorphic Switching and Reservoir Computing | 11:50-12:05 | Oral-S | 131 Fabio Michieletti, Gianluca Milano and Carlo Ricciardi | Self-organized criticality in memristive nanowire networks |
| 12:05-12:20 | Oral-S | 192 Carlos Silva, Jonas Deuermeier, Rodrigo Martins and Asal Kizadeh | ZTO-based resistive switching devices for brain-inspired neuromorphic applications | 12:05-12:20 | Oral-S | 25 Sabrina Artmeier, Jonathan Hiltz, Jonathan G. C. Veinot and Marc Tarnow | Single-Nanoparticle Based Memristors for Neuromorphic Computing |
| 12:20-12:35 | Oral-S | 12 Kaoru Shibata, Daiki Nishioka, Wataru Namiki, Tomoki Wada, Takashi Tsuchiya, Tohru Higuchi and Kazuya Terabe | A Redox-Based Ion-Gating Reservoir, Utilizing (104) Oriented LiCoO2 Film and Physical Masking | 12:20-12:35 | Oral | 94 Paolo Milani, Bruno Paroli and Marco Potenza | An Optical Neuromorphic Device for Classification and Pattern Recognition |
| 12:35-12:50 | Oral-S | 34 Dongkai Guo, Omesh Kapur, Peng Dai, Liudi Jiang, C. H. de Groot and Ruomeng Huang | Reservoir computing using back-end-of-line SiC based memristors | 12:35-12:50 | Oral-S | 98 Francesca Borghi, Giacomo Nadalin, Silvia Bressan and Paolo Milani | In-Materia Adaptive Computing Devices based on Random-Assembled Clusters Network |
| 12:50-13:05 | Oral-S | 148 Caterina Sbandati, Spyros Stathopoulos, Patrick Foster, Alexander Serb, Shiwei Wang and Themis Prodromakis | RRAM-based processing of Local Field Potentials | 12:50-13:05 | Oral-S | 224 Davide Pilati, Fabio Michieletti, Gianluca Milano and Carlo Ricciardi | Multielectrode characterization of neuromorphic nanowire networks |
| 13:05-14:30 Lunch break (FOYER AULA MAGNA) | | | | | | | |
| Steering committee meeting (including lunch): Shannon meeting room (ground floor) - only for the steering committee members | | | | | | | |
| Session 7: Neuromorphic computing I; Chairs: Cheol Seong Hwang | | | | Session 8: Molecular and organic memristors; Chairs: Wilfred van der Wiel and Marc Tarnow | | | |
| 14:30 - 14:55 | Invited | 110 Erika Covi | Synergistic Memristive-CMOS Architectures for Energy-Efficient Neuromorphic Edge Computing | 14:30-14:55 | Invited | 216 Yoeri van de Burgt | Hardware implementation of backpropagation using progressive gradient descent |
| 14:55 - 15:10 | Oral-S | 93 Tongjun Zhang, Li Shao, Ioannis Zelmpeks, Andrew Hector and Ruomeng Huang | Temporal timescale control enabled by mesoporous silica-based memristors | 14:55-15:20 | Invited | 134 Suin Yi, Sreetosh Goswami, Thirumalai Venkatesan and R. Stanley Williams | Versatile Molecular Memristor Crossbars for 32-bit Parallel Adders and Brain-like Deep Learning |
| 15:10- 15:25 | Oral | 178 Minmoy Dutta, Stefano Brivio and Sabina Spiga | Integrative function before and during switching phase in volatile memristors | 15:20-15:35 | Oral | 19 Marco Moors, Irina Werner, Fangshun Yang, Eric Vogelsberg and Kirill Monakhov | Polyoxovanadates as potential molecular multi-level switching elements |
| 15:25 -15:40 | Oral-S | 129 M. Payvand, S. D'Agostino, F. Moro, Y. Demirag, G. Indiveri and E. Vianello | Exploitation of Resistive Memories as Delays and Weights in Dendritic Computation for Temporal Pattern Recognition | 15:35-15:50 | Oral-S | 115 Carlos David Prado Socorro, Salvador Cardona Serra and Eugenio Coronado | Data-Driven Chemical Design: Tailoring Properties for Mechanism Comprehension and Optimization of Polymeric Memristive Devices |
| 15:40-15:55 | Oral | 152 Marcelo Rozenberg, Jiaming Wu, Olivier Schneegans and Kang Wang | Bursting dynamics in a spiking neuron with a memristive voltage-gated channel | 15:50-16:05 | Oral | 125 Silvia Battistoni, Victor Erokhin, Simone Luigi Marasso, Matteo Parmeggiani, Rocco Carcione and Matteo Cocuzza | Exploring printing technologies for the memristive devices realization |
| 15:55 -16:10 | Oral-S | 65 Prabana Jetty, Kannan Udaya Mohanan and S Narayana Jammalamadaka | α -Fe2O3-based artificial synaptic RRAM device for pattern recognition using artificial neural networks | 16:05-16:20 | Oral-S | 112 Raquel Martins, Emanuel Carlos and Jonas Deuermeier | Sustainable and cost-effective solution-based metal oxide memristors |
| 16:10 - 16:25 | Oral-S | 124 T. Nora Torok, R. Kovacs, D. Molnar, L. Posa, G. Molnar, N. Q. Khanh, A. Halbritter and J. Volk | Applying neurodynamic behavior of Mott insulators for auditory sensing | | | | |
| 16:25-16:50 Coffee break | | | | | | | |
| Session 9: Memristive networks III; Chairs: John Paul Strachan and Alon Ascoli | | | | Session 10: 2D and layered materials; Chairs: Paolo Fantini and Erika Covi | | | |
| 16:50-17:15 | Invited | 18 Huaqing Wu and Jianshi Tang | Towards Memristor-based Versatile Computing-in-Memory Systems with Software-Hardware Co-Development | 16:50-17:15 | Invited | 8 Chanyoung Yoo and Cheol Seong Hwang | Atomic Layer Deposition of Sb2Te3/GeTe superlattice film and its melt-quenching-free phase transition mechanism for phase-change memory |
| 17:15-17:30 | Oral | 177 Manuel Escudero, Sabina Spiga and Stefano Brivio | A memristor-based chaotic physical reservoir with tunable dynamics | 17:15-17:30 | Oral | 157 M. Farronato, P. P. Tummala, C. Martella, A. Lamperti, A. Molle, C. M. Compagnoni and D. Ielmini | Memtransistors based on few-layer MoS2 with ionic and electronic switching for neuromorphic computing |
| 17:30 - 17:45 | Oral-S | 104 Dongshu Liu, Jérémie Laydevant, Damien Querlioz and Julie Grollier | Unsupervised Equilibrium Propagation | 17:30 - 17:45 | Oral-S | 22 S. Cruces, L. Voelkel, J. Lee, A. Esteki, D. Braun, A. Grundmann, H. Kalisch, M. Heuken, A. Vescan, A. Daus and M. Lemme | Forming-Free Resistive Switching by Lateral Ag Ion Migration in MoS2 |
| 17:45-18:00 | Oral | 222 Gianluca Zoppo, Francesco Marrone, Fernando Corinto and Marco Gilli | A nonlinear dynamic approach to equilibrium propagation techniques | 17:45-18:00 | Oral-S | 170 Sara Ghomi, Christian Martella, Carlo Grazianetti and Alessandro Molle | Investigation of resistive switching behavior in the CVD grown 2D Tellurium |
| 18:0-18:15 | Oral | 153 Philipp Schreyer, Nico Kaiser and Eszter Piros | Substoichiometric conducting HfOx phases as new type of electrode with a built-in oxygen vacancy reservoir for RRAM-applications | 18:0-18:15 | Oral | 194 Catarina Dias, Naveed Mehmood, João Ventura and Harri Lipsanen | Resistive switching in 2D NbSe2 for neuromorphic applications |
| 18:15-18:30 | Oral | 120 A. Gutsche, M. Buczek, Z. Fiedler, S. Siegel, S. Hamsch and R. Dittmann | Area-dependent switching memristive devices for neuromorphic applications | 18:15-18:30 | Oral-S | 42 Lijun Chen and Maria Antonietta Loi | Quasi-2D lead-tin perovskite memory devices fabricated by blade coating |
| 18:30-18:45 | Oral-S | 122 P. F. Betancur, I. Fernandez-Guillen, C. A. Aranda, M. Vallés-Pelarda, E. C. Mombiona, T. Ripollés, R. Abarques, P. P. Boix | Perovskite Memristors: a new wave of emerging memories based on Thin-Film Single Cristal | 18:30-18:45 | Oral-S | 193 Henrique Teixeira, Catarina Dias, I. Çaha, L. Francis and João Ventura | Tuning of 2D Ti3C2Tx MXene flakes for neuromorphic applications |
| 18:45-20:30 Poster session 1 (with aperitif and snacks) - FOYER AULA MAGNA (the posters can be hung to the panels at the end of the lunch break) | | | | | | | |

Oral-S Student papers are eligible for the **Best Oral Award** and are highlighted in grey

Wednesday, November 8, 2023

Plenary session - AULA MAGNA

| 9:00 - 9:45 | | Plenary | | Elisa Vianello | | Resistive memory-based concepts for real-time signal processing at the edge | | Chair: Sabina Spiga | | | | | | |
|---|---------|---------|---|---|---|---|-----|--|--|--|--|--|--|--|
| Parallel sessions | | | | | | | | | | | | | | |
| Room AULA MAGNA | | | | | Room EMMA STRADA | | | | | | | | | |
| 9:50-11:15 | | | | | Session 11: Neuromorphic computing II; Chairs: Elisa Vianello and Damien Querlioz | | | | | Session 12: Electrochemical metallization cells; Chairs: Ming Liu and Kazuya Terabe | | | | |
| 9:50 - 10:15 | Invited | 204 | Chiara Bartolozzi | Unconventional sensing and perception: towards neuromorphic robots | 9:50-10:15 | Invited | 195 | Schaochuan Chen, Zheng Yang, Heinrich Hartmann, Astrid Besmehn, Yuchao Yang and Iliia Valov | Ohmic memristors – new understandings on the switching mechanism in ReRAM devices | | | | | |
| 10:15 - 10:30 | Oral-S | 141 | D. Molnár, T. N. Török, R. Kovacs, L. Pósa, P. Balázs, Z. Balogh, G. Molnár, N. J. Olalla, J. Leuthold, J. Volk, M. Csontos and A. Halbritter | Autonomous neural information processing by a dynamical memristor circuit | 10:15-10:30 | Oral-S | 132 | Rana Walled Ahmad, Rainer Waser, Florian Maudet, Onur Toprak, Catherine Dubourdieu and Stephan Menzel | Variability-Aware Modeling of Electrochemical Metallization Memory Cells | | | | | |
| 10:30 - 10:45 | Oral | 45 | Zhongqiang Wang, Ya Lin, Xiaoning Zhao, Ye Tao, Haiyang Xu and Yichun Liu | Metal Oxide Based Memristors for Neuromorphic Sensory System | 10:30-10:45 | Oral-S | 160 | Francesco Vaccaro, Stefano Brivio, Simona Perotto, Aurelio Giancarlo Mauri, Minmoy Dutta and Sabina Spiga | Morphological modelling of the formation and dissolution of the metallic filament in cation-based RRAMs | | | | | |
| 10:45-11:00 | Oral | 56 | Si En Timothy Ng, Natalia Yantara, Arindam Basu and Nripan Mathews | Ion-mediated recombination dynamics in perovskite-based memory light-emitting diodes for neuromorphic control systems | 10:45-11:00 | Oral | 212 | I.-A. Frygios, I. Chatzipaschalis, E. Tsipias, T. P. Chatziniolaou, R.-E. Karamani, N. Vasileiadis, P. Dimitrakis and Georgios Ch. Sirakoulis | Quantum Computation Enabling Circuits utilizing CBRAM Devices | | | | | |
| 11:00-11:15 | Oral | 219 | Adil Malik | Memristive Stochastic Binary Neurons for Solving Optimisation Problems | 11:00-11:15 | Oral-S | 180 | Noushin Rastli, Philip Calado and Piers R F Barnes | From memdiodes to memristors: Resistive switching mechanisms of perovskite-based devices | | | | | |
| 11:15-11:40 Coffe break | | | | | | | | | | | | | | |
| 11:40-13:20 | | | | | Session 13: Valence change memories; Chairs: Gianluca Milano and Stefano Brivio | | | | | Session 14: Memristor models, materials and mechanisms, Chairs: Iliia Valov and Paolo Milani | | | | |
| 11:40-12:05 | Invited | 83 | Stephan Menzel | Analytical Modeling of the Electron Conduction in VCM Cells | 11:40-12:05 | Invited | 78 | Kazuya Terabe, Takashi Tsuchiya and Tohru Tsuruoka | Ionic Nanoarchitectonics to Enhance Memristive and Neuromorphic Technology | | | | | |
| 12:05-12:20 | Oral | 166 | Dimitrios Prousalis, Vasileios Ntinias, Ioannis Messaris, Ahmet Samil Demirkol, Alon Ascoli and Ronald Tetzlaff | Dynamics of Memristive Bridge Structures with Valence Change Mechanism (VCM) Devices | 12:05-12:20 | Oral-S | 197 | Alon Ascoli, Nicolas Schmitt, Ioannis Messaris, Ahmet Samil Demirkol, Stephan Menzel, Rana Vikas and Ronald Tetzlaff | Local Fading Memory of a Nonvolatile Memristor from Forschungszentrum Jülich | | | | | |
| 12:20-12:35 | Oral-S | 174 | Johannes Hellwig, Carsten Funck, Hugh Greatorex, Regina Dittmann and Elisabetta Chicca | Resolving the Physical Origin of LRS Relaxation in Valence Change Memory | 12:20-12:35 | Oral | 165 | Eszter Piroos, S. Petzold, F. Aguirre, J. Gehringer, T. Oster, K. Hofmann, J. Sune, C. Hochberger, E. Miranda and L. Aiff | Gradual and multi-state resistive switching in oxygen-engineered yttria-based OxRAM | | | | | |
| 12:35-12:50 | Oral | 76 | Cristian Ferreyra, María José Sánchez, Diego Rubi, Miguel Badillo, Yulei Li, Monica Acuautla and Beatriz Noheda | Competitive mechanisms in Hafnia-based memristive devices | 12:35-12:50 | Oral-S | 24 | D. F. Falcone, S. Menzel, T. Stecconi, Y. Popoff, A. La Porta, M. Sousa, B. Jan Offrein and V. Bragaglia | Analog Conductive Metal Oxide-HfO2 ReRAM artificial synapses for neuromorphic computing: physical modelling and stack optimization | | | | | |
| 12:50-13:05 | Oral-S | 161 | Nils Sommer, and Stephan Menzel | Physics-inspired Compact Modeling of the Bilayer Oxide Resistive Switching Cells Based on an Exchange of Oxygen Ions | 12:50-13:05 | Oral-S | 127 | Elias Passerini, M. Lewerenz, M. Csontos, N. J. Olalla, K. Keller, J. Aeschlimann, F. Xie, A. Emboras, X. Zhang, M. Fischer, Y. Fedoryshyn, M. Luisier, T. Schimmel, U. Koch and J. Leuthold | Sn Alloying to Improve Memristive Device Performance | | | | | |
| 13:05-13:20 | Oral | 189 | Vasileios Ntinias, Y. Wang, I. Messaris, V. Rana, S. Menzel, A. Ascoli and R. Tetzlaff | VCM Memristor Model Adaptation to Enable Simulation Time Speed-Up | 13:05-13:20 | Oral | 68 | M. Loizos, K. Rogdakis, W. Luo, P. A. Gaina, J. V. Milić and E. Kymakis | 3D/2D Heterostructure mixed halide perovskite resistance memories enabled by perfluorinated spacer cations with enhanced retention and endurance characteristics | | | | | |
| 13:20-14:30 Lunch break - Foyer AULA MAGNA | | | | | | | | | | | | | | |
| 14:30-16:05 | | | | | Session 15: Memristive nanostructures; Chairs: Simon Brown and Hirofumi Tanaka | | | | | Session 16: Ferroelectric memristors; Chairs: Stephan Menzel and Georgios Ch. Sirakoulis | | | | |
| 14:30-14:55 | Invited | 47 | Gianluca Milano and Carlo Ricciardi | In materia computing with self-organizing nanowire networks | 14:30-14:55 | Invited | 50 | Marc Tomow | Towards organic monolayer ferroelectric tunnel junctions | | | | | |
| 14:55-15:20 | Invited | 89 | Zdenka Kuncic, A. Loeffler, A. Diaz-Alvarez, R. Zhu, J. Shine and T. Nakayama | Spikes, synapses and dynamic memory in memristive nanowire networks | 14:55-15:20 | Invited | 97 | Ming Liu, Jianguo Yang and Qing Luo | First Demonstration of 9-Mb HZO-based FeRAM Chip: From Device to Chip Perspective | | | | | |
| 15:20-15:35 | Oral | 84 | A. Cultrera, G. Milano, L. Boarino, N. De Leo, C. Ricciardi, K. Bejtka and L. Callegaro | Electrical Resistance Tomography of self-organizing neuromorphic nanowire networks | 15:20-15:35 | Oral | 105 | Thanh Luan Phan, Charlotte van Dijk and Catherine Dubourdieu | Ferroelectric Field-Effect Transistor Based on Amorphous Gallium Oxide Films for Back-End-of-Line Integration | | | | | |
| 15:35 - 15:50 | Oral | 155 | Katarzyna Bejtka, Marco Allione, Gianluca Milano and C. F. Pirri | In-situ TEM study of breakdown and thermal annealing effects on silver nanowire for memristive applications | 15:35-15:50 | Oral | 62 | N. Siannas, C. Zacharakis, P. Tsipias, D. J. Kim, W. Hamouda, C. Dubourdieu and Athanasios Dimoulas | Ferroelectric synapses made of epitaxial HfO ₂ /SrTiO ₃ -δ on silicon | | | | | |
| 15:50-16:05 | Oral | 95 | Paolo Milani and Francesca Borghi | Building reliable devices with unreliable components: supersonic cluster beam fabrication of neuromorphic data processing systems | 15:50-16:05 | Oral-S | 196 | S. Hosseinzadeh, S. Lancaster, Z. Yu, T. Mikolajick, S. Slesazek and D. Fey | Ternary Addition Based on Neural Network Using Ferroelectric Tunnel Junctions | | | | | |
| 16:10-17:40 Poster session 2 (with coffee and sweets) - FOYER AULA MAGNA (the posters can be hung to the panels at the end of the lunch break) | | | | | | | | | | | | | | |
| 18:00-23:00 All the following events are held at Museo del Risorgimento, Piazza Carlo Alberto 8, TORINO | | | | | | | | | | | | | | |
| 18:15-19:15 optional guided tour to Museo del Risorgimento (subject to availability and reservation) at 18:15, 18:25, 18:35; free tour at any time from 18:00 to 20:00 | | | | | | | | | | | | | | |
| 19:15-20:00 Round Table with editors (Museo del Risorgimento, Sala Codici): Ian Forbes (Neuromorphic Computing and Engineering, IOP); Selina La Barbera (Nature Communications, NPG); Matthew Parker (Nature Electronics, NPG); Gaia Tomasello (Advanced Electronic Materials, Wiley); Chair: Carlo Ricciardi | | | | | | | | | | | | | | |
| 20:00-23:00 MEMRISYS 2023 dinner (Museo del Risorgimento) | | | | | | | | | | | | | | |

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MEMRISYS 2023 - Torino, Italy, 5-9 November 2023

Thursday, November 9, 2023

Plenary session - AULA MAGNA

| 9:00 - 9:45 | | Plenary | Tuo-Hung (Alex) Hou | Toward practical applications of analog in-memory computing: from AI acceleration to combinatorial optimization | Chair: Daniele Ielmini |
|---|--------------|---------|---|---|-------------------------|
| | | | Parallel sessions | | |
| Room AULA MAGNA | | | Room EMMA STRADA | | |
| 9:50-11:00 | | | Session 17: Memristive networks IV; Chair: Qiangfei Xia | | |
| 9:50 - 10:15 | Invited | 211 | Suhas Kumar | Scalable AI training at the edge using memristors | 9:50 - 10:15 |
| 10:15 - 10:30 | Oral-S | 69 | Daniel Schön and Stephan Menzel | Impact of Thermal Crosstalk in Memristive Crossbar Arrays | 10:15 - 10:30 |
| 10:30 - 10:45 | Oral-S | 96 | Ziang Chen, X. Zhao, C. Bengel, F. Liu, K. Li, H. Schmidt, S. Menzel and N. Du | Exploiting sneak path effect for assessing functional behaviors in self-rectifying passive and crossbar arrays | 10:30 - 10:45 |
| 10:45-11:00 | Oral-S | 71 | Onur Toprak, F. Maudet, R. Thewes, C. Dubourdieu and V. Deshpande | Amorphous GaOx based Non-Filamentary Memristive Device with Highly Repeatable Multiple States | 10:45-11:00 |
| | | | Session 18: Memristors and applications I; Chair: Tuo-Hung (Alex) and Ronald Tetzlaff | | |
| 9:50 - 10:15 | Invited | 209 | Julie Grollier and Frank Alice Mizrahi | Multilayer spintronic neural networks with radio-frequency connections | |
| 10:15 - 10:30 | Oral | 6 | Alberto Riminucci, A. Shumilin, P. Neha, M. Benini, R. Rakshit, M. Singh, L. Gnoli, I. Bergenti and R. Cecchini | Synaptic Time Dynamics in Molecular $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3/\text{GaQ3}/\text{AlOx}/\text{Co}$ Spintronic Devices | |
| 10:30 - 10:45 | Oral | 2 | Juan Bisquet | Device physics criteria to make spiking neurons from memristors by ac impedance characteristics | |
| 10:45-11:00 | Oral | 100 | Jangyong Kim, Deepika Yadav, Spyros Stathopoulos and Themis Prodromakis | Memristive Switching Effect of Planar Metal-Insulator-Metal Capacitors with Micro and Nano Gap | |
| 11:00-11:30 Coffe break | | | | | |
| 11:30-13:10 | | | Session 19: Phase Change Memories; Chairs: Andrea Redaelli and Suhas Kumar | | |
| 11:30-11:55 | Invited | 119 | Paolo Fantini | Memory technology enabling future computing systems | 11:30-11:55 |
| 11:55 - 12:20 | Invited | 205 | Stefano Ambrogio, P. Narayanan, A. Okazaki, A. Fasoli, C. Mackin, A. Friz, J. Luquin, A. Chen, H. Tsai and G. W Burr | Accelerating AI with Analog In-Memory-Computing | 11:55 - 12:10 |
| 12:20-12:35 | Oral-S | 137 | Joseph Pady, Julio Costa, Catherine Ramsdale, Feras Alkhalil, Monica F. Craciun and C. David Wright | GeSbSeTe Phase-Change Materials for Non-Volatile Memory Applications in Flexible Electronics | 12:10-12:25 |
| 12:35-12:50 | Oral-S | 226 | L. Pistolesi, A. Glukhov, A. de Gracia Herranz, M. Lopez-Vallejo, M. Carissimi, M. Pasotti, P. Rolandi, A. Redaelli, I. Muñoz Martin, S. Bianchi, A. Bonfanti, D. Ielmini | Drift compensation in multilevel phase change memory (PCM) for in-memory computing (IMC) | 12:25-12:40 |
| 12:50-13:05 | Oral | 146 | László Pósa, Péter Hornung, Tímea Nóra Török, Sebastian Werner Schmid, András Halbritter and János Volk | Interplay of Thermal and Electronic Effects in the Mott Transition of Nanosized VO_2 Phase Change Memory Devices | 12:40-12:55 |
| | | | Session 20: Memristors and applications II; Chair: Frank Mizrahi | | |
| 11:30-11:55 | Invited | 221 | Qiangfei Xia | Memristive Device and Circuits for Radiofrequency Applications | |
| 11:55 - 12:10 | Oral | 44 | Dayanand Kumar and Nazek El-Atab | Negative photo conduction induced by visible light in wide bandgap oxides-based memristor for data storage and photo sensing | |
| 12:10-12:25 | Oral-S | 139 | K. Portner, L. Bégon-Lours, V. Bragaglia, T. Zellweger, C. Weilenmann, D. Jubin, D. Falcone, F. Hermann, L. De Angelis, U. Drechsler, A. Olziersky, T. Steccoli, A. La Porta, M. Luisier, B. Jan Offrein and A. Emboras | Co-Integration of an Analog, CMOS-Compatible Electro-Conductive Metal-Oxide/HfO2 Memristor with Si Photonics | |
| 12:25-12:40 | Oral-S | 108 | Till Zellweger, K. Portner, C. Weilenmann, M. Luisier and A. Emboras | An Electro-Optical Memristor Based on Amorphous Germanium | |
| 12:40-12:55 | Oral-S | 28 | Jiayi Li, Haider Abbas, Asif Ali, Xin Ju and Diing Sheng Ang | An HfOx ReRAM Optronic Reservoir for Image Classification | |
| 13:20-14:30 Lunch break - FOYER AULA MAGNA | | | | | |
| 14:30-15:15 | Plenary talk | | Ronald Tetzlaff | Recent insights into multistable memristors | Chair: Fernando Corinto |
| 15:15-15:30 ECCTD 2023 opening | | | | | |
| 15:30-17:00 MEMRISYS 2023 - ECCTD 2023 joint session - AULA MAGNA; Chairs: Marco Gilli | | | | | |
| 15:30 - 15:55 | Invited | 26 | Nikolay Agudov, Alexander Dubkov, Alexey Mikhaylov, Maria Koryazhkina and Bernardo Spagnolo | Stochastic approach to memristor modeling | |
| 15:55-16:10 | Oral | 101 | Alon Ascoli, Ahmet Samil Demirkol, Ronald Tetzlaff and Leon Chua | Edge of Chaos Behind Yet-Unexplained Phenomena across Neuronal Channels | |
| 16:10-16:25 | Oral-S | 158 | Kailing Song, Fabrizio Bonani, Michele Bonnin, Fernando Corinto, Fabio Traversa, Stefano Brivio and Manuel Escudero | Noise induced oscillation in a memristive circuit | |
| 16:25-16:40 | Oral | 140 | Ahmet Samil Demirkol, Mohamad Moner Al Chawa, Alon Ascoli and Ronald Tetzlaff | Implementation of Compact Chaotic Systems Using the Locally Active 2T1RC Circuit | |
| 16:40-17:00 MEMRISYS 2023 closure (including communication of best poster and oral award) | | | | | |

Oral-S Student papers are eligible for the **Best Oral Award** and are highlighted in grey

MEMRISYS 2023 - Torino, Italy, 5-9 November 2023

POSTER Session 1 - November 7, 2023

| Abstract ID | Authors | Title |
|-------------|---|--|
| 3 | Rishab Goyal and Ritu Gupta | PHYSICALLY UNCLONABLE FUNCTION USING SCHMITT TRIGGERS |
| 9 | <u>Hongwei Tan</u> and Sebastiaan van Dijken | Dynamic machine vision with retinomorph photomemristor-reservoir computing |
| 11 | <u>Yu Yamaguchi</u> , Daiki Nishioka, Wataru Namiki, Takashi Tsuchiya, Masataka Imura, Yasuo Koide, Tohru Higuchi and Kazuya Terabe | Spoken digit recognition using an electric double layer-based ion-gating reservoir |
| 17 | <u>Zhi Li</u> , Dashan Shang, Rui Bao, Jun Wang, Haoxiong Ren, Woyu Zhang, Fei Wang and Zhongrui Wang | RRAM-based In-Memory Hyperdimensional Computing for Spatial-Temporal Signal Encoding |
| 20 | <u>Lukas Voelkel</u> , Dennis Braun, Melkamu Belete, Satender Kataria, Thorsten Wahlbrink, Ke Ran, Kevin Kistermann, Joachim Mayer, Stephan Menzel, Alwin Daus and Max C. Lemme | Temperature-dependent Current Voltage Measurements in Hexagonal Boron Nitride Threshold Memristors with Nickel Electrodes |
| 21 | <u>Abdulaziz Alshaya</u> , Adil Malik, Andrea Mifsud and Christos Papavassiliou | Fully Passive Selectorless Array Based on 1C1R |
| 29 | <u>Woyu Zhang</u> , Zhi Li, Fei Wang, Yi Li, Jun Wang, Rui Bao, Haoxiong Ren, Zhongrui Wang and Dashan Shang | Fully Binarized RRAM-based Graph Convolutional Network Acceleration |
| 30 | Ishan Madaan, Prisha Singla, Vikram Makhija, Sarvesh Vishwakarma and Taneesha Tandon | Human Personality Prediction Model Using Machine Learning Techniques |
| 32 | <u>Enrique Miranda</u> , Fernando Aguirre, Eszter Piros, Nico Kaiser, Tobias Vogel, Stefan Petzold, Jonas Gehrunger, Timo Oster, Klaus Hofmann, Jordi Suñe, Christian Hochberger and Lambert Alff | Recursive formulation of the memdiode model for resistive switching devices |
| 33 | <u>Jeong Hyun Yoon</u> , Young-Woong Song and Jang-Yeon Kwon | Resistive Switching Behavior Improvement of Peptide Material-Based Memristor Device through Al ₂ O ₃ Layer Insertion |
| 36 | <u>Aijaz Lone</u> and Gianluca Setti | Magnetic Domain Wall and Skyrmion Devices -based Neuromorphic Computing |
| 46 | <u>Seung Woo Han</u> and Moo Whan Shin | Stable and uniform resistive switching of multi-stacked structure-based memristor for neuromorphic system |
| 51 | <u>Zachary Heywood</u> , Joshua Mallinson, Ryan Daniels, Matthew Arnold, Philip Bones and Simon Brown | Emulation of Swarming with Percolating Networks of Nanoparticles |
| 54 | <u>Geunyoung Kim</u> and Kyung Min Kim | Threshold Modulative Artificial GABAergic Nociceptor |
| 57 | <u>Taewook Kim</u> , Toviias Vogel and Eszter Piros | Oxide thickness-dependent resistive switching characteristics of Cu/HfO ₂ /Pt ECM devices |
| 58 | <u>Anni Antola</u> , Ilari Angervo, Hannu Huhtinen, Alejandro Schulman and Petriina Paturi | Optimizing Gd _{0.2} Ca _{0.8} MnO ₃ -Based Memristors |
| 63 | <u>Christopher Madden</u> , Dimitra Georgiadou, Firman Simanjuntak and Sujay Kumar Vishwanath | Low-Power Perovskite Memory Devices Based on Coplanar Nanogaps |
| 64 | <u>Ilari Angervo</u> , Anni Antola, Alejandro Schulman, Hannu Huhtinen and Petriina Paturi | The resilience of resistive switching phenomenon against structural deformation in Gd _{1-x} Ca _x MnO ₃ based planar systems |
| 67 | <u>Yongmin Wang</u> , Vasileios Ntinias, Alon Ascoli, Ioannis Messaris, Ronald Tetzlaff, Vikas Rana and Stephan Menzel | Image processing using VCM based Memristor Cellular Nonlinear Networks |
| 75 | <u>Josh Mallinson</u> , Zac Heywood, Ryan Daniels, Matthew Arnold, Phil Bones and Simon Brown | Reservoir Computing with Scale-free Networks of Memristors |
| 81 | <u>Alexandr Marunchenko</u> , Albert Nasibulin, Ivan Scheblykin and Anatoly Pushkarev | Control over Opto-Electronic Synapses in Halide-Perovskite Microcrystals Toward Memristive Laser Generation |
| 82 | <u>Itir Koymen</u> , Ivan De Carlo, Matteo Fretto, <u>Ozgur Bozat</u> and Gianluca Milano | Temperature Dependence of Au/Cr/TiO ₂ /TiO _x /Cr/Au Memristors Exhibiting Quantum Conductance |
| 85 | <u>Aakash Yadav</u> , Dong-Hyeok Lim and Hongsik Jeong | Investigating the polarity dependence of multi-level cell operation in conventional mushroom phase change memory cells |
| 88 | <u>Wooho Ham</u> and Jang-Yeon Kwon | Surface Roughness Engineering for Improvement of Variability of Memristors |
| 91 | <u>Khaled Humood</u> , Alex Serb, Shiwei Wang and Themis Prodromakis | SPIKA: An Energy-Efficient Time-Domain Hybrid CMOS-RRAM Compute-in-Memory Macro for AI Applications |
| 92 | <u>Mi Hyang Park</u> , Ui Yeon Won, Quoc An Vu, Sung Bum Park and Woo Jong Yu | Multi-terminal Floating gate Memristor in van der Waals heterostructures for Unsupervised Learning |
| 99 | <u>Deepika Yadav</u> , Hannah Levene, Spyros Stathopoulos, Jangyong Jangyong Kim and Themis Prodromakis | Memimpedance behaviour of metal-oxide-based Memristor |
| 220 | <u>Naresh Kumar Pendyala</u> , Antonio Guerrero and Juan Bisquert | Inorganic Buffer-layer for Perovskite Memristor with High and Stable Performance |
| 225 | <u>Giuseppe Leonetti</u> , Matteo Fretto, Katarzyna Bejtka, Fabrizio Pirri, Elena Olivetti, Natascia De Leo, Ilia Valov and Gianluca Milano | Resistive switching properties of anodic NbOx-based devices |

Student papers are eligible for the **Best Poster Award** and are highlighted in grey

MEMRISYS 2023 - Torino, Italy, 5-9 November 2023

POSTER Session 2 - November 8, 2023

| Abstract ID | Authors | Title |
|-------------|--|---|
| 109 | <u>Jordi Suñé</u> , Fernando Aguirre, Mireia Bargalló-González, Francesca Campabadal and Enrique Miranda | Modeling memristors with conductance quantization for SPICE simulation |
| 116 | <u>Tobias Schwarz</u> , Jonas Gehringer, Timo Oster, Eszter Piros, Fernando Aguirre, Lambert Alff, Enrique Miranda, Klaus Hofmann and Christian Hochberger | Impact and Circuit Implications of Defect Memristors in NV-FPGAs |
| 118 | <u>Stefano Brivio</u> , Manuel Escudero, Mauro Di Marco, Mauro Forti, Giacomo Innocenti, Alberto Tesi, Fernando Corinto and Sabina Spiga | Design and implementation of chaotic circuits based on nonvolatile memristor devices |
| 123 | <u>Spyros Stathopoulos</u> , Alex Serb and Themis Prodromakis | TiOx-based RRAM crossbars integrated on a 180 nm BCD process |
| 128 | <u>Yanhao Wang</u> , Ke Yang and Yuchao Yang | High-order sensory processing nanocircuit based on coupled VO ₂ oscillators |
| 130 | Paul-Philipp Manea, Jiaao Yu and John Paul Strachan | Analysis of the Memristor Comparator: A Key Component in Analog Content Addressable Memories |
| 133 | <u>Michele Martemucci</u> , François Rummens, Tifenn Hirtzlin, Elisa Vianello, Adrien F. Vincent and Sylvain Saighi | Exploring Learning Techniques for Edge AI Taking Advantage of NVMs |
| 135 | <u>Alin Panca</u> , Spyros Stathopoulos, Alex Serb and Themis Prodromakis | Automated RRAM characterization on wafer scale for statistical switching behavior and modeling |
| 138 | <u>Xianyue Zhao</u> , Du Nan, Kefeng Li, Ziang Chen, Jan Dellith, Andrea Dellith, Marco Diegel, Daniel Blaschke, Danilo Bürger, Ilona Skorupa, Hans-Jürgen Engelmann, Stephan Menzel, Ilia Polian, Heidemarie Schmidt and Stephan Krüger | Engineering electrode material and fabrication parameters of BiFeO ₃ thin film in memristive device for brain-inspired in-memory computing |
| 147 | <u>Zoltán Balogh</u> , Anna Nyáry, Botond Sánta, Sebastian Werner Schmid, László Pósa and András Halbritter | Exploring the noise map of memristive systems |
| 149 | <u>Marina Sparvoli</u> , Fábio Jorge, Ricardo Rangel, Ronaldo Mansano, Guilherme Lenz E Silva and José Chubaci | Graphene and ITON-based resistive memories for use as a neuronal membrane |
| 151 | <u>Daisy Gogoi</u> , Carsten Wiemann and Claus Michael Schneider | Photo-emission spectroscopy on resistive switching processes in the ferromagnetic oxide La _{0.7} Sr _{0.3} MnO ₃ |
| 159 | <u>Guoyang Huang</u> , Chaohan Wang, Zhaoguang Si, Lu Yang, Shiwei Wang, Alexander Serb, Themis Prodromakis and Christos Papavassiliou | A Data-Driven Memristor Model Accounting for Sequences Stimulus Features |
| 162 | <u>Vittorio Fra</u> , Enrico Macii and Gianvito Urgese | Quantized LIF-based Recurrent Spiking Neural Network for on-edge Neuromorphic Human Activity Recognition |
| 163 | <u>Vishal Gupta</u> , Manuel Escudero, Sabina Spiga and Stefano Brivio | Impact of Compliance Increase and Resistance Reading Modes in Program/Verify Algorithm for HfO ₂ -based RRAM Devices |
| 164 | Mohamad Moner Al Chawa, <u>Rodrigo Picos</u> and Ronald Tetzlaff | A Behavioural Compact Model for Programmable Neuromorphic ReRAM Devices |
| 167 | <u>Ioannis Messaris</u> , Ahmet Samil Demirkol, Ronald Tetzlaff, Alon Ascoli, Vasileios Ntinias and Dimitrios Prousalis | High Frequency Response of Volatile Memristors |
| 169 | <u>Emanuele Gemo</u> , Sabina Spiga and Stefano Brivio | Numerical emulation of neuromorphic systems for multi-time scale data processing |
| 172 | <u>Gergő Fehérvári</u> , Zoltán Balogh, Tímea Nóra Török and András Halbritter | Noise tailoring, noise annealing and external noise injection strategies in memristive Hopfield neural networks |
| 173 | <u>Kristina Nikiruy</u> , Seongae Park, Tzvetan Ivanov, Alon Ascoli, Fernando Corinto, Ronald Tetzlaff and Martin Ziegler | Chaotic time series prediction using next generation reservoir computing with memristive devices |
| 175 | Khitem Lahbacha, Fakhreddine Zayer, <u>Sueda Saylan</u> , Baker Mohammad and Antonio Maffucci | Experimental Analysis of HfO ₂ -Based Memristor Devices |
| 176 | <u>Davide Rossetti</u> , Sergio Chibbaro, Cyril Furtlehner and Lionel Mathelin | Machine Learning for Causal Analysis: An Innovative Approach |
| 181 | <u>Mohamad Moner Al Chawa</u> , Daniel Bedau, Ahmet Samil Demirkol, James W Reiner, Derek Stewart, Michael Grobis and Ronald Tetzlaff | A Compact Model of Threshold Switching Devices |
| 182 | <u>Jeongwoo Lee</u> and Hyunchul Sohn | Compositional Dependence of Threshold Switching in La _x Ni _{1-x} O _y Thin Films |
| 184 | <u>Ju-Young Jeong</u> , Yoogeun Han, Jaeyoung Joo and Hyunchul Sohn | Neuromorphic Characteristics of La-doped HfO ₂ Based FTJ Devices |
| 190 | <u>Andreia Silva</u> , Catarina Dias, Ana Teresa Brandão, Carlos Manuel Pereira and João Ventura | Liquid artificial synapses based on copper solutions |
| 200 | <u>Filippo Profumo</u> , Francesca Borghi, Andrea Falqui and Paolo Milani | Memristive planar devices based on a tunable nanostructured Au and ZrOx composite film |
| 201 | <u>Silvia Bressan</u> | Timing dependence on the pulse train characteristics of the electrical activity of a nanostructured metallic memristive network |
| 203 | <u>Gabriel Caballero Catalan</u> | Tailoring MoS ₂ memtransistors by direct nanopatterning |
| 206 | <u>Utkarsh Misra</u> , Vikas K. Sahu, Amit K. Das, Ajimsha R. S. and Pankaj Misra | Compliance Current Controlled Conductance Quantization in Cu/Ta ₂ O ₅ /Pt Memristors |
| 213 | <u>Andrzej Stawek</u> , Lulu Alluhaibi and Konrad Szacitowski | Neuromorphic devices based on Ni(II)-tetraaza[14]annulene complexes |
| 215 | <u>Gisya Abdi</u> , Tomasz Mazur, Ewelina Kowalewska, Andrzej Stawek and Konrad Szacitowski | Investigation the Effect of Cationic and Anionic counterparts in Halobismuth(III) Salts in Artificial Synapses |
| 218 | <u>Tomasz Mazur</u> , Gisya Abdi, Ewelina Kowalewska, Andrzej Stawek, Wojciech Wieczorek, Michał Suwarzyński and Konrad Szacitowski | Exploring Memristive Behavior and Synaptic Plasticity Across Diverse Architectures: From Nanoparticles to Polymer Brushes and Crystalline Layers |

Student papers are eligible for the **Best Poster Award** and are highlighted in grey