

# PRIME 2024

19th International Conference On PhD Research in Microelectronics and Electronics

Sunday, 09 Jun

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14:00 - 15:00 Registration Begins at 14.00

15:30 - 18:00 WiCAS 1 (Peer Review Workshop)  
Chair: Hannah Chapman  
Room: Princess Ballroom

Workshop on Paper Review for young researchers (WiCAS)

18:00 - 19:30 Welcome Reception

## Monday, 10 Jun

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9:20 - 11:00 Parallel sessions

### Power Circuits I

Chair: Alon Kuperman

Room: Princess Ballroom

- 9:20 Analysis of Non-Ideal Series-Series Compensated Inductive Wireless Power Transfer Link Under Sub-Resonant Frequency Control  
*Andrey Vulfovich, Alon Kuperman*
- 9:40 A 10-MHz Three-Level Buck Converter with Dual-Loop Time-Based Control and Flying Capacitor Voltage-Balance for Fast DVS  
*Gabriele Magni, Paolo Melillo, Alessandro Bertolini, Mauro Leoncini, Massimo Ghioni*
- 10:00 A Platform for the Behavioural Analysis of DC-DC Power Converters for Electric Cars  
*Marcello Tettamanti, Paolo Del Croce, Markus Lardurner, Andrea Baschirotto*
- 10:20 Improvements Through Forward Power Transfer in an Isolated Flyback Boost Converter for Solar Applications  
*Juan Cruz-Cozar, Alfredo Medina-Garcia, Jorge Perez-Martinez, Cristina Martos-Contreras, Noel Rodriguez, Diego P. Morales*
- 10:40 Design and Discretization of Multi-Resonant Current Controllers  
*Moria Sassonker Elkayam, Dmitri Vinnikov*

### Radio Frequency Circuits and Systems I

Chair: Loukas Petrou

Room: Kings Conference Room

- 9:20 A Ku-Band MMIC Two-Stage GaAs-based Low Noise Amplifier for Radar Applications  
*Andrea Forte, Patrick Ettore Longhi, Walter Ciccognani, Sergio Colangeli, Antonio Serino, Ernesto Limiti*
- 9:40 A simple synthesis methodology for 3-Stage LNA Design in GaAs technology  
*Fida Abdalrahman, Patrick E. Longhi, Ernesto Limiti*
- 10:00 Mismatch based Implementation of W Band LNA using GaAs pHEMTs  
*Shikha Swaroop Sharma, Swati Sharma, Sergio Colangeli, Patrick Longhi, Walter Ciccognani, Ernesto Limiti*
- 10:20 Extension of Quasi-Load Insensitive Class-E Doherty Operation with Complex Load Trajectories  
*Mehdi Otmani, Ayssar Serhan, Jean-Daniel Arnould, Estelle Lauga-Larroze, Alexandre Giry*
- 10:40 A 170 GHz 5.5 dB NF Low-Noise-Amplifier in 55nm SiGe BiCMOS  
*Guglielmo De Filippi, Lorenzo Piotto, Melchiorre Bruccoleri, Andrea Mazzanti*

### Analog Circuits I

Chair: Adam Teman

Room: Queens Conference Room

- 9:20 A Novel Technique to Design Ultra-Low Voltage and Ultra-Low Power Inverter-Based OTAs  
*Riccardo Della Sala, Francesco Centurelli, Giuseppe Scotti*
- 9:40 A Highly Energy-Efficient FIA-based AZ-free Ring Amplifier for Pipeline-SAR ADCs  
*Alessia Ceroni, Gabriele Zanoletti, Carlo Samori, Andrea Bonfanti*
- 10:00 A Rail-to-Rail Second Generation Voltage Conveyor for Low-Power Applications  
*Paolo Esposito, Gianluca Barile, Giuseppe Ferri, Vincenzo Stornelli*
- 10:20 A rail-to-rail ultra-low power OTA based on a hybrid Nauta-DIGOTA topology  
*Paolo Faustini, Anna Richelli, Luigi Colalongo, Paolo Croveti*

10:40 A Novel, Highly Linear, Digital OTA With Modified Input Stage  
*Reza Shokri, Orazio Aiello, Daniele Caviglia*

11:00 - 11:30 Coffee Break / Company Fair

11:30 - 13:00 Invited / Industrial Talks  
Room: Princess Ballroom

11:30 - 12:00 - Opening Message from the Chief Scientist of the Research, Innovation and Technology of the Republic of Cyprus, Demetris Skourides

12:00 - 12:30 - Synopsys - Title: "Innovation in High-Speed Interfaces in the AI era"

12:30-13:00 - Marvell

13:00 - 14:30 Lunch

14:30 - 16:30 Parallel sessions

### Digital Circuits and Architectures

Chair: Inbal Stanger

Room: Princess Ballroom

14:30 Low Power, Energy Efficient and High Performance Triple Mode Logic for IoT Applications  
*Inbal Stanger, Netanel Shavit, Ramiro Taco, Leonid Yavits, Alexander Fish*

14:50 Design of a hardware-efficient floating-point multiplier with dynamic segmentation  
*Luca Tegazzini, Gennaro Di Meo, Davide De Caro, Antonio G. M. Strollo*

15:10 Exploring Variable Latency Dividers in Vector Hardware Accelerators  
*Marco Angioli, Marcello Barbirotta, Abdallah Cheikh, Antonio Mastrandrea, Mauro Olivieri*

15:30 A 4T GC-eDRAM Bitcell with Differential Readout Mechanism For High Performance Applications  
*Roman Golman, Avinoam Segev, Adam Teman*

15:50 500 MHz CMOS 28-nm Floating Point arithmetic Unit for 32-bit RISC-V Microprocessors  
*Silvia Ceppi, Andrea Gallacci, Mattia Tambaro, Mirco Malanchini, Andrea La Gala, Marcello De Matteis*

16:10 QEC Decoder Implementations: Current and Future Trends towards Fault Tolerant Quantum Computers  
*Gilad Burovov, Yonatan Shoshan, Alexander Fish, Adam Teman*

### Photon and Particle Detection Circuits

Chair: Noa Edri

Room: Kings Conference Room

14:30 Time Resolution Simulations of Monolithic CMOS Sensors with Internal Gain  
*Umberto Follo*

14:50 A CMOS readout pixel circuitry for spectral-CT applications  
*Daniel Tran, Arnaud Peizerat, Andréa Brambilla*

15:10 Low-Noise Wide Dynamic Range Charge Sensitive Amplifier in 65 nm CMOS Technology for the Second Flight of the GAPS Experiment  
*Luca Ghislotti, Massimo Manghisoni, Paolo Lazzaroni, Elisa Riceputi*

15:30 A 10  $\mu$ W front-end enabling 200 ps resolution in high-efficiency large area monolithic pixel sensors  
*Antonio Picardi, Roberto Cardella, Luca Iodice, Thanushan Kugathasan, Lorenzo Paolozzi*

15:50 A 64  $\times$  64 SPAD Array For Quantum Ghost Imaging with Integrated TDCs and event-driven readout in a 40 nm CMOS Technology  
*Davide Moschella, Davide Berretta, Federica Villa, Alberto Tosi*

16:10 Compact SPAD Pixels with Analogue Counter for Ultraviolet Imaging  
*Soumya Shatakshi Panda, Qiushuang Zhang, Bhaskar Choubey*

## Neural networks: circuits and applications

Chair: Yehuda Kra

Room: Queens Conference Room

- 14:30 A Robot Execution Failures Classification system based on Analog IC Neural Networks  
Vassilis Alimisis, *Charis Aletraris*, Andreas Papathanasiou, Paul P. Sotiriadis
- 14:50 Hardware Modelling and Testing of a Rotating Neuron Reservoir  
*Antonia Pavlidou*, Mohammed Waqas Mughal, Meraj Ahmad, Hadi Heidari
- 15:10 Drift-tolerant implementation of a neural network on a PCM-based Analog In-memory Computing unit for motor control applications  
*Francesco Zavalloni*, Alessio Antolini, Mattia Luigi Torres, Alessandro Nicolosi, Francesco D'Angelo, Andrea Lico, Eleonora Franchi Scarselli, Marco Pasotti
- 15:30 Basecalling by Statistical Profiling and Hardware-Accelerated Convolutional Neural Network  
*Yehuda Kra*, Yehuda Rudin, Adam Teman, Alexander Fish
- 15:50 An Analog and Time-Discrete Neuron with Charge-Injection for use in Ultra-Low Power Spiking Neural Networks  
*Matthias Ochs*, Markus Dietl, Ralf Brederlow
- 16:10 Analog Two-Variable Spiking Neuron in 16 nm FinFET for Neuromorphic Systems  
*Lorenzo Stevenazzi*, Andrea Baschiroto, Marcello De Matteis

16:30 - 17:00 Coffee Break / Company Fair

## Tuesday, 11 Jun

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9:20 - 11:00 Parallel sessions

### Power Circuits II

Chair: Alberto Gola

Room: Princess Ballroom

- 9:20 A 55nm, multiple-loop, fast-transient, -76.2 dB worst-case PSRR LDO for high-end audio circuits  
*Francesco Spreafico, Luca Sant, Richard Gaggl, Andrea Baschirotto*
- 9:40 Design and Modelling of a Neural Network used to Optimize and to Monitor a DC-DC converter  
stefano passi, *Sandeep Krishnan Nandialath Radhakrishnan, Francesco D'Angelo, Alessandro Nicolosi, Alessandro Cabrini*
- 10:00 A 40V robust leakage current based start-up circuit  
*Lara Devoti, Giovanni Sicurella, Manuela La Rosa, Alessandro Nicolosi*
- 10:20 An Excellent Transient Response LDO with External Pass Device for High Current Automotive Applications  
*Ionut-Alin Ilie, Florin Dumitru, Ozan Serpedin, Gheorghe Brezeanu*
- 10:40 An Accurate High-Voltage Supply-Referred Low-Impedance On-Chip Reference Voltage for Optimized Driving of High-Side PMOS Transistors  
*Tobias Zekorn, Florian Schimkat, Erik Wehr, Kenny Vohl, Léon Weihs, Ralf Wunderlich, Stefan Heinen*

### Hardware for Security and Data Acquisition

Chair: Yoav Weitzman

Room: Kings Conference Room

- 9:20 Empowering Smart Mobility with a Component-based Data Acquisition System for Multi-sensor Readout  
*Matteo Verzeroli, Andrea Galliani, Luca Ghislotti, Luigi Gaioni, Paolo Lazzaroni, Valerio Re*
- 9:40 Sub-100 ps modular asynchronous readout for single event cluster detection in pixel sensor applications  
*Luca Iodice, Roberto Cardella, Carlo Alberto Fenoglio, Thanushan Kugathasan, Lorenzo Paolozzi*
- 10:00 Novel Device Fingerprinting Sensor Leveraging Back-End-of-Line Resistance and Capacitance  
*Jen-Chieh Hsueh, Michael Kines, Sam Ellicott, Shane Smith, Waleed Khalil*

### Analog Circuits II

Chair: Roman Golman

Room: Queens Conference Room

- 9:20 A PVT-robust Beta-Multiplier Current Reference with Body-Effect-based Temperature Dependency Modulation  
*Francesco Gagliardi, Iacopo Nannipieri, Margherita Scognamiglio, Simone Contardi, Andrea Ria*
- 9:40 Design of a Nano-Power Capacitor-Less LDO Voltage Regulator for Wake-Up Radio Applications  
*Marco Villa, Marco Guerrini, Eleonora Franchi Scarselli, Matteo D'Addato, Alessia Maria Elgani, Alessandro Nicolosi, Sandro Rossi, Aldo Romani*
- 10:00 A Reconfigurable High-Efficiency All-PMOS Charge Pump with Dual-Phase Clock Scheme  
*Xingyuan Chen, Berkay Ozbek, Peilong Feng, Timothy Constandinou*
- 10:20 A Low Quiescent Current Capacitor-less LDO Voltage Regulator in 22nm FDSOI CMOS  
*Adilet Dossanov, Vadim Issakov*

11:00 - 11:30 Coffee Break / Company Fair

11:30 - 13:00 Industrial Talks / WiCAS 2

Room: Princess Ballroom

11:30 - 12:00: STMicroelectronics

12:00 - 12:30: Bosch

12:30 - 13:00: Invited Talk: Antigoni Parmaxi (WiCAS 2)

13:00 - 14:30 Lunch

14:30 - 16:30 Parallel sessions

### Radio Frequency Circuits and Systems II

Chair: Chiara Bartolozzi

Room: Princess Ballroom

- 14:30 On the Efficiency of Output-Matched Radiofrequency Power Amplifiers  
*Davide Pecile, Stefan Kokorovic, Alberto Gambarucci, Andrea Bevilacqua*
- 14:50 A G-Band ASK Transceiver for Short-Range Communications in 130 nm SiGe BiCMOS  
*Vasileios Manouras, Yannis Papananos*
- 15:10 A 28-nm CMOS 60-GHz LNA for OOK Low Power Receivers  
*Minoo Eghtesadi, Gianluca Giustolisi, Salvatore Pennisi, Egidio Ragonese*
- 15:30 A comparison between single and differential-ended Doherty power stages in GaN Technology for 28-GHz 5G Applications  
*Alessandro Domenico Minnella, Giuseppe Papotto, Alessandro Parisi, Giuseppe Palmisano*
- 15:50 A C-Band MMIC Multi-Functional Core Chip with 7 Bits Phase Shifter and Attenuator using GaAs pHEMT  
*Shikha Swaroop Sharma, Swati Sharma, Sergio Colangeli, Patrick E. Longhi, Walter Ciccognani, Ernesto Limiti*
- 16:10 A C-Band Two-Stage MMIC GaN Power Amplifier for Radar Applications  
*Andrea Forte, Rocco Giofrè, Walter Ciccognani, Antonio Serino, Ernesto Limiti*

### Biomedical Circuits

Chair: Julius Georgiou

Room: Kings Conference Room

- 14:30 A two channels fully-programmable integrated neurostimulator with a 0.07% charge mismatch  
*Simone Contardi, Andrea Ria, Iacopo Nannipieri, Margherita Scognamiglio, Massimo Piotto*
- 14:50 Demodulation Circuit for Power and Bidirectional Data Transmission in Implantable Distributed Wired System  
*Cinzia Salis, Riccardo Collu, Massimo Barbaro*
- 15:10 Computationally Efficient RF Band and Base band Beam-former for Coherent Plane Wave Imaging  
*zahraa alzein, Marco Crocco, Daniele Caviglia*
- 15:30 38.5-300 kHz-Fundamental-Frequency Tuning Range 16.9 mW-Power Digital Denoising System for Proton Sound Detectors in 28 nm CMOS  
*Mirco Malanchini, Andrea Baschiroto, Mattia Tambaro, Elia Arturo Vallicelli, Marcello De Matteis*
- 15:50 PVDF Ultrasound Array Design for Ionoacoustic Tomography of Particle Beams in Hadron Therapy  
*Mirza Hassan Baig, Elia Arturo Vallicelli, Marcello De Matteis, Giuseppe Chirico*
- 16:10 An Impedance Characterisation Circuit for Implantable Research Platforms  
*Vichaya Manatchinapisit, Peilong Feng, Lijie Xie, Timothy Constandinou*

### Sensing Circuits and Comparators

Chair: Alexander Fish

Room: Queens Conference Room

- 14:30 Offset Compensation for Differential Charge-Based Capacitance Measurement  
*Mirko Cassalini, Nicolò Cascone, Umberto Ferlito, Alfio Dario Grasso, Giuseppe Bruno*
- 14:50 A Current-Mirroring Voltage Buffer for Analog Read-Out in Memristor Crossbar Arrays  
*Jonas Zoche, Ricardo Heinen, Jan Grobe, Ralf Wunderlich, Stefan Heinen*
- 15:10 Low-Cost Stretchable Sensor: Range Of Motion Evaluation With Open-Source Software Validation  
*Giuseppe Longo, Rosalba Liguori, Luigi Di Benedetto, Gian Domenico Licciardo, Alfredo Rubino*
- 15:30 An Auto-Zero Comparator for Monolithic GaN Power Integration  
*Jan Grobe, Jonas Zoche, Ralf Wunderlich, Stefan Heinen*
- 15:50 Low-power VCII-based Current-mode Schmitt Trigger with High Drive Capabilities  
*Davide Colaiuda, Gianluca Barile, Alfiero Leoni, Vincenzo Stornelli, Giuseppe Ferri*
- 16:10 Enhancing Performance of Ultra-Low Voltage Body-Driven Comparators through Clocked Supply Voltage  
*Riccardo Della Sala, Cristian Bocciarelli, Valerio Spinogatti, Francesco Centurelli, Alessandro Trifiletti*

16:30 - 17:00 Coffee Break / Company Fair

17:00 - 18:00 WiCAS 3 (Speed Meeting Event)

Chair: Chiara Bartolozzi

Room: Princess Ballroom

Speed Meeting Event (WiCAS 3)

18:00 - 22:00 Tour & Conference Dinner

## Wednesday, 12 Jun

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9:20 - 11:20 Parallel sessions

### Data Converters

Chair: Loukas Petrou

Room: Princess Ballroom

- 9:20 Efficient Saturation Control for Fully Differential Integrator in Continuous-Time Sigma-Delta Modulators  
*Matteo De Ferrari, Francesco Stilgenbauer, Edoardo Botti, Cristiano Meroni, Paolo Crovetto, Edoardo Bonizzoni, Piero Malcovati*
- 9:40 Asynchronous vs Synchronous SAR ADCs –Performance Beyond Nominal Speed  
*Hamid Karrari, Pietro Andreani, Siyu Tan*
- 10:00 Analysis of a Split-Constant-Slope Digital-to-Time Converter Topology  
*Nicolò Zugno, Andrea Bevilacqua*
- 10:20 A 150 MS/s, 10 bit SAR ADC Featuring a Modified Quasi-Monotonic Switching Scheme  
*Valerio Spinogatti, Cristian Bocciarelli, Lorenzo Eusebio, Francesco Centurelli, Giuseppe Scotti, Alessandro Trifiletti*
- 10:40 Analysis and Design of High-speed, Linear and Fullscale Input Swing Voltage to Time Converters  
*Shivani Garg, Ankesh Jain*
- 11:00 A 7.69 ENOB, 161 $\mu$ W SAR ADC in 28nm CMOS for Proton Sound Detectors  
*Davide Turossi, Elia Arturo Vallicelli, Marcello De Matteis, Andrea Baschirotto*

### Modeling, Optimization and Characterization

Chair: Noam Rognian

Room: Kings Conference Room

- 9:20 Impedance Spectroscopy as On-Field Monitoring Technique for PV modules  
*Monica De Riso, Ilaria Maticena, Pierluigi Guerriero, Santolo Daliento*
- 9:40 Enhancing Electrical Ruggedness in Double-Sided Cooled Power Modules  
*Ciro Scognamiglio, Antonio Pio Catalano, Lorenzo Codecasa, Alberto Castellazzi, Vincenzo d'Alessandro*
- 10:00 IGS-IGD gate current noise model at low frequency  
*Federico Torri, Olivier Leman, Piero Malcovati, Andrea baschirotto*
- 10:20 Modeling I-MOS Capacitor C-V Characteristic for Non-Linear Charge Sensitive Amplifiers  
*Simone Giroletti, Fatemeh Shojaei, Massimo Manghisoni, Lodovico Ratti, Carla Vacchi*
- 10:40 Analysis of the Impact of Input Encoding and ADC Resolution on Matrix-Vector Multiplication Accuracy  
*Riccardo Vignali, Gianluca Ricotti, Riccardo Zurla, Marco Pasotti, Alessandro Cabrini*
- 11:00 Methodologies for Device Characterization in Cryogenic Temperatures  
*Noam Rognian, Yonatan Shoshan, Inbal Stanger, Menachem Goldzweig, Yoav Weizman, Adam Teman, Edoardo Charbon, Alexander Fish*

### Analog Circuits III

Chair: Gianluca Giustolisi

Room: Queens Conference Room

- 9:20 A 1.2V, 0.25%/V, 50ppm/ $^{\circ}$ C, 1% Precision, 500kHz Relaxation Oscillator in 55nm CMOS.  
*Alessandro Lanteri, Luca Sant, Richard Gaggl, Andrea Baschirotto*
- 9:40 Envelope Tracking DC-DC Power Supply for a Piezoelectric MEMS-based Earbuds System  
*Francesco Romano, Alessandro Gemelli, Samuele Fusetto, Edoardo Bonizzoni, Piero Malcovati*

10:00 A Fully Integrated 1 kHz-1 MHz Sinusoidal Waveform Generator based on Second Order Analog Interpolation  
*Margherita Scognamiglio, Francesco Gagliardi, Simone Contardi, Iacopo Nannipieri, Paolo Bruschi*

10:20 A Bit-Line Biasing Circuit for Analog In-Memory Computing based on Phase Change Memory  
*Andrea Lico, Alessio Antolini, francesco zavalloni, Eleonora Franchi Scarselli, Riccardo Zurla, Marco Pasotti*

11:20 - 11:40 Coffee Break / Company Fair

11:40 - 13:10 Industrial Talks  
Room: Princess Ballroom

11:40 - 12:10: FBK

12:10 - 12:40: Power Intergrations

12:40 - 13:10: Infineon Technologies

13:10 - 14:40 Lunch

14:40 - 15:40 Closing Ceremony  
Room: Princess Ballroom