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Welcome from the CICC Committee

Welcome to our virtual conference platform! On behalf of the Executive Committee and the Technical Program Committee, we are honored and delighted to present the 42nd annual IEEE Custom Integrated Circuits Conference (CICC) – a showcase for Integrated Circuits. Our conference will be a vibrant forum for sharing state of the art techniques and results, learning from world-renowned experts in custom IC designs and adjacent fields, and networking with old and new colleagues in a virtual format.

CICC 2021 officially starts with 4 Educational Sessions on Sunday April 25, followed by daily keynote presentations and technical lectures from Monday through Friday. Throughout the conference, 18 Technical Sessions, 4 Forum Sessions, and 5 Panel Sessions are strategically placed to highlight the latest trends and challenges. In addition, a new Industry Session is on Friday that highlights the role of solid-state circuits and SoCs in the creation of novel products. The Outstanding Paper awards and closing ceremony is scheduled at the end of the conference. Registration covers all the events including the Educational Sessions on Sunday. Top-rated papers will be invited to a special issue in the IEEE Journal of Solid-State Circuits.

Four Educational Sessions provide background tutorial information on several topics of active research, including “Quantum Computing Circuits and Systems”, “High Performance mm-wave Circuits”, “Emerging Applications for Digital Accelerators”, and “Low Power Wireless for Biomedical Sensing and IoT”. All presenters are well-known for their contributions in their respective areas.

The Technical Sessions are the backbone of our conference. This year’s Technical Sessions will showcase original innovative analog and digital circuit techniques covering a broad spectrum of technical topics, including: Analog Circuits, Data Converters, Design Foundations, Digital Circuits, Emerging Technologies, Power Management, Wireless Circuits, and Wireline Circuits. This year we are proud to offer a strong technical program with 89 lecture presentations, including 10 invited papers.

These Technical Sessions are complemented by Forums and Panels covering various popular areas related to integrated circuits and systems. We are pleased to offer 4 Forum Sessions, including “Advanced Modulation Schemes for Wireline”, “Heterogeneous Integration”, “Human Brain-Machine Interface”, and “Essential Analog Innovations”. In addition, we offer 5 Panel Sessions, including “Are FoMs Killing Creativity?”, “Who is Leading Innovations, Academia or Industry?”, “Will THz IC Technology Catch Up with THz Applications?”, “Machine Learning for Chip Design”, and “Missing Arrow in My Quiver”.

Moreover, we will hold exciting virtual social events that include the Young Professionals and Women in Circuits Mentoring Event on Monday afternoon and the reception on Wednesday afternoon. The conference will close strong on Friday afternoon with the Industry Session, Best Paper Poster Session, and the Closing Ceremony where this year’s outstanding paper winners will be announced.

Finally, the CICC Chairs and executive committee would like to extend their sincere thanks to the authors and the technical program committee members for their hard work in writing and reviewing the papers and oral presentations. Your hard work is greatly appreciated and is essential to the success of CICC 2021. Please kindly join us virtually this year!

Samuel Palermo
Technical Program Committee Chair
2021 IEEE Custom Integrated Circuits Conference

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Sunday, 25 April

9am — **Educational Session 1: Quantum Computing Circuit and System**
Chaired by: SungWon Chung (United States) and Jongseok Park (United States)

9am — **ES1-1: Quantum Computing: What is it, how does it work, and why should circuit designers care?**
» Joseph Bardin (United States)[1] (1. Google AI Quantum & University of Massachusetts Amherst)

11:15am — **ES1-2: Cryo-CMOS Electrical Interfaces for Large-Scale Quantum Computers**
» Fabio Sebastiano (Netherlands)[1] (1. delft university of technology)

9am — **Educational Session 2: High Performance mm-wave Circuits**
Chaired by: Debo Chowdhury (United States) and Hossein Miri Lavasani (United States)

9am — **ES2-1: SOI Technology for 5G and mm-wave Circuits**
» Andreia Cathelin (France)[1] (1. STMicroelectronics)

10:45am — **ES2-2: Efficiency and Linearity Considerations for 5G & mm-wave CMOS Power Amplifiers**
» Patrick Reynaert (Belgium)[1] (1. KU Leuven)

9am — **Educational Session 3: Emerging Applications for Digital Accelerators**
Chaired by: Jie Gu (United States) and Gregory Chen (United States)

9am — **ES3-1: Data Analysis for Next-Generation Sequencing – from Basics to Dedicated Accelerators**
» Chia-Hsiang Yang (Taiwan)[1] (1. National Taiwan University)

10:45am — **ES3-2: Distributed, Autonomous and Collaborative Multi-Agent Systems**
» Vinayak Honkote (India)[1] (1. Intel)

9am — **Educational Session 4: Low Power Wireless for Biomedical Sensing and IoT**
Chaired by: Chris Rudell (United States) and Steven Bowers (United States)

9am — **ES4-1: Ultra-low-power Frequency Reference, on-chip and Crystal Oscillators**
» Taekwang Jang (Switzerland)[1] (1. ETH Zürich)

10:45am — **ES4-2: Millimeter-scale Energy-efficient Wireless Transceivers for Minimally-invasive Implants: the Smaller, the Better**
» Yao-Hong Liu (Netherlands)[1] (1. IMEC)

12:15pm — **Break**

12:15pm — **Break**

12:15pm — **Break**

12:45pm — **Break**

1:30pm — **Educational Session 1: Quantum Computing Circuit and System**
Chaired by: SungWon Chung (United States) and Jongseok Park (United States)

1:30pm — **ES1-3: Quantum Computing in Nanoscale CMOS Using Position-Based Charge Qubits**
» Robert Bogdan Staszewski (Ireland)[1] (1. University College Dublin & Equal1)

3:15pm — **ES1-4: Scaling Photonic Quantum Computers**
» Zachary Vernon (Canada)[1], Blair Morrison (Canada)[1] (1. Xanadu Quantum Technologies)

1:30pm — **Educational Session 2: High Performance mm-wave Circuits**
Chaired by: Debo Chowdhury (United States) and Hossein Miri Lavasani (United States)

Continued from **Sunday, 25 April**

1:30pm **ES2-3: VCO Design Challenges and Solutions for mm-wave Applications**
» Waleed Khalil (United States)[1] (1. The Ohio State University)

3:15pm **ES2-4: Radio-frequency and Millimeter-Wave Phased Arrays**
» Hossein Hashemi (United States)[1] (1. university of southern california)

1:30pm **Educational Session 3: Emerging Applications for Digital Accelerators**
Chaired by: Jie Gu (United States) and Gregory Chen (United States)

1:30pm **ES3-3: Machine Learning Applications in Design Automation**
» Haoxing (Mark) Ren (United States)[1] (1. NVIDIA)

3:15pm **ES3-4: Coupled Oscillator based Computing: Using Nature to Solve Difficult Problems**
» Chris Kim (United States)[1] (1. University of Minnesota)

1:30pm **Educational Session 4: Low Power Wireless for Biomedical Sensing and IoT**
Chaired by: Chris Rudell (United States) and Steven Bowers (United States)

1:30pm **ES4-3: Deep Sub-Millimeter-Dimension Implants: Challenges and Opportunities**
» Alyosha Molnar (United States)[1], Sunwoo Lee (United States)[1], Alejandro Cortese (United States)[1], Paul McEuen (United States)[1], Sanaz Sadeghi (United States)[1], Shahaboddin Ghajari (United States)[1] (1. Cornell University)

3:15pm **ES4-4: The Internet-of-Medical Things (IoMT): An Opportunity for Ubiquitous Health Monitoring**
» Drew Hall (United States)[1] (1. University of California, San Diego)

Monday, 26 April

8:30am **Welcome and Opening Remarks**
Chaired by: Christophe Antoine (United Kingdom) and Sam Palermo and Arijit Raychowdhury (United States)

8:50am **Session 1: Keynote Session**
Chaired by: Foster Dai (United States) and Christophe Antoine (United Kingdom)

8:50am **Technology And Architecture For The Next Decade Of Compute (Keynote)**
» Samuel Naffziger (United States)[1] (1. Senior Vice President, Corporate Fellow, and Product Technology Architect, Advanced Micro Devices, Inc)

10am **Session 2: Photonics, Sensing and Machine Learning**
Chaired by: Firooz Aflatouni (United States) and Kaushik Sengupta (United States)

10am **Introduction: Photonics, Sensing and Machine Learning**
» Firooz Aflatouni (United States)[1], Kaushik Sengupta (United States)[2] (1. University of Pennsylvania, 2. Princeton University)

10:05am **2-1: Electronics-photonics Co-design for Robust Control of Optical Devices in Dense Integrated Photonic Circuits (Invited)**
» Fabio Toso (Italy)[1], Francesco Zanetto (Italy)[1], Vittorio Grimaldi (Italy)[1], Alessandro Perino (Italy)[1], Emanuele Guglielmi (Italy)[1], Francesco Morichetti (Italy)[1], Andrea Melloni (Italy)[1], Giorgio Ferrari (Italy)[1], Marco Sampietro (Italy)[1] (1. Politecnico di Milano, Department of Electronics, Information and Bioengineering)

Continued from **Monday, 26 April**

10:55am

2-2: Fully Integrated Electronic-Photonic Sensor for Label-Free Refractive Index Sensing in Advanced Zero-Change CMOS-SOI Process

» Christos Adamopoulos (United States)[1], Sidney Buchbinder (United States)[1], Panagiotis Zarkos (United States)[1], Pavan Bhargava (United States)[1], Asmaysinh Gharia (United States)[2], Ali Niknejad (United States)[1], Mekhail Anwar (United States)[3], Vladimir Stojanovic (United States)[1] (1. University of California, Berkeley, 2. University of California, Berkeley, University of California, San Francisco, 3. University of California, San Francisco)

11:20am

2-3: Integrated-Circuit Node for Time-Domain Near-infrared Diffuse Optical Tomography Imaging Arrays with On-chip Histogramming and Integrated VCSELs

» Sajjad Moazeni (United States)[1], Kevin Renehan (United States)[2], Eric Pollmann (United States)[2], Kenneth Shepard (United States)[2] (1. University of Washington, 2. Columbia University)

11:45am

2-4: A 256x256 6.3pJ/pixel-event Query-driven Dynamic Vision Sensor with Energy-conserving Row-parallel Event Scanning

» Rajkumar Kubendran (United States)[1], Akshay Paul (United States)[2], Gert Cauwenberghs (United States)[2] (1. University of Pittsburgh, 2. University of California San Diego)

10am

Session 3: Modelling and Design Automation for Emerging Applications

Chaired by: Xuan Zhang (United States) and Charles Augustine (United States)

10am

Introduction: Modelling and Design Automation for Emerging Applications

» Xuan Zhang (United States)[1], Charles Augustine (United States)[2] (1. Washington University in St. Louis, 2. Intel Circuit Research Lab)

10:05am

3-1: MAGICAL 1.0: An Open-Source Fully-Automated AMS Layout Synthesis Framework Verified With a 40-nm 1GS/s ΔΣ ADC

» Hao Chen (United States)[1], Mingjie Liu (United States)[1], Xiyuan Tang (United States)[1], Keren Zhu (United States)[1], Abhishek Mukherjee (United States)[1], Nan Sun (United States)[1], David Z. Pan (United States)[1] (1. The University of Texas at Austin)

10:30am

3-2: MemGen: An Open-Source Framework for Autonomous Generation of Memory Macros

» Sumanth Kamineni (United States)[1], Shourya Gupta (United States)[1], Benton H. Calhoun (United States)[1] (1. University of Virginia)

10:55am

3-3: Physical Design Strategies for Mitigating Fine-Grained Electromagnetic Side-Channel Attacks

» Meizhi Wang (United States)[1], Vishnuvardhan V Iyer (United States)[1], Shanshan Xie (United States)[1], Ge Li (United States)[1], Sanu K Mathew (United States)[2], Raghavan Kumar (United States)[2], Michael Orshansky (United States)[1], Ali E Yilmaz (United States)[1], Jaydeep P Kulkarni (United States)[1] (1. The University of Texas at Austin, 2. Intel Circuit Research Lab)

11:20am

3-4: 64-Bit ARM CPU at Cryogenic Temperatures: A Design Technology Co-Optimization for Power and Performance

» Rakshith Saligram (United States)[1], Divya Prasad (United States)[2], David Pietromonaco (United States)[2], Arijit Raychowdhury (United States)[1], Brian Cline (United States)[2] (1. Georgia Institute of Technology, 2. Arm)

10am

Session 4: References and Sensors

Chaired by: Sudhakar Pamarti (United States) and Yongping Fan (United States)

10am

Introduction: References and Sensors

» Sudhakar Pamarti (United States)[1], Yongping Fan (United States)[2] (1. University of California, Los Angeles, 2. Intel)

10:05am

4-1: A Digitally Reconfigurable RC Frequency Generator using Impedance IQ-Balanced Frequency-Locked-Loop with Selectable Phase Mixing (Best Student Paper Candidate)

» Boyu Shen (United States)[1], Matthew Johnston (United States)[1] (1. Oregon State University)

Continued from **Monday, 26 April**

10:30am **4-2: A Second-order Temperature Compensated 1µW/MHz 100MHz RC Oscillator with ±140ppm Inaccuracy From -40°C to 95°C**

» Kyu-Sang Park (United States)[1], Amr Khashaba (United States)[1], Ahmed Abdelrahman (United States)[1], Yongxin Li (United States)[1], Tianyu Wang (United States)[1], Ruhao Xia (United States)[1], Nilanjan Pal (United States)[1], Pavan Kumar Hanumolu (United States)[1] (1. university of illinois at urbana-champaign)

10:55am **4-3: A 12MHz/38.4MHz Fast Start-Up Crystal Oscillator Using Impedance Guided Chirp Injection in 22nm FinFET CMOS**

» Hao Luo (United States)[1], Somnath Kundu (United States)[1], Chun Lee (United States)[1], Rinkle Jain (United States)[1], Sarah Shahraini (United States)[1], Eduardo Alban (United States)[1], Timo Huusari (United States)[1], Jason Mix (United States)[1], Nasser Kurd (United States)[1], Mohamed Abdel-moneum (United States)[1], Brent Carlton (United States)[1] (1. Intel)

11:20am **4-4: A 1-V Diode-Based Temperature Sensor with a Resolution FoM of 3.1pJ•K2 in 55nm CMOS**

» Zhong Tang (China)[1], Yun Fang (China)[1], Xiao-Peng Yu (China)[1], Nick Nianxiong Tan (China)[1], Zheng Shi (China)[1], Pieter Harpe (Netherlands)[2] (1. Zhejiang University, 2. Eindhoven University of Technology)

11:45am **4-5: An 111pW Voltage Reference with a Diode-Leakage Decoupling Replica for High-Temperature Miniature IoT Systems**

» Yuyang Li (United States)[1], Inhee Lee (United States)[1] (1. University of Pittsburgh)

10am **Session 5: Panel Session: Are FoMs Killing Creativity?**

Chaired by: Jerald Yoo (Singapore) and Sudip Shekhar (Canada)

12:10pm **Break**

12:30pm **Session 2: Photonics, Sensing and Machine Learning**

Chaired by: Firooz Aflatouni (United States) and Kaushik Sengupta (United States)

12:30pm **2-5: An In-Memory-Computing Charge-Domain Ternary CNN Classifier (Best Student Paper Candidate)**

» Xiangxing Yang (United States)[1], Keren Zhu (United States)[1], Xiyuan Tang (United States)[1], Meizhi Wang (United States)[1], Mingtao Zhan (China)[2], Nanshu Lu (United States)[3], Jaydeep P Kulkarni (United States)[1], David Z. Pan (United States)[1], Yongpan Liu (China)[2], Nan Sun (China)[2] (1. The University of Texas at Austin, 2. Tsinghua University, 3. University of Texas, Austin)

12:55pm **2-6: A 22 nm, 1540 TOP/s/W, 12.1 TOP/s/mm2 in-Memory Analog Matrix-Vector-Multiplier for DNN Acceleration**

» Ioannis Papistas (Belgium)[1], Stefan Cosemans (Belgium)[1], Bram Rooseleer (Belgium)[1], Jonas Doevenspeck (Belgium)[1], Myung Hee Na (Belgium)[1], Arindam Mallik (Belgium)[1], Peter Debacker (Belgium)[1], Diederik Verkest (Belgium)[1] (1. IMEC)

1:20pm **2-7: A 20µW, 0.05mm2 Duty-Cycled Resistor and Frequency-Locked-Loop based Wheatstone Bridge Interface for Low Resistance Sensing Systems**

» Jinyong Kim (United States)[1], Callen Votzke (United States)[1], Soumya Bose (United States)[1], Arun Natarajan (United States)[1], Matthew Johnston (United States)[1] (1. Oregon State University)

12:30pm **Session 6: 2D/3D SOC Design**

Chaired by: Farhana Sheikh (United States) and Xinfei Guo (United States)

12:30pm **Introduction: 2D/3D SOC Design**

» Farhana Sheikh (United States)[1], Xinfei Guo (United States)[2] (1. Intel Circuit Research Lab, 2. NVIDIA)

12:35pm **6-1: A 256Gb/s/mm-shoreline AIB-Compatible 16nm FinFET CMOS Chiplet for 2.5D Integration with Stratix 10 FPGA on EMIB and Tiling on Silicon Interposer (Best Student Paper Candidate)**

» Chester Liu (United States)[1], Jacob Botimer (United States)[1], Zhengya Zhang (United States)[1] (1. University of Michigan)

Continued from **Monday, 26 April**

1pm

6-2: 3DIC Design Challenges, Early Solutions and Future Recommendations (Invited)

» Victoria Kolesov (United States)[1], Vivek Rajan (United States)[1], Ramune Nagisetty (United States)[2] (1. Product Enablement Solutions Group, Intel Corporation, 2. Technology Development, Intel Corporation)

1:50pm

6-3: 3D-Split SRAM: Enabling Generational Gains in Advanced CMOS

» Rahul Mathur (United States)[1], Mudit Bhargava (United States)[2], Heath Perry (United States)[2], Alberto Cestero (United States)[3], Frank Frederick (United States)[2], Shawn Hung (United States)[2], Chien-Ju Chao (United States)[2], Daniel Smith (United States)[3], Daniel Fisher (United States)[3], Norman Robson (United States)[3], Xiaoqing Xu (United States)[2], Pranavi Chandupatla (United States)[2], Raguram Balachandran (United States)[2], Saurabh Sinha (United States)[2], Brian Cline (United States)[2], Jaydeep P Kulkarni (United States)[4] (1. University of Texas, Austin, 2. ARM Inc, 3. GLOBAL FOUNDRIES, 4. The University of Texas at Austin)

12:30pm **Session 7: Amplifier Techniques**

Chaired by: Shaolan Li (United States) and Tolga Dinc (United States)

12:30pm

Introduction: Amplifier Techniques

» Shaolan Li (United States)[1], Tolga Dinc (United States)[2] (1. Georgia Institute of Technology, 2. Texas Instruments, Dallas, TX)

12:35pm

7-1: A Negative R-Assisted Amplifier on the Virtual Ground and Its Applications (Invited)

» Youngcheol Chae (Korea, Republic of)[1], MoonHyung Jang (Korea, Republic of)[1], Changuk Lee (Korea, Republic of)[1], Sangwoo Lee (Korea, Republic of)[2], Seungwoo Song (Korea, Republic of)[2] (1. Yonsei University, 2. Samsung Electronics)

1:25pm

7-2: An 8-Channel Analog Front-End with a PVT-Insensitive Switched-Capacitor and Analog Combo DC Servo Loop Achieving 300mV Tolerance and 0.64s Recovery Time to Electrode-DC Offset for Physiological Signal Recording

» Geng Mu (China)[1], Dawei Ye (China)[1], Liangjian Lyu (China)[1], Xiaobin Zhao (China)[1], C. -J. Richard Shi (United States)[2] (1. Fudan University, 2. University of Washington)

1:50pm

7-3: An Inverter-Based Amplifier Structure for Neural Signal Recording with an NEF of 1.28 and Area-per-Channel of 0.06mm2

» Qiuzhen Xu (China)[1], Kun Liao (China)[1], Junzhong Yang (China)[2], Pengda Qu (China)[1], Feng Luo (China)[1], Weibo Hu (China)[1], Stephen VanDuyne (United States)[3], Zhiming Xiao (China)[1] (1. Nankai University, 2. State Grid Taizhou Power Supply Company, 3. Analog Devices Inc.)

2:15pm

7-4: A 53GΩ@DC Input Impedance Multi-Channel Neural Recording Amplifier with 0.77 μVrms Input-Referred Noise for Deep Brain Implants

» Hai Au Huynh (Denmark)[1], Milad Zamani (Denmark)[1], Margherita Ronchini (Denmark)[1], Homan Farkhani (Denmark)[1], Farshad Moradi (Denmark)[1] (1. Aarhus university)

12:30pm **Session 8: Forum: Advanced Modulation Schemes for Wireline**

Chaired by: Mayank Raj (United States) and Xiang Gao (China)

12:30pm

8-1: Transitioning From Electrical to Optical I/O for Tb/s Bandwidth Interconnects

» James Jaussi (United States)[1] (1. Intel)

1pm

8-2: Modulation and Coding Considerations for 224 Gb/s Per Lane Over Copper

» Cathy Liu (United States)[1] (1. Broadcom)

1:30pm

8-3: Coherent vs PAM4 Optics in the Data Center

» Alexander Rylyakov (United States)[1] (1. Nokia)

2pm

8-4: Modulation Schemes, DSP Architectures, and FEC for Future Data Center Interconnects

» Ilya Lyubomirsky (United States)[1] (1. InPhi)

Continued from **Monday, 26 April**

2:30pm **Joint Mentoring Event with YP and WiC**

Tuesday, 27 April

9am **Session 9: Keynote Session**
Chaired by: Foster Dai (United States) and Christophe Antoine (United Kingdom)

9am **Mixed Signal Designs for a Digitized World (Keynote)**
» Vida Ilderem (United States)[1] (1. Vice President & Director Wireless Systems Research, Intel Corporation)

10am **Session 10: Biomedical Systems and Interfaces**
Chaired by: Marco Tartagni (Italy) and Jongseok Park (United States)

10am **Introduction: Biomedical Systems and Interfaces**
» Marco Tartagni (Italy)[1], Jongseok Park (United States)[2] (1. University of Bologna, 2. Intel)

10:05am **10-1: Multisite Bio-stimulating Implants Magnetoelectrically Powered and Individually Programmed by a Single Transmitter (Best Student Paper Candidate)**
» Zhanghao Yu (United States)[1], Joshua Chen (United States)[1], Yan He (United States)[1], Fatima Alrashdan (United States)[1], Benjamin Avants (United States)[1], Amanda Singer (United States)[1], Jacob Robinson (United States)[1], Kaiyuan Yang (United States)[1] (1. Rice University)

10:30am **10-2: A Somatosensory Feedback System in 180nm CMOS**
» Han Hao (United States)[1], Hangxing Liu (United States)[1], Jan Van der Spiegel (United States)[1], Firooz Aflatouni (United States)[1] (1. University of Pennsylvania)

10:55am **10-3: A 24-Channel Neurostimulator IC with One-Shot Impedance-Adaptive Channel-Specific Charge Balancing**
» Fatemeh Eshaghi (Canada)[1], Esmaeil Najafiaghdam (Iran, Islamic Republic of)[2], Hossein Kassiri (Canada)[1] (1. Department of Electrical Engineering and Computer Science, York University, Toronto, ON M3J 1P3, 2. Microelectronic Research Laboratory, EE Department, Sahand University of Technology, Tabriz)

11:20am **10-4: A 16-Channel Wireless Neural Recording System-on-Chip with CHT Feature Extraction Processor in 65nm CMOS**
» Arda Uran (Switzerland)[1], Kerim Ture (Switzerland)[1], Cosimo Aprile (Switzerland)[1], Alix Trouillet (Switzerland)[1], Florian Fallegger (Switzerland)[1], Azita Emami (United States)[2], Stéphanie Lacour (Switzerland)[1], Catherine Dehollain (Switzerland)[1], Yusuf Leblebici (Switzerland)[1], Volkan Cevher (Switzerland)[1] (1. EPFL, 2. California Institute of Technology)

11:45am **10-5: A 46-channel Vector Stimulator with 50mV Worst-Case Common-Mode Artifact for Low-Latency Adaptive Closed-Loop Neuromodulation**
» Arindam Mandal (United States)[1], Diego Peña-Colaiocco (United States)[1], Rajesh Pamula (United States)[2], Karam Khateeb (United States)[1], Logan Murphy (United States)[1], Azadeh Yazdan-Shahmorad (United States)[1], Steve Perlmutter (United States)[1], Forrest Pape (United States)[3], Chris Rudell (United States)[1], Visvesh Sathe (United States)[1] (1. University of Washington, 2. Skyworks Solutions, 3. Medtronic Inc)

10am **Session 11: Advanced Electrical and Optical Communication Circuits and Systems**
Chaired by: Armin Tajalli (United States) and Tejasvi Anand (United States)

10am **Introduction: Advanced Electrical and Optical Communication Circuits and Systems**
» Armin Tajalli (United States)[1], Tejasvi Anand (United States)[2] (1. University of Utah, 2. Oregon State University)

Continued from **Tuesday, 27 April**

10:05am **11-1: 56/112Gbps Wireline Transceivers for Next Generation Data Centers on 7nm FINFET CMOS Technology (Invited)**
» Tamer Ali (United States)[1], Mohammed Abdullatif (United States)[1], Henry Park (United States)[1], Ehung Chen (United States)[1], Ramy Yousry (United States)[1], Miguel Gandara (United States)[1] (1. Mediatek, Irvine)

10:55am **11-2: A 3.2GHz 405fsrms Jitter -237.2dB-FoMJIT Ring-based Fractional-N Synthesizer Using Two-step Quantization Noise Cancellation and Piecewise-linear Nonlinearity Correction (Best Student Paper Candidate)**
» Ahmed Elmallah (United States)[1], Junheng Zhu (United States)[1], Amr Khashaba (United States)[1], Karim M. Megawer (United States)[1], Ahmed Elkholy (United States)[1], Pavan Kumar Hanumolu (United States)[1] (1. university of illinois at urbana-champaign)

11:20am **11-3: A 4-to-1 240 Gb/s PAM-4 MUX with a 7-tap Mixed-Signal FFE in 55nm BiCMOS**
» Michiel Verplaetse (Belgium)[1], Hannes Ramon (Belgium)[2], Nishant Singh (Belgium)[1], Bart Moeneclaey (Belgium)[1], Peter Ossieur (Belgium)[1], Guy Torfs (Belgium)[1] (1. imec - Ghent University, 2. currently with Nokia)

11:45am **11-4: A Scalable 32-to-56Gb/s 0.56-to-1.28pJ/b Voltage-Mode VCSEL-Based Optical Transmitter in 28nm CMOS (Best Regular Paper Candidate)**
» Rajesh Inti (United States)[1], Mozhgan Mansuri (United States)[1], Joe Kennedy (United States)[1], Junyi Qiu (United States)[1], Chun-Ming Hsu (United States)[1], Jahnavi Sharma (United States)[1], Hao Li (United States)[1], Bryan Casper (United States)[1], James Jaussi (United States)[1] (1. Intel)

10am **Session 12: mm-Wave Circuits and Transceivers**
Chaired by: Jane Gu (United States) and Amr Fahim (United States)

10am **Introduction: mm-Wave Circuits and Transceivers**
» Jane Gu (United States)[1], Amr Fahim (United States)[2] (1. University of California, Davis, 2. Broadcom)

10:05am **12-1: Transceivers for 6G Wireless Communications: Challenges and Design Solutions (Best Invited Paper Candidate)**
» Payam Heydari (United States)[1] (1. University of California, Irvine)

10:55am **12-2: An Ultra-Compact 84.9-107 GHz LNA with 4.9dB NF by Utilizing Coupled-line-based Gm-Boosting and Noise-Canceling Techniques in 65-nm CMOS Technology (Best Regular Paper Candidate)**
» Wei Zhu (China)[1], Jiawen Wang (China)[1], Yan Wang (China)[1], Ruitao Wang (China)[1] (1. Tsinghua University)

11:20am **12-3: A 3.6dB NF, 23–39GHz Reflectionless RX with Absorptive Amplifier and Dual-Path Noise Cancelling LNA Supporting 64-QAM/256-QAM/1024-QAM for 5G NR**
» Zhixian Deng (China)[1], Huizhen Qian (China)[1], Xun Luo (China)[1] (1. University of Electronic Science and Technology of China)

11:45am **12-4: A 94GHz Scalable 2×2 Phased-Array Receiver in SiGe BiCMOS for High Data-Rate Communication**
» Huanbo Li (China)[1], Jixin Chen (China)[1], Debin Hou (China)[1], Zekun Li (China)[1], Rui Zhou (China)[1], Wei Hong (China)[1] (1. Southeast University)

10am **Session 13: Forum: Heterogeneous Integration**
Chaired by: Gregory Chen (United States) and Yoonmyung Lee (Korea, Republic of)

10am **13-1: On-Chip Power Delivery using GaN: Challenges and Opportunities for Heterogeneous Integration**
» Nachiket Desai (United States)[1] (1. Intel Labs)

10:30am **13-2: Towards the Next-generation Intelligence with Electronic-Photonic Integration**
» Sajjad Moazeni (United States)[1] (1. University of Washington, Seattle)

11am **13-3: Design Enablement and Implementation of Memory-on-Logic application with Advanced CMOS Nodes**
» Dragomir Milojevic (Belgium)[1] (1. IMEC)

Continued from **Tuesday, 27 April**

11:30am **13-4: Package Architectures for High Volume Chiplet Solutions**
» Raja Swaminathan (United States)[1] (1. AMD)

12:10pm **Break**

12:10pm **Break**

12:10pm **Break**

12:30pm **Session 10: Biomedical Systems and Interfaces**
Chaired by: Marco Tartagni (Italy) and Jongseok Park (United States)

12:30pm **10-6: A 40V Voltage-Compliance 12.75mA Maximum-Current Multipolar Neural Stimulator Using Time-Based Charge Balancing Technique Achieving 2mV Precision**
» Haoran Pu (United States)[1], Ahmad Reza Danesh (United States)[1], Omid Malekzadeh-Arasteh (United States)[1], Won Joon Sohn (United States)[1], An H. Do (United States)[1], Zoran Nenadic (United States)[1], Payam Heydari (United States)[1] (1. University of California, Irvine)

12:55pm **10-7: Zero-Crossing-Based Bio-Engineered Sensor**
» Qijun Liu (United States)[1], Arslan Riaz (United States)[1], Timur Zirtiloglu (United States)[1], Maria Eugenia Inda (United States)[2], Miguel Jimenez (United States)[2], Yong Lai (United States)[2], Christoph Steiger (Germany)[3], Elizabeth Diamond (United States)[1], Giovanni Traverso (United States)[2], Timothy Lu (United States)[2], Anantha Chandrakasan (United States)[2], Phillip Nadeau (United States)[4], Rabia Tugce Yazicigil (United States)[1] (1. Boston University, 2. Massachusetts Institute of Technology, 3. Bayer Pharmaceuticals, 4. Analog Devices)

12:30pm **Session 11: Advanced Electrical and Optical Communication Circuits and Systems**
Chaired by: Armin Tajalli (United States) and Tejasvi Anand (United States)

12:30pm **11-5: A 50Gb/s High-Efficiency Si-Photonic Transmitter With Lump-Segmented MZM and Integrated PAM4 CDR (Best Student Paper Candidate)**
» Qiwen Liao (China)[1], Miaofeng Li (China)[2], Zhao Zhang (China)[3], Jian Liu (China)[1], Nanjian Wu (China)[1], Xi Xiao (China)[2], Nan Qi (China)[1] (1. Institute of Semiconductors, Chinese Academy of Sciences and University of Chinese Academy of Sciences, 2. National Information Optoelectronics Innovation Center, China Information and Communication Technologies Group Corporation, 3. Institute of Semiconductors, Chinese Academy of Sciences)

12:30pm **Session 12: mm-Wave Circuits and Transceivers**
Chaired by: Jane Gu (United States) and Amr Fahim (United States)

12:30pm **12-5: A 26-32 GHz Dual-Polarization Receiver with Autonomous Polarization Alignment for Fast-Response Mm-Wave MIMO Links in Highly Dynamic Mobile Environments**
» Amr Ahmed (United States)[1], Boce Lin (United States)[1], Hua Wang (United States)[1] (1. Georgia Institute of Technology)

12:55pm **12-6: A 28GHz Hybrid-Beamforming Transmitter Array Supporting Concurrent Dual Data Steams and Spatial Notch Steering for 5G MIMO (Best Student Paper Candidate)**
» Yaolong Hu (United States)[1], Xiaohan Zhang (United States)[1], Taiyun Chi (United States)[1] (1. Rice University)

1:20pm **12-7: A Dual-Mode 24-32 GHz 4-Element Phased-Array Transceiver Front-End with SSA Beamformer for Autonomous Agile Unknown Signal Tracking and Blocker Rejection within <0.1 us and 21.3%/15% Transmitter Peak/OP1dB PAE**
» Wei Zhu (China)[1], Jiawen Wang (China)[1], Yan Wang (China)[1], Ruitao Wang (China)[1] (1. Tsinghua University)

1:45pm **12-8: An Energy Efficient Fully Integrated 20Gbps OOK Wireless Transmitter at 220GHz**
» Bahareh Hadidian (United States)[1], Farzad Khoeini (United States)[1], S.M. Hossein Naghavi (United States)[1], Andreia Cathelin (France)[2], Ehsan Afshari (United States)[1] (1. University of Michigan, 2. STMicroelectronics)

Continued from **Tuesday, 27 April**

12:30pm **Session 14: Panel Session: Who is Leading Innovations, Academia or Industry?**
Chaired by: Sudip Shekhar (Canada) and Mozhgan Mansuri (United States)

Wednesday, 28 April

9am **Session 15: Security Instances: Shielding the Achilles' Heel of Chips**
Chaired by: Elkim Roa (Colombia) and Shreyas Sen (United States)

9am **Introduction: Security Instances: Shielding the Achilles' Heel of Chips**
» Elkim Roa (Colombia)[1] (1. Universidad Industrial de Santander)

9:05am **15-1: Samsung Physically Unclonable Function (SAMPUF™) and its integration with Samsung Security System (Best Invited Paper Candidate)**
» Yongki Lee (Korea, Republic of)[1], Bohdan Karpinskyy (Korea, Republic of)[1], Yunhyeok Choi (Korea, Republic of)[1], Kyoung-Moon Ahn (Korea, Democratic People's Republic of)[1], Yongsoo Kim (Korea, Republic of)[1], Jieun Park (Korea, Republic of)[1], Sumin Noh (Korea, Republic of)[1], Jisu Kang (Korea, Republic of)[1], Jonghoon Shin (Korea, Republic of)[1], Jaechul Park (Korea, Republic of)[1], Youngjin Chung (Korea, Republic of)[1], Jongshin Shin (Korea, Republic of)[1] (1. Foundry Business, Samsung Electronics, Hwaseong 18448)

9:55am **15-2: Galvanically Isolated, Power and Electromagnetic Side-Channel Attack Resilient Secure AES Core with Integrated Charge Pump based Power Management**
» Meizhi Wang (United States)[1], Shanshan Xie (United States)[1], Ping Na Li (United States)[1], Aseem Sayal (United States)[1], Ge Li (United States)[1], Vishnuvardhan V Iyer (United States)[1], Aditya Thimmaiah (United States)[1], Michael Orshansky (United States)[1], Ali E Yilmaz (United States)[1], Jaydeep P Kulkarni (United States)[1] (1. The University of Texas at Austin)

10:20am **15-3: A Low-Power Elliptic Curve Pairing Crypto-Processor for Secure Embedded Blockchain and Functional Encryption**
» Utsav Banerjee (United States)[1], Anantha Chandrakasan (United States)[1] (1. Massachusetts Institute of Technology)

10:45am **15-4: Secure-RRAM: A 40nm 16kb Compute-in-Memory Macro with Reconfigurability, Sparsity Control, and Embedded Security**
» Wantong Li (United States)[1], Shanshi Huang (United States)[1], Xiaoyu Sun (United States)[1], Hongwu Jiang (United States)[1], Shimeng Yu (United States)[1] (1. Georgia Institute of Technology)

9am **Session 16: Frequency Generation**
Chaired by: Wanghua Wu (United States) and Hamidreza Aghasi (United States)

9am **Introduction: Frequency Generation**
» Wanghua Wu (United States)[1], Hamidreza Aghasi (United States)[2] (1. Samsung, 2. University of California, Irvine)

9:05am **16-1: Dividerless Frequency Acquisition & Charge Pump Mismatch Compensation for Low-Power Millimeter-Wave Sub-Sampling PLL (Invited)**
» Hao Wang (United States)[1], Omeed Momeni (United States)[1] (1. University of California, Davis)

9:30am **16-2: An 8.2-to-21.5 GHz Dual-Core Quad-Mode Orthogonal-Coupled VCO with Con-currently Dual-Output using Parallel 8-Shaped Resonator**
» Wei Deng (China)[1], Haikun Jia (China)[1], Rui Wu (China)[2], Shiyan Sun (China)[3], Chenggang Li (China)[1], Zhihua Wang (China)[1], Baoyong Chi (China)[1] (1. Tsinghua University, 2. National Key Lab of Microwave Imaging Technology, AIR, CAS, 3. Beijing Institute of Technology)

9:55am **16-3: A 13.6-69.1GHz 5.6mW Ring-Type Injection-Locked Frequency Divider by Five with >20% Continuous Locking Range and Operation up to 101.6GHz in 28nm CMOS**
» Alessandro Garghetti (Austria)[1], Andrea L. Lacaita (Italy)[2], David Seebacher (Austria)[1], Matteo Bassi (Austria)[1], Salvatore Levantino (Italy)[2] (1. Infineon Technologies Austria, 2. Politecnico di Milano)

Continued from **Wednesday, 28 April**

10:20am **16-4: A 2.7mW 45fsrms-Jitter Cryogenic Dynamic-Amplifier-Based PLL for Quantum Computing Applications**
» Jiang Gong (Netherlands)[1], Edoardo Charbon (Netherlands)[1], Fabio Sebastiano (Netherlands)[1], Masoud Babaie (Netherlands)[1] (1. delft university of technology)

9am **Session 17: DC-DC Converters**
Chaired by: Yan Lu (Macao) and Eric Soenen (United States)

9am **Introduction: DC-DC Converters**
» Eric Soenen (United States)[1], Yan Lu (Macao)[2] (1. TSMC, 2. University of Macau)

9:05am **17-1: Design Techniques of Integrated Power Management Circuits for Low Power Edge Devices (Best Invited Paper Candidate)**
» Li Xu (United States)[1], Jeongsup Lee (United States)[1], Mehdi Saligane (United States)[1], David Blaauw (United States)[1], Dennis Sylvester (United States)[1] (1. University of Michigan)

9:55am **17-2: A 5–100V Input Low-Profile Adaptive Delay Compensated Hysteretic LED Driver with Enhanced Current Accuracy (Best Student Paper Candidate)**
» Qi Cheng (United States)[1], Jin Liu (United States)[1], Hoi Lee (United States)[1] (1. The University of Texas at Dallas)

10:20am **17-3: Quad Gate-Drive Controller with Start-Up and Shutdown for Cascaded Resonant Switched-Capacitor Converter**
» Pourya Assem (United States)[1], Robert Pilawa-Podgurski (United States)[1] (1. University of California)

10:45am **17-4: A Self-Resonant Boost Converter for Solar Energy Harvesting with 97% Tracking Efficiency, 80 mV Self-Startup and Ultra-Wide Range Source Tracking**
» Seneke Chamith Chandrarathna (Korea, Republic of)[1], Jong-Wook Lee (Korea, Republic of)[1] (1. Kyung hee university)

11am **Session 18: Panel Session: Will THz IC Technology Catch Up with THz Applications?**
Chaired by: Chris Rudell (United States) and Sudipto Chakraborty (United States)

11:10am **Break**

11:30am **Session 17: DC-DC Converters**
Chaired by: Eric Soenen (United States) and Yan Lu (Macao)

11:30am **17-5: A 12-W 96.1%-Efficiency eFuse-Based Ultrafast Battery Charger Supporting Wireless and USB Power Inputs**
» Yong Qu (Singapore)[1], Wei Shu (Singapore)[2], Yen-Cheng Kuan (Taiwan)[3], Shiuh-Hua Wood Chiang (United States)[4], Yue Li (Singapore)[1], Zixian Zheng (Singapore)[1], Joseph S. Chang (Singapore)[1] (1. Nanyang Technological University, 2. Zero-Error Systems, 3. National Chiao Tung University, 4. Brigham Young University)

11:55am **17-6: A Dual-Loop 4-Phase Switching LDO with Scalable Load Capability and Tunable Active Voltage Positioning for Microprocessors**
» Xiangyu Mao (Macao)[1], Yan Lu (Macao)[1], Rui Paulo Martins (Macao)[1] (1. University of Macau)

12:20pm **17-7: A 0.75-5V, 15.8 nA with 1.8 µs Delay Supply Voltage Supervisor using Adaptively Biased Comparator and Sample & Hold Technique for IoT**
» Ashutosh Chitnis (India)[1], Rajat Chauhan (India)[2], Divya Kaur (India)[2], Qadeer Khan (India)[1] (1. Indian Institute of Technology Madras, Chennai, 2. Texas Instruments, Bangalore)

1pm **Session 20: Keynote Luncheon**
Chaired by: Christophe Antoine (United Kingdom) and Foster Dai (United States)

1pm **AR/VR Applications at Facebook Reality Labs: Silicon Challenges and Research Directions (Keynote)**
» Sha Rabii (United States)[1], Edith Beigné (United States)[2] (1. Vice President, Head of Silicon, Facebook Inc., 2. Research Director of AR/VR Silicon, Facebook Reality Labs)

Continued from **Wednesday, 28 April**

2:30pm **Virtual Reception/Networking Event**

Thursday, 29 April

9am **Session 21: Keynote Session**
Chaired by: Foster Dai (United States) and Christophe Antoine (United Kingdom)

9am **The Future of Memory Chip Technology (Keynote)**
» Gurtej Sandhu (United States)[1] (1. Senior Fellow and Vice President, Micron Technology Inc.)

10am **Session 22: Circuits for Machine Learning and cryo-CMOS Applications**
Chaired by: Visvesh Sathe (United States) and Supreet Jeloka (United States)

10am **Introduction: Circuits for Machine Learning and cryo-CMOS Applications**
» Visvesh Sathe (United States)[1] (1. University of Washington)

10:05am **22-1: A 40nm 100Kb 118.44TOPS/W Ternary-weight Compute-in-Memory RRAM Macro with Voltage-sensing Read and Write Verification for Reliable Multi-bit RRAM Operation (Best Regular Paper Candidate)**
» Jong-Hyeok Yoon (United States)[1], Muya Chang (United States)[1], Win-San Khwa (Taiwan)[2], Yu-Der Chih (Taiwan)[3], Meng-Fan Chang (Taiwan)[2], Arijit Raychowdhury (United States)[1] (1. Georgia Institute of Technology, 2. TSMC Corporate Research, 3. TSMC Design Technology)

10:30am **22-2: A 128x128 SRAM Macro with Embedded Matrix-Vector Multiplication Exploiting Passive Gain via MOS Capacitor for Machine Learning Application**
» Rezwan A Rasul (United States)[1], Mike Shuo-Wei Chen (United States)[1] (1. university of southern california)

10:55am **22-3: A 400MHz NPU with 7.8 TOPS²/W High-Performance-Guaranteed Efficiency in 55nm for Multi-Mode Pruning and Diverse Quantization Using Pattern-Kernel Encoding and Reconfigurable MAC Units**
» Zhanhong Tan (China)[1], Sia-Huat Tan (China)[1], Jan-Henrik Lambrechts (China)[1], Yannian Zhang (China)[2], Yifu Wu (China)[2], Kaisheng Ma (China)[1] (1. Tsinghua University, 2. Institute for Interdisciplinary Information Core Technology)

11:20am **22-4: CryoMem: A 4K-300K 1.3GHz eDRAM Macro with Hybrid 2T-Gain-Cell in a 28nm Logic Process for Cryogenic Applications**
» Rakshith Saligram (United States)[1], Suman Datta (United States)[2], Arijit Raychowdhury (United States)[1] (1. Georgia Institute of Technology, 2. University of Notre-Dame)

10am **Session 23: Emerging Power Converters**
Chaired by: John Pigott (Netherlands) and Hyun-Sik Kim (Korea, Republic of)

10am **Introduction: Emerging Power Converters**
» John Pigott (United States)[1], Hyun-Sik Kim (Korea, Republic of)[2] (1. NXP Semiconductors, 2. KAIST)

10:05am **23-1: Coupled Inductors for Fast-Response High-Density Power Delivery: Discrete and Integrated (Invited)**
» Charles Sullivan (United States)[1], Minjie Chen (United States)[2] (1. Dar, 2. Pri)

10:55am **23-2: Envelope-Tracking Supply Modulator with Trellis Search-Based Switching and 160MHz Capability (Best Student Paper Candidate)**
» Weiyu Leng (United States)[1], Asad Abidi (United States)[1], Sraavan Mundlapudi (United States)[2], Hooman Darabi (United States)[2], Debopriyo Chowdhury (United States)[2], Ali Afsahi (United States)[2], Sida Li (United States)[1] (1. University of California, Los Angeles, 2. Broadcom Corporation)

Continued from **Thursday, 29 April**

11:20am **23-3: An Analog Low-Power Highly-Accurate Link-Adaptive Energy Storage Efficiency Maximizer for Resonant CM Wireless Power Receivers (Best Student Paper Candidate)**
» Mansour Taghadosi (Canada)[1], Hossein Kassiri (Canada)[2] (1. EECS Department, York University, Toronto, Canada, 2. Department of Electrical Engineering and Computer Science, York University, Toronto, ON M3J 1P3)

11:45am **23-4: A Battery-Connected Inductor-First Flying Capacitor Multilevel Converter Achieving 0.77W/mm2 and 97.1% Peak Efficiency**
» Abdullah Abdulslam (United States)[1], Patrick Mercier (United States)[1] (1. University of California, San Diego)

10am **Session 24: Millimeter Wave Power Amplifiers and Transmitters**
Chaired by: Aritra Banerjee (United States) and Alan Westwick (United States)

10am **Introduction: Millimeter Wave Power Amplifiers and Transmitters**
» Aritra Banerjee (United States)[1], Alan Westwick (United States)[2] (1. IMEC, 2. Silicon Laboratories)

10:05am **24-1: A 30GHz 4-way Series Doherty Digital Polar Transmitter Achieving 18% Drain Efficiency and -27.6dB EVM while Transmitting 300MHz 64-QAM OFDM Signal (Best Student Paper Candidate)**
» Mohsen Mortazavi (Netherlands)[1], Yiyu Shen (Netherlands)[1], Dieuwert Peter Nicolaas Mul (Netherlands)[1], Leo de Vreede (Netherlands)[1], Marco Spirito (Netherlands)[1], Masoud Babaie (Netherlands)[1] (1. delft university of technology)

10:30am **24-2: Prospects for High-Efficiency Silicon and III-V Power Amplifiers and Transmitters in 100-300 GHz Bands (Invited)**
» James Buckwalter (United States)[1], Mark Rodwell (United States)[1], Kang Ning (United States)[1], Ahmed Ahmed (United States)[1], Andrea Arias-Purdue (United States)[1], Jeff Chien (United States)[1], Everett O'Malley (United States)[1], Eythan Lam (United States)[1] (1. University of California, Santa Barbara)

11:20am **24-3: A 24-28 GHz Concurrent Harmonic and Subharmonic Tuning Class E/F2,2/3 Subharmonic Switching Power Amplifier Achieving Peak/PBO Efficiency Enhancement**
» Aoyang Zhang (United States)[1], Mostafa Ayesh (United States)[1], Soumya Mahapatra (United States)[1], Mike Shuo-Wei Chen (United States)[1] (1. university of southern california)

11:45am **24-4: An Ultra-Compact 16-to-45 GHz Power Amplifier within A Single Inductor Footprint Using Folded Transformer Technique**
» Pingda Guan (China)[1], Haikun Jia (China)[1], Wei Deng (China)[1], Zhihua Wang (China)[1], Baoyong Chi (China)[1] (1. Tsinghua University)

10am **Session 25: Forum: Human Brain-Machine Interface**
Chaired by: Mahsa Shoaran (Switzerland) and Jerald Yoo (Singapore)

10am **25-1: Next-Generation Neurotechnology**
» Dejan Markovic (United States)[1] (1. University of California, Los Angeles)

10:30am **Design Challenges in Closed-loop Neuromodulators: Case Study of Intractable Epilepsy**
» Roman Genov (Canada)[1] (1. University of Toronto)

11am **A fully-implanted 1024 channel brain-machine interface**
» Joseph O'Doherty (United States)[1] (1. Neuralink)

11:30am **Bioelectronic Interfaces: Platforms and Applications to Movement Disorders**
» Timothy Denison (United Kingdom)[1] (1. University of Oxford)

12:10pm **Break**

12:30pm **Session 26: Delta-Sigma Converters**
Chaired by: John Khoury (United States) and Nima Maghari (United States)

12:30pm **Introduction: Delta-Sigma Converters**
» John Khoury (United States)[1], Nima Maghari (United States)[2] (1. Silicon Laboratories, 2. University of Florida)

Continued from **Thursday, 29 April**

12:35pm **26-1: A 94.1 dB DR 4.1 nW/Hz Bandwidth/Power Scalable DTDSM for IoT Sensing Applications Based on Swing-Enhanced Floating Inverter Amplifiers (Best Regular Paper Candidate)**

» zhao yibo (China)[1], Huajun Zhang (Netherlands)[2], Yaopeng Hu (China)[1], Yuanxin Bao (China)[3], Le Ye (China)[3], Wanyuan Qu (China)[1], Menlian Zhao (China)[1], Zhichao Tan (China)[1] (1. Zhejiang University, 2. delft university of technology, 3. Peking University)

1pm **26-2: A 0.9-V Calibration-Free 97dB-SFDR 2-MS/s Continuous-Time Incremental Delta-Sigma ADC Utilizing Variable Bit-Width Quantizer in 28nm CMOS**

» Mohamed A. Mokhtar (Germany)[1], Ahmed Abdelaal (Germany)[1], Markus Sporer (Germany)[1], Joachim Becker (Germany)[1], John G. Kauffman (Germany)[1], Maurits Ortmanns (Germany)[1] (1. University of Ulm)

1:25pm **26-3: A 0.9V 45MS/s CT ΔΣ Modulator with 94dB SFDR and 25.6fJ/conv. Enabled by a Digital Static and ISI Calibration in 22 FDSOI CMOS**

» Marcel Runge (Germany)[1], Dario Schmock (Germany)[1], Tobias Kaiser (Germany)[1], Friedel Gerfers (Germany)[1] (1. Technische Universität Berlin)

1:50pm **26-4: A 18MS/s 76dB SNDR 93dB SFDR CT ΔΣ Modulator with Input Voltage Tracking 2nd-Order GmVC Filter and Shared FIR DAC in 22nm FDSOI CMOS**

» Marcel Runge (Germany)[1], Julius Edler (Germany)[1], Tobias Kaiser (Germany)[1], Friedel Gerfers (Germany)[1] (1. Technische Universität Berlin)

2:15pm **26-5: An 81.5dB-DR 1.25MHz-BW VCO-Based CT ΔΣ ADC with Double-PFD Quantizer**

» Yi Zhong (China)[1], Xiyuan Tang (United States)[2], Jiaxin Liu (China)[1], Wenda Zhao (United States)[2], Shaolan Li (United States)[3], Nan Sun (China)[1] (1. Tsinghua University, 2. Univ. of Texas Austin, 3. Georgia Institute of Technology)

12:30pm **Session 23: Emerging Power Converters**

Chaired by: John Pigott (Netherlands) and Hyun-Sik Kim (Korea, Republic of)

12:30pm **23-5: An Efficient Wireless Power and Data Transfer System with Current-Modulated Energy-Reuse Back Telemetry and Energy-Adaptive Dual-Input Voltage Regulation**

» Minjae kim (Korea, Republic of)[1], Hyun-Su Lee (Korea, Republic of)[1], Hyung-Min Lee (Korea, Republic of)[1] (1. School of Electrical Engineering, Korea University, Seoul 02841)

12:55pm **23-6: A General-Regression-Neural-Network Based 5V-to-48V Three-Level Buck/Boost Power Converter with 40dB PSRR 90%-Efficiency for SSD Power Loss Protection**

» Chang Yang (United States)[1], Weizhong Chen (United States)[1], Yanli Fan (United States)[2], Ping Gui (United States)[3] (1. Southern Methodist University, ECE, 2. Texas Instruments, Dallas, TX, 3. Southern Methodist University (SMU))

12:30pm **Session 27: Panel Session: Machine Learning for Chip Design**

Chaired by: Farhana Sheikh (United States) and Patrick Mercier (United States)

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9am **Session 28: Keynote Session**

Chaired by: Foster Dai (United States) and Christophe Antoine (United Kingdom)

9am **Semiconductor Technology – The Path Forward for The Coming Decades (Keynote)**

» H.-S. Philip Wong (United States)[1] (1. Willard R. and Inez Kerr Bell Professor in the School of Engineering at Stanford University)

10am **Session 29: Advanced SoCs for Emerging Wearable/Portable Applications**

Chaired by: Jaydeep P Kulkarni (United States) and Divya Prasad (United States)

Continued from **Friday, 30 April**

10am **Introduction: Advanced SoCs for Emerging Wearable/Portable Applications**
» Divya Prasad (United States)[1], Jaydeep Kulkarni (United States)[2] (1. Arm, 2. The University of Texas at Austin)

10:05am **29-1: A 65nm Resonant Electro-Quasistatic 5-240uW Human Whole-Body Powering and 2.19uW Communication SoC with Automatic Maximum Resonant Power Tracking (Best Student Paper Candidate)**
» Nirmoy Modak (United States)[1], Debayan Das (United States)[1], Mayukh Nath (United States)[1], Baibhab Chatterjee (United States)[1], Gaurav Kumar K (United States)[1], Shovan Maity (United States)[1], Shreyas Sen (United States)[1] (1. Purdue University)

10:30am **29-2: A 252 Spins Scalable CMOS Ising Chip Featuring Sparse and Reconfigurable Spin Interconnects for Combinatorial Optimization Problems (Best Student Paper Candidate)**
» Yuqi Su (Singapore)[1], Junjie Mu (Singapore)[1], Hyunjoon Kim (Singapore)[1], Bongjin Kim (United States)[2] (1. Nanyang Technological University, 2. University of California, Santa Barbara)

10:55am **29-3: A 16 pJ/bit 0.1-15Mbps Compressive Sensing IC with on-chip DWT Sparsifier for Audio Signals**
» Gaurav Kumar K (United States)[1], Baibhab Chatterjee (United States)[1], Shreyas Sen (United States)[1] (1. Purdue University)

11:20am **29-4: A 650µW 4-channel 83dBA-SNDR Speech Recognition Front-End with Adaptive Beamforming and Feature Extraction**
» Taewook Kang (United States)[1], Seungjong Lee (United States)[1], Mohammad Haghigat (United States)[2], Darren Abramson (United States)[3], Michael Flynn (United States)[1] (1. University of Michigan, 2. Intel, Santa Clara, 3. Intel, Folsom)

11:45am **29-5: A 32x32 Time-Domain Wavefront Computing Accelerator for Path Planning and Scientific Simulations**
» Chengshuo Yu (Singapore)[1], Yuqi Su (Singapore)[1], Jaeho Lee (Singapore)[1], Kevin Chai (Singapore)[2], Bongjin Kim (United States)[3] (1. Nanyang Technological University, 2. Institute of Microelectronics, A*STAR, 3. University of California, Santa Barbara)

10am Session 30: Low Power and High Precision – RF Potpourri
Chaired by: Sudipto Chakraborty (United States) and Swaminathan Sankaran (United States)

10am **Introduction: Low Power and High Precision – RF Potpourri**
» Sudipto Chakraborty (United States)[1], Swaminathan Sankaran (United States)[2] (1. IBM, 2. Texas Instruments)

10:05am **30-1: Nanoliter-Scale Autonomous Electronics: Advances, Challenges, and Opportunities (Invited)**
» Alyosha Molnar (United States)[1], Sunwoo Lee (United States)[1], Alejandro Cortese (United States)[1], Paul McEuen (United States)[1], Sanaz Sadeghi (United States)[1], Shahaboddin Ghajari (United States)[1] (1. Cornell University)

10:55am **30-2: A 1.6GS/s Spectrum Channelizer with PWM-LO Based Sub-band Equalization**
» KI YONG KIM (United States)[1], Ranjit Gharpurey (United States)[1] (1. The University of Texas at Austin)

11:20am **30-3: A 6µm-Precision Pulsed-Coherent Lidar with a 40-dB Tuning Range Inverter-Based Phase-Invariant PGA**
» Li-Yang Chen (United States)[1], Abhinav Kumar Vinod (United States)[1], James McMillan (United States)[1], Chee Wei Wong (United States)[1], Chih-Kong Ken Yang (United States)[1] (1. University of California, Los Angeles)

10am Session 31: SAR Converters
Chaired by: Lukas Kull (Switzerland) and Filip Tavernier (Belgium)

10am **Introduction: SAR Converters**
» Lukas Kull (Switzerland)[1] (1. Cisco Systems)

Continued from **Friday, 30 April**

10:05am **31-1: A 1GS/s 82dB Peak-SFDR 12b Single-Channel Pipe-SAR ADC with Harmonic-Injecting Cross-Coupled-Pair Achieving 7.5fj/conv-step**

» Liang Fang (United States)[1], Tao Fu (United States)[1], Xianshan Wen (United States)[1], Ping Gui (United States)[1] (1. Southern Methodist University (SMU))

10:30am **31-2: A 79.1dB-SNDR 20MHz-BW 2nd-Order SAR-Assisted Noise-Shaping Pipeline ADC with Gain and Offset Background Calibrations Based on Convergence Enhanced Split-Over-Time Architecture (Best Student Paper Candidate)**

» Yanbo Zhang (China)[1], Jin Zhang (China)[1], Shubin Liu (China)[2], Zhangming Zhu (China)[2], Yan Zhu (China)[3], Chi-Hang Chan (China)[3], Rui Paulo Martins (Portugal)[4] (1. University of Macau; Xidian University, 2. Xidian University, 3. University of Macau, 4. University of Lisboa)

10:55am **31-3: A Low-cost 0.98μW 0.8V Oversampled SAR ADC with Pre-comparison and Mismatch Error Shaping Achieving 84.5dB SNDR and 103dB SFDR (Best Student Paper Candidate)**

» Yuting Shen (Netherlands)[1], Hanyue Li (Netherlands)[1], Haoming Xin (Netherlands)[1], Eugenio Cantatore (Netherlands)[1], Pieter Harpe (Netherlands)[1] (1. Eindhoven University of Technology)

11:20am **31-4: A13b-ENOB Third-Order Noise-Shaping SAR ADC using a Hybrid Error-Control Structure**

» Qihui zhang (China)[1], Jing Li (China)[1], Zhong Zhang (China)[1], Kejun Wu (China)[1], Ning Ning (China)[1], Yu Qi (China)[1] (1. University of Electronic Science and Technology of China)

10am **Session 32: Forum: Essential Analog Innovations**

Chaired by: Elkim Roa (Colombia) and Jerald Yoo (Singapore)

10am **32-1: Precision BAW Oscillators for Low Power, High Performance Applications**

» Danielle Griffith (United States)[1] (1. Texas Instruments Inc)

10:30am **32-2: Circuit Intuitions**

» Ali Sheikholeslami (Canada)[1] (1. University of Toronto)

11am **32-3: New Functionalities and Applications Enabled by Time-Varying Circuits**

» Harish Krishnaswamy (United States)[1] (1. Columbia University)

11:30am **32-4: Generalized Time-Transfer Constants**

» Ali Hajimiri (United States)[1] (1. California Institute of Technology)

12pm **32-5: N Path Techniques: From Mechanical Switching Circuits to Nano-scale CMOS and Beyond**

» Bram Nauta (Netherlands)[1] (1. University of Twente)

12:30pm **Best Papers Poster Session**

12:30pm **Session 33: Industry Session**

Chaired by: Tod Dickson (United States) and Ion Tesu (United States)

12:30pm **33-1: Digitally Configurable 1.3A, 460°C Junction Temperature Operational Squib/Solenoid Power SOC (System On Chip) for Passenger/Pedestrian protection with Smart diagnostics**

» Sri Navaneeth Easwaran (United States)[1], Danielle Griffith (United States)[1], Sunil Kashyap Venugopal (United States)[1] (1. Texas Instruments Inc)

12:55pm **33-2: ANAGEN: A Methodology for ANAlog Circuit GENeration**

» Federico Passerini (Austria)[1], Kyrylo Cherniak (Austria)[1], Florian Renneke (Germany)[2], Habal Husni (Germany)[2], Christoph Sandner (Austria)[1] (1. Infineon Technologies Austria AG, 2. Infineon Technologies AG)

1:20pm **33-3: An Edge Boosting Equalizer Technique with Negative Voltage for Cost-Effective Single-Ended Mobile Interface**

» Hyun-gi Seok (Korea, Republic of)[1], Byungki Han (Korea, Republic of)[1], Seungjin Kim (Korea, Republic of)[1], Baek-min Lim (Korea, Republic of)[1], Eswar Mamidala (India)[1], Jaehoon Lee (Korea, Republic of)[1], Seunghyun Oh (Korea, Republic of)[1], Jongwoo Lee (Korea, Republic of)[1] (1. System LSI Business,Samsung Electronics)

Continued from **Friday, 30 April**

1:45pm **33-4: A 1197GBps 36Gb Stacked Embedded DRAM Platform for SoC using Hybrid Bonding Integration**

» Xiping Jiang (China)[1], Fengguo Zuo (China)[2], Song Wang (China)[3], Xiaofeng Zhou (China)[2], Bing Yu (China)[2], Yubing Wang (China)[2], Qi Liu (China)[2], Ainv An (China)[2], Yang Han (China)[2], Wei Tao (China)[2], Zhengwen Wang (China)[2], Hangbing Lv (China)[4], Ming Liu (China)[4], Yi Kang (China)[5], Qiwei Ren (China)[2] (1. Xi'an UniIC Semiconductors,Institute of Microelectronics of the Chinese Academy of Sciences,University of Chinese Academy of Sciences, 2. Xi'an UniIC Semiconductors, 3. Xi'an UniIC Semiconductors,University of Science and Technology of China, 4. Institute of Microelectronics of the Chinese Academy of Sciences,University of Chinese Academy of Sciences, 5. University of Science and Technology of China)

2:10pm **33-5: A High Linearity Ku-band 6-Bit Digital Phase Shifter using SOI Technology for Phased Array Applications**

» Hamhee Jeon (United States)[1], Wonseok Oh (United States)[1], Kevin Kobayashi (United States)[1] (1. Qorvo, Inc.)

12:30pm **Session 34: Panel Session: Missing Arrow in My Quiver (The one component that I'd kill to have but doesn't exist on an IC today)**

Chaired by: Antonio Liscidini (Canada) and Edoardo Bonizzoni (Italy)

3pm **Closing and Awards Ceremony**

Chaired by: Christophe Antoine (United Kingdom) and Arijit Raychowdhury (United States) and Sam Palermo