



CHIP

on • the • mountains

29th SBCCI – Symposium on Circuits and Systems Design
31st SBMicro – Symposium on Microelectronics Technology and Devices
1st INSCIT – Symposium on Instrumentation Systems, Circuits and Transducers
6th WCAS – Workshop on Circuits and Systems
16th SFORUM – Undergraduate-Student Forum

Program

29 AUGUST - 03 SEPTEMBER
2016
BELO HORIZONTE - BRAZIL



CHIP

on the mountains

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Chip on the Mountains 2016

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Chip on the Mountains 2016

Welcome Message

We are pleased to welcome you to Chip on the Mountains 2016 in the city of Belo Horizonte, Minas Gerais, Brazil, a stage to increasing investments in the fields of microelectronics, semiconductors and related technologies.

Chip on the Mountains is an international event that hosts a Technology Fair, besides a rich schedule of scientific and business sessions, discussing the latest developments in microelectronics, micro-systems, electronic instrumentation and corresponding fields. The “Chip in/on” trademark has been happening in Brazil consistently over the years, each time in a different location in the country. This edition will boost a week with plenary sessions, technical presentations & posters, tutorials, discussion panels, social events & networking opportunities. Five symposia and one forum will take place simultaneously:

- 29th SBCCI - Symposium on Circuits and Systems Design
- 31st SBMicro - Symposium on Microelectronics Technology and Devices
- 1st INSCIT - Symposium on Instrumentation Systems, Circuits and Transducers
- 6th WCAS - Workshop on Circuits and Systems
- 16th SFORUM – Undergraduate-Student Forum
- Business Forum – IoT: challenges and opportunities

In this edition we challenge the paradigm of relative inertia and will actively bring service providers, investors, manufacturers and R&D closer to social and market demands, offering a unique blend of interdisciplinary topics and plenty of networking possibilities, including a business forum, co-organized by the Industry Federation of the State of Minas Gerais (FIEMG). The Technology Fair is designed as a dynamic environment with live prototype demonstrations, stand-up podium presentations and e-posters, all open to the general public. We are confident that application sectors will identify viable solutions.

Being centralized in Brazil, the State of Minas Gerais favors considerable national attendance from both Northern, Southern, coastal and inland states, converging accents towards microelectronics. The participation of our international colleagues and the steady openness for new collaborations has been helping us thrive in the world-wide scenario, attracting attendees from various locations around the continent and the globe.

Most of the organization of this conference has happened among people scattered all over the country and abroad and has therefore been strongly dependent on electronic means to bring them and their contributions together. We are grateful to all speakers, authors and to the members of the committees for their diligent work. We also thank the several instances of Universidade Federal de Minas Gerais (UFMG), that complied seamlessly to our demands and proposals. We have also had a countless number of enthusiastic volunteers, who have been assisting us all along.

The event counts on a variety of corporate and institutional sponsors, including national and international technical societies, and is co-organized by the Brazilian Microelectronics Society (SBMicro), the Brazilian Computer Society (SBC) and the International Institute of Electrical Engineers (IEEE). Our acknowledgments are naturally extended to the funding agencies and corporate supporters, whose financial support made this conference possible.

Belo Horizonte, August 2016

Davies W. de Lima Monteiro - DEE/UFMG - General Chair

Omar P. Vilela Neto - DCC/UFMG - Local Chair

Frank Sill Torres - DELT/UFMG - Associate Chair

Ado Jório - DFIS/UFMG - Finance Chair

Luciana Pedrosa Salles - DEE/UFMG - Finance Chair

Yuri G. Colares Costa - Logistic Supervisor

Lidiane C. Costa - Corporate Relations

Dayane A. Reis - Corporate Relations

General, Fringe and Social Meetings

Monday, August 29th

12h40 - 19h00

Registration

13h00 - 14h20

Steering SBCCI Meeting

Transistor room

14h20 - 15h40

CECCI/SBC Council Meeting

Transistor room

15h40 - 16h00

Afternoon coffee break

16h00 - 17h20

Steering SBMicro Meeting

Transistor room

Steering SForum Meeting

Diode room

17h20 - 18h40

SBMicro Council Meeting

Transistor room

19h00 - 20h00

Welcoming remarks & Opening Ceremony

Including IEEE EDS Region 9 Outstanding Student Paper Award

20h20 - 22h00

Welcoming reception and cocktail

Including Pe. Landell de Moura Award & Theses and Dissertations Awards

Tuesday, August 30th

8h40 - 19h00

Registration

Technology Exhibition with LIVE prototype demos

9h20 - 10h40

CI Brazil Meeting

Diode room

10h40 - 11h00

Morning coffee break

11h00 - 12h20

IEEE CEDA (Brazil Chapter) Meeting

Transistor room

11h00 - 13h00

CI Brazil Meeting

Diode room

13h00 - 14h00

Lunch break

14h00 - 15h20

CECCI/SBC Assembly

FPGA room

14h00 - 19h00

LIVE prototype demos

PIN room

15h20 - 15h40

Afternoon coffee break 1

15h40 - 18h00

SBMicro Assembly

CMOS auditorium

18h00 - 18h40

CNPq CA-ME Meeting (Wafer Room)

Wafer room

18h40 - 19h00
Afternoon coffee break 2

19h00 - 21h00
Exhibition Opening and Welcome Lecture
Talk: "The evolution of technology from the analog cellular phone to the Pokemon Go game", Victor Grimblatt - SYNPOSYS
CMOS Auditorium

Wednesday, August 31st

8h40 - 19h00
Registration
Technology Exhibition with LIVE prototype demos

10h00 - 10h40
Morning coffee break

10h40 - 16h40
LIVE prototype demos
PIN room

12h40 - 14h00
Lunch Break

16h00 - 16h40
Afternoon coffee break

19h00 - 21h00
Strategic Panel
CMOS auditorium

Thursday, September 1st

8h40 - 19h00
Registration
Technology Exhibition with LIVE prototype demos

10h00 - 10h40
Morning coffee break

10h40 - 16h40
LIVE prototype demos
PIN room 12h40 - 14h00
Lunch Break

16h00 - 16h40
Afternoon coffee break

19h00 - 20h40
Technical Panel
CMOS auditorium

20h40 - 23h00
Conference Dinner

Friday, September 2nd

8h40 - 16h00
Registration
Technology Exhibition with LIVE prototype demos

10h20 - 10h40
Morning coffee break

10h40 - 16h00
LIVE prototype demos
PIN room

12h20 - 13h20
Lunch Break

14h00 - 15h00
INSCIT Round table
Transistor room
Yuri Catunda (UFRN), Raimundo Freire (UFCG), Ado Jório (UFMG)

15h00 - 15h40
Steering INSCIT Meeting
Transistor room

15h40 - 16h00
Afternoon coffee break

16h00 - 17h40
Closing Session
CMOS auditorium

Saturday, September 3rd

8h40 - 17h00
Inhotim Tour

Keynote and Tutorial Speakers

Monday, August 29th

13h00 - 14h20

EDS Workshop - Tutorial 1

Patrick Fay - Advances in III-V Heterostructure Devices and Integration for Millimeter-Wave and THz Sensing and Imaging

Chair: **Newton Frateschi**

Wafer room

14h00 - 15h40

Tutorial SBCCI 1:

Reinhart Job - Development Process for MEMS Pressure Sensors with CMOS Read-Out Circuitry

Chair: **Gilson I. Wirth**

FPGA room

14h20 - 15h40

EDS Workshop - Tutorial 2:

Fernando Guarín - Reliability challenges for the qualification of Leading Edge CMOS Technologies

Chair: **Newton Frateschi**

Wafer room

16h00 - 17h20

EDS Workshop - Tutorial 3:

Enrico Sangiorgi - Micro- and nano-power management circuit systems for energy harvesting

Chair: **João Martino**

Wafer room

16h00 - 17h40

Tutorial SBCCI 2:

Eduardo de la Torre - Partial Reconfiguration Applied to Dynamic Multithread Hardware Acceleration and Evolvable Hardware

Chair: **Leandro Soares Indrusiak**

FPGA room

17h20 - 18h40

EDS Workshop - Tutorial 4:

Cor L. Claeys - Challenge of Advanced Semiconductor Devices for future CMOS Technologies

Chair: **João Martino**

Wafer room

Tuesday, August 30th

8h40 - 9h40

Tutorial SBMicro 1:

Tayeb Mohammed-Brahim - Flexible electronics: the new way towards friendly applications

Chair: **Gustavo Rheder**

Wafer room

9h00 - 10h40

Tutorial SBCCI 3:

TBD

Chair: **Gilson I. Wirth**

FPGA room

9h40 - 10h40

Tutorial SBMicro 2:

Lorenzo Faraone - Infrared optoelectronics technology: Materials and devices for detectors and imaging applications

Chair: **Newton Frateschi**

Wafer room

IEEE/CEDA Talk

Shishpal Rawat (IEEE/CEDA) - IEEE/CEDA

Chair: **Ricardo Reis**

Transistor room

11h00 - 12h00

Tutorial SBMicro 3:

Mehmet Kaynak - Future of SiGe BiCMOS Technologies with "More-than-Moore" Modules for mm-wave and THz Applications

Chair: **Gustavo Rheder**

Wafer room

11h00 - 12h40

Tutorial SBCCI 4:

Bertrand Saillet - Yield learning of CMOS technology during development and mass production

Chair: **Frank Sill Torres**

Wafer room

12h00 - 13h00

Tutorial SBMicro 4:

Yeshiahu Fainman - Nanophotonics Technology and Applications

Chair: **Newton Frateschi**

Wafer room

19h00 - 20.30

The evolution of technology from the analog cellular phone to the Pokemon Go game", **Victor Grimblatt** - SYNPOSYS
CMOS Auditorium

Wednesday, August 31st

8:40-10:00

Keynote SBCCI

Rajiv Joshi - From Low Power to Predictive Analytics – Beyond Guessing

Chair: **Frank Sill Torres**

CMOS Auditorium

Thursday, September 1st

8h40 - 10h00

Keynote SBMICRO

Lorenzo Faraone - Optical MEMS Technologies for Infrared Spectroscopy, Sensing, and Imaging

Chair: **Newton Frateschi**

CMOS Auditorium

Expo Stage Presentations

Tuesday, August 30th

10h40 - 11h00

IMEC - IMEC's service model for supporting IC Brazil Program and DH's

Paul Malisse

15h20 - 15h40

UNITEC - Unitec - Opportunities for partnerships in innovation projects

Edelvício Júnior

Wednesday, August 31st

10h00 - 10h20

BNDES - LED's and Smart Cities

Ingrid Teixeira

10h20 - 10h40

BNDES - LED's and Smart Cities

Ingrid Teixeira

Thursday, September 1st

10h00 - 10h20

IMEC - Enabling extreme low cost prototyping through the imec/TSMC sponsored Mini@sic program

Jacobus Swart

10h20 - 10h40

UNITEC - Unitec operation activities in Minas Gerais – Opportunities for Semiconductor's industry

Michael May

16h00 - 16h20

IMEC - IMEC's service model for supporting IC Brazil Program and DH's

Paul Malisse

SBCCI 2016

29th Symposium on Integrated Circuits and Systems Design

The Symposium on Integrated Circuits and Systems Design (SBCCI) is an international forum dedicated to Integrated Circuits and Systems Design, Test and Electronic Design Automation (EDA), held annually in Brazil.

The SBCCI has been established as an important international forum for presentation of advanced research results on leading edge aspects of integrated circuits and systems design, such as Analog circuits, Mixed-signal and Digital Integrated Circuits Design, Dedicated and Reconfigurable Architectures, EDA tools, Design Methods, Embedded Systems, Nanoarchitectures and Nanocomputing, as well as Verification and Test Methods. In the Systems-on-Chip (SoC) era, all these technical fields contribute to the advancement of computing, communication and information systems. The SBCCI Symposium is co-sponsored by IEEE CAS Society, IEEE CEDA, ACM-SigDA, IFIP Group 10, Brazilian Computer Society (SBC – Sociedade Brasileira de Computação) and Brazilian Microelectronics Society (SBMICRO – Sociedade Brasileira de Microeletrônica).

The SBCCI 2016 Program Committee has made a major effort to thoroughly review 98 papers, which were electronically submitted to five technical tracks. After double-blind reviewing by the 106 member of the TPC, 40 papers have been selected for the final program, distributed over 9 technical sessions. This year SBCCI received submissions coming from 12 countries, including Austria, Brazil, Canada, China, Colombia, France, Germany, Great Britain, India, Italy, Japan, and United States.

The Technical Program of SBCCI is enriched by many highlights: 1 keynote speaker, 4 tutorials, and 3 invited talks. The keynote speech by Dr. Rajiv Joshi (IBM Thomas J. Watson Research Center, USA) deals with the challenges of advanced technology and circuit techniques from low power perspective.

The 5 technical tracks for this symposium and their committee are:

1. *Analog and RF*

André Augusto Mariano (UFPR / Brazil)

François Rivet (IMS / France)

2. *Digital Circuits, Mixed Signal and Applications*

Cleonilson Protásio de Souza (UFPB / Brazil)

Rodrigo Possamai Bastos (TIMA) / France

3. *EDA/CAD, Test and Reliability*

Alberto Garcia Ortiz (Bremen / Germany)

José Güntzel (UFSC / Brazil)

4. *SoC, NoC and Reconfigurable*

Janier Arias García (UFMG / Brazil)

Masoud Dabeshlab (KTH / Sweden)

5. *Embedded Software and Systems*

Antônio Carlos Beck (UFRGS / Brazil)

Christian Pilato (Columbia / United States)

29th SBCCI 2016

Committees

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Davies William de Lima
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Program Chairs

Frank Sill Torres - UFMG, Brazil

Leandro Soares Indrusiak -
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Kingdom

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Omar Paranaíba Vilela Neto -
UFMG, Brazil

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Gilson Inácio Wirth - UFRGS,
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Europe Liaison

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Bordeaux, France

Asia Liaison

Rui P. Martins - University of
Macau, China

Latin America Liaison

Victor Champac - INAOE,
Mexico

Tutorials

Monday, August 29th

14h00 - 15h40

Tutorial 1:

Reinhart Job - Development Process for MEMS Pressure Sensors with CMOS Read-Out Circuitry

Chair: **Gilson I. Wirth**

FPGA room

16h00 - 17h40

Tutorial 2:

Eduardo de la Torre - Partial Reconfiguration Applied to Dynamic Multithread Hardware Acceleration and Evolvable Hardware

Chair: **Leandro Soares Indrusiak**

FPGA room

Tuesday, August 30th

9h00 - 10h40

Tutorial 3:

Rajeev Ranjan (Cadence) - Accelerating SoC Design and Verification with Formal Technology

Chair: **Gilson I. Wirth**

FPGA room

11h00 - 12h40

Tutorial 4:

Bertrand Sallet - Yield learning of CMOS technology during development and mass production

Chair: **Frank Sill Torres**

FPGA room

Keynotes

Wednesday, August 31st

8h40 - 10h00

Keynote (CMOS Auditorium):

Rajiv Joshi - From Low Power to Predictive Analytics – Beyond Guessing

Chair: **Frank Sill Torres**

CMOS Auditorium

Technical Sessions

Wednesday, August 31st

Session 1 - Amplifiers

Room: FPGA

Chair: **François Rivet**

10h40

Characterization and Nonlinear Modeling of MASMOS[®] Transistor in Order to Design Power Amplifiers for LTE Applications

Frédérique Simbelie, Sylvain Laurent, Myriamne Regis, Yann Creveuil, Pierre Medrel, Michel Prigent And Raymond Quere

11h00

Integrated CMOS class-E power amplifier for Self-Sustaining Wireless Power Transfer system

Arturo Fajardo and Fernando Rangel de Sousa

11h20

A Design Methodology for Low-Noise CMOS Transimpedance Amplifiers Based on Shunt-Shunt Feedback Topology

André Ponchet, Roberto Panepucci, Jacobus Swart, Célio Finardi and Ezio Bastida

11h40

Modeling and Design of High-Efficiency Power Amplifiers fed by limited power sources

Arturo Fajardo and Fernando Rangel de Sousa

12h00

Synopsys University Program - Driving the SoC Design in Latin America - Invited Presentation

Victor Grimblatt

Session 2 - Digital Circuits, Mixed Signal and Applications I

Room: *FPGA*

Chair: **Ney Calazans**

14h00

Energy-Aware Light-Weight DMM-1 Patterns Decoders with Efficiently Storage in 3D-HEVC

Gustavo Sanchez, César Marcon and Luciano Agostini

14h20

A Novel Pruned-Based Algorithm for Energy-Efficient SATD Operation in the HEVC Coding

Leonardo Soares, Claudio Diniz, Eduardo Costa and Sergio Bampi

14h40

Low-Power Hardware Design for the HEVC Binary Arithmetic Encoder Targeting 8K Videos

Fábio Luís Ramos, Jones Goebel, Bruno Zatt, Marcelo Porto and Sergio Bampi

15h00

An FPGA-based accelerator for multiple real-time template matching

Erika Albuquerque, Antonyus Ferreira, Renato Carlos, João Silva, João Barbosa, Djeefther Souza and Edna Barros

15h20

A Hardware Accelerator for the Alignment of Multiple DNA Sequences

Antonyus Ferreira, João Silva, Jefferson Anjos, Luiz Figueiroa, Edna Barros, Manoel Lima and Victor Medeiros

Session 3 - SoC, NoC and Reconfigurable
Room: FPGA

Chair: **Leandro Soares Indrusiak**

16h40

Towards Smarter Reconfigurable Systems - Invited

Eduardo de la Torre

17h20

FPGA-Based Implementation of the Richardson-Lucy Algorithm to Accelerate the Restoration of Motion-Blurred Image

Oscar Anacona Mosquera, Janier Arias García, Daniel M. Muñoz and Carlos H. Llanos

17h40

A Parallel Motion Estimation Solution for Heterogeneous System on Chip

Mateus Melo, Gustavo Smaniotto, Henrique Maich, Luciano Agostini, Bruno Zatt, Leomar Rosa JR and Marcelo Porto

18h00

Side Channel Attack on NoC-based MPSoCs are practical: NoC Prime+Probe Attack

Cezar Rodolfo Wedig Reinbrecht, Altamiro Susin, Georg Sigl, Lilian Bossuet and Martha Sepúlveda

18h20

A Security Aware Routing Approach for NoC-based MPSoCs

Ramon Fernandes, Cesar Marcon, Martha Sepulveda, Rodrigo Cataldo and Jarbas Silveira

Thursday, September 1st

Session 4 - Embedded Software and Systems

Room: FPGA

Chair: **Marcio Eduardo Kreutz**

10h40

Cache Sizing for Low-Energy Elliptic Curve Cryptography

Felipe A. Piovezan, Tarcísio E. M. Crocomo and Luiz C. V. dos Santos

11h00

Energy-aware Scheduling in Transactional Memory Systems

Ademir Marques Junior and Alexandro Baldassin

11h20

Architectural Exploration of Last-Level Caches targeting Homogeneous Multicore Systems

Rodrigo Cataldo, Guilherme Korol, Ramon Fernandes, Debora Matos and Cesar Marcon

11h40

A Lightweight Software-based Runtime Temperature Monitoring Model for Multiprocessor Embedded Systems

Guilherme Castilhos, Luciano Ost and Fernando Moraes

12h00

Cadence University Program 2.0 - Enablement and Benefits - Invited Presentation

Patrick Haspel

Session 5 - Analog circuits

Room: FPGA

Chair: **André Augusto Mariano**

14h00

A balanced logic routing block for factorial-DLL based frequency generation

Yann Deval and Francois Rivet

14h20

Analytic Boundaries for 6T-SRAM Design in Standby Mode

Fabián Olivera and Antonio Petraglia

14h40

A 0.3 V, High-PSRR, Picowatt NMOS-Only Voltage Reference using zero- V_T Active Loads

David Cordova, Arthur Oliveira, Pedro Toledo, Hamilton Klimach, Sergio Bampi and Renato Ribas

15h00

Successful Prototyping of Complex Integrated Circuits with Focused Ion Beam

Emmanuel Petitprez, Dalton Colombo, Felipe Henes, Laurent Courcelle, Ronald Tararam, Saulo Jacobsen, Rafael Soares, Cristiano Krug and Marcelo Lubaszewski

15h20

A systematic design approach for nanoscale inductor-less regulated cascode stages

Claudio Talarico, Giulio D'Amato, Gianfranco Avitabile, Giovanni Piccinni and Giuseppe Coviello

Session 6 - Digital Circuits, Mixed Signal and Applications II

Room: *FPGA*

Chair: **Gilson I. Wirth**

16h40

Formal Technology in Modern SoC Flow: Establishing Correctness for Functionality and Security - Invited

Rajeev Ranjan

17h20

Cluster-based Architecture Relying on Optical Integrated Networks with the Provision of a Low-latency Arbiter

Felipe de Magalhães, Fabiano Hessel, Odile Liboiron-Ladouceur and Gabriela Nicolescu

17h40

New Asynchronous Protocols for Enhancing Area and Throughput in Bundled-Data Pipelines

Jean Simatic, Rodrigo Possamai Bastos, Abdelkarim Cherkaoui and Laurent Fesquet

18h00

Software-Defined Radio Design based on GALS Architecture for FPGAs

Eduardo Lussari, Duarte Oliveira, Lester Faria and Orlando Verducci

18h20

Design and Analysis of the HF-RISC Processor Targeting Voltage Scaling Applications

Felipe Bortolon, Matheus Gibiluka, Sergio Johann, Sergio Bampi, Ney Laert Vilar Calazans, Fabiano Passuelo Hessel and Matheus Moreira

18h40

An Offset Reduction Technique for Dynamic Voltage Comparators

Andres Amaya, Rodolfo Villamizar and Elkim Roa

Friday, September 2nd

Session 7 - Mixed Signal, Test and Reliability

Room: *FPGA*

Chair: **Luciano Vulcan Agostini**

08h40

A Mutual Rectification-Interference Avoidance Technique with Cascade Filters for Both Downward- Direction Tailed-RDF Deconvolution

Hiroyuki Yamauchi and Worawit Somha

09h00

A new two-step Sigma-Delta architecture column-parallel ADC for CMOS image sensor

Pierre Bisiaux, Caroline Lelandais-Perrault, Filipe Vinci Dos Santos, Anthony Kolar and Philippe Bénabès

09h20

Focal-Plane Image Encoder with Cascode Current Mirrors and Increased VQ Bit Rate

Fernanda Oliveira, Tiago Lopes, José Gabriel Gomes, Fernando Barúqui and Antonio Petraglia

09h40

Automatic Layout Integration of Bulk Built-In Current Sensors for Detection of Soft Errors

Mário Vinícius Pelegrini Guimarães and Frank Sill Torres

10h00

Inserting Stuck-On fault input dependence on PTM to improve robustness evaluation

Rafael Schivittz, Rafaél Fritz, Denis Franco, Cristina Meinhardt and Paulo Butzen

Session 8 - RF Receivers

Room: FPGA

Chair: **Sérgio Bampi**

10h40

An Ultra Wide Band Analog-to-Digital Converter based on a Delta-Riemann architecture

Francois Rivet, Elina Fiawoo, Richard Montigny, Patrick Garrec and Yann Deval

11h00

A 450 mV Supply Self-biased Wideband Inductorless Balun LNA for sub-GHz Applications

Arthur Liraneto Torres Costa, Hamilton Klimach and Sergio Bampi

11h20

A Digitally Tunable 4th-order Gm-C Low-Pass Filter for Multi-Standards Receivers

Mateus Oliveira, Lucas Severo, Alessandro Girardri, Altamiro Susin and Paulo César de Aguirre

11h40

A 0.7 V Fully Differential First Order GZTC-C Filter

Pedro Toledo, René Timbo, Hamilton Klimach, David Cordova, Sergio Bampi and Renato Ribas

12h00

Mentor Higher Education Program - Invited Presentation

Marcelo Ferreira

Session 9 - EDA/CAD

Room: FPGA

Session Chair: **Ricardo Reis**

Invited Speaker Chair: **Omar Paranaíba Vilela Neto**

13h20

Speed and Reliability of Nanomagnetic Logic (NML)

Technology – Invited

Jeffrey Bokor

14h00

A Placement and Routing Algorithm for Quantum-dot Cellular Automata

Alyson Trindade, Ricardo Ferreira, José Nacif, Douglas Salles and Omar Paranaíba Vilela Neto

14h20

MagPDK: an Open-Source Process Design Kit for Circuit Design with Magnetic Tunnel Junctions

Raphael M. Brum and Gilson I. Wirth

14h40

Evaluating the Impact of Circuit Legalization on Incremental Optimization Techniques

Renan Netto, Vinicius Livramento, Chrystian Guth, José Luís Güntzel and Luiz C. V. dos Santos

15h00

A Standard Cell Characterization Flow for Voltage Scaling Operation

Matheus Gibiluka, Matheus Trevisan Moreira, Walter Lau Neto and Ney Laert Vilar Calazans

SBMicro 2016

31st Symposium on Microelectronics Technology and Devices

SBMicro is an international forum dedicated to semiconductor devices and processes, mainly targeting microelectronics devices and process integration, held annually in Brazil.

The goal of the symposium, which has a technical sponsorship from IEEE Electron Devices Society (EDS), is to bring together researchers and industrial/commercial partners in the fields of materials, processing, equipment, MEMS, micro-transducers, photovoltaic cell & module technology, and modeling & TCAD of integrated devices and circuits.

31st SBMicro 2016

Committees

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Davies William de Lima
Monteiro - UFMG, Brazil

Program Chairs

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Unicamp, Brazil

Yeshaiahu Fainman -
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Netherlands

Asia Liaison

Seong Ho Kong - KNU, Korea

Latin America Liaison

Felix Palumbo, UTN,
Argentina

Tutorials

Tuesday, August 30th

8h40 - 9h40

Tutorial 1:

Tayeb Mohammed-Brahim - Flexible electronics: the new way towards friendly applications

Chair: **Gustavo Rheder**

Wafer room

9h40 - 10h40

Tutorial 2:

Lorenzo Faraone - Infrared optoelectronics technology: Materials and devices for detectors and imaging applications

Chair: **Newton Frateschi**

Wafer room

11h00 - 12h00

Tutorial 3:

Mehmet Kaynak - Future of SiGe BiCMOS Technologies with "More-than-Moore" Modules for mm-wave and THz

Applications

Chair: **Gustavo Rheder**

Wafer room

12h00 - 13h00

Tutorial 4:

Yehaiahu Fainman - Nanophotonics Technology and Applications

Chair: **Newton Frateschi**

Wafer room

Keynotes

Thursday, September 1st

8h40 - 10h00

Keynote (CMOS Auditorium):

Lorenzo Faraone - Optical MEMS Technologies for Infrared Spectroscopy, Sensing, and Imaging

Chair: **Newton Frateschi**

CMOS Auditorium

Technical Sessions

Wednesday, August 31st

Session 1 - New Platforms and Device simulation

Room: Wafer

Chair: **Gustavo Redher**

10h40

Silicon: a flexible material for bendable electronics and sensors – Invited

Tayeb Mohammed-Brahim

11h20

Automated Analysis of Propagation Induced Pulse Broadening of Single Event Transients

Michele Vieira and Gilson Wirth

11h40

A New Series Resistance Extraction Method for Junctionless Nanowire Transistors

Renan Trevisoli, Rodrigo Doria, Michelly de Souza, Sylvain Barraud, Maud Vinet and Marcelo Pavanello

12h00

Physical Insights on the Dynamic Response of Junctionless Nanowire Transistors

Rodrigo Doria, Renan Trevisoli, Michelly de Souza and Marcelo Pavanello

Session 2 - CMOS SOI FINFET

Room: Wafer

Chair: **João Martino**

14h00

Reliability challenges for the qualification of Leading Edge CMOS Technologies - Invited

Fernando Guarín

14h40

Analysis of Carrier Mobility in Triple Gate SOI nFinFET Combining Rotated Substrate and Strain

Thales Augusto Ribeiro, Eddy Simoen, Cor Claeys, João Antonio Martino and Marcelo Antonio Pavanello

15h00

Diffuse Interface Modeling for Electromigration Induced Void Growth

Leonardo Queiroz and Roberto Orio

15h20

Innovation in Higher Education: specificity of the microelectronics field

Olivier Bonnaud

Session 3 - Integrated Photonics

Room: Wafer

Chair: **Newton Frateschi**

16h40

Nanoscale Light-Emitters - Invited

Yeshaiahu Fainman

17h20

Fabrication and Characterization of InGaAsP/Ag Luminescent Hyperbolic Metamaterials

Joseph Smalley, Felipe Vallini, Sergio Montoya, Lorenzo Ferrari, Shiva Shahin, Boubacar Kante, Eric Fullerton, Zhaowei Liu and Yeshaiahu Fainman

17h40

Silicon nano-optomechanical actuator

Janderson Rocha Rodrigues and Vilson Rosa Almeida

18h00

Microring Photodetection in Silicon Photonic Integrated Circuits

Roberto Panepucci

18h20

Simulation and Fabrication of Silicon Nitride Microring Resonator by DUV Lithography

Giuseppe Cirino, Luis Barea, Antonio A. von Zuben, Hervé L'hermite, Bruno Beche, Olivier De Sagazin, Newton Frateschi and Tayeb Mohammed-Brahim

18h40

Detecting milk components using intraband infrared photodetectors

Daniela Szwarcman, Mauricio Pires and Patricia Souza

Thursday, September 1st

Session 4 - High Power, High Frequency, and
New devices electronics

Room: Wafer

Chair: **Roberto Panepucci**

10h40

**Beyond Power: III-N Devices for Low-Power Systems,
Millimeter-Wave Applications, and More – Invited**

Patrick Fay

11h20

**Giant Magnetoresistance measurement in an array of
nanodisks with vortex-like magnetization**

Rafael Cacilhas, Clodoaldo Araujo, Jérôme Borme and Paulo
Freitas

11h40

A 40 GHz-Platform using Soft Substrates

Celio Finardi, Andre Ponchet, Cristina Adamo, Ricardo Teixeira,
Alex Flacker and Roberto Panepucci

12h00

**n-Channel Bulk and DTMOS FinFETs: Investigation of GIDL
and Gate Leakage Currents**

Caio Malingre Magan, João Antonio Martino, Eddy Simoen, Cor
Claeys and Maria Gloria Cano de Andrade

Session 5 - Optics & CMOS

Room: Wafer

Chair: **Felipe Valline**

14h00

Approaches to the Design, Fabrication, and Test of Electroacoustic Micro-transducers - Invited

Libor Rufer

14h40

CMOS Image Sensor with FPN Reduction by Correlated Double Sampling in Current Mode

Rubens Souza, Luiz Ventura, Luisa Reis, Davies Monteiro and Luciana Salles

15h00

Development of an Analog and Mixed-Signal Read-out Circuit for Long-Wavelength Infrared Focal Plane Arrays

Marcel Claro and Alain André Quivy

15h20

Porous Silicon Passivation for Applications in Sensors and Photovoltaics: Optical Characterization

Rosimara Toledo, Carlos Eduardo Dias, Danilo Huanca, Savio Zaccaro and Walter Salcedo

Session 6 - SOI Devices
Room: Wafer
Chair: **Paula Agopian**

16h40

Random Telegraph Signal Noise in Advanced High Performance and Memory Devices – Invited

Cor Clayes

17h20

Low-Frequency Noise in Asymmetric Self-Cascode FD SOI nMOSFETs

Rafael Assalti, Denis Flandre, Rodrigo Trevisoli Doria, Marcelo Antonio Pavanello and Michelly de Souza

17h40

Non-linearity Analysis of Triple Gate SOI Nanowires MOSFETS

Bruna Cardoso Paz, Rodrigo Trevisoli Doria, Mikaël Cassé, Sylvain Barraud, Gilles Reibold, Maud Vinet, Olivier Faynot and Marcelo Antonio Pavanello

18h00

Influence of different UTBB SOI Technologies on Analog Parameters

Vitor Itocazu, Victor Sonnenberg, Eddy Simoen, Cor Claeys and João Antonio Martino

18h20

Proton Radiation Influence on SOI FinFET Trade-Off Between Transistor Efficiency and Unit Gain Frequency

Luis Felipe Vicentis Caparroz, Joao Antonio Martino, Eddy Simoen, Cor Claeys and Paula Ghedini Der Agopian

18h40

Back Enhanced (BE) SOI pMOSFET Behavior at High Temperatures

Leonardo Yojo, José A. Padovese, Ricardo C. Rangel and Joao A. Martino

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General Schedule

Monday 29/08/2016

FPGA	Wafer	Transistor	Diode (satellite lower level)
12h40 - 13h00 Registration starts			
14h00 - 15h40 ★ Tutorial SBCCI 1	13h00 - 14h20 EDS Workshop ★ Tutorial 1	13h00 - 14h20 Steering SBCCI Meeting	
	14h20 - 15h40 EDS Workshop ★ Tutorial 2	14h20 - 15h40 CECCI Council Meeting	
15h40 - 16h00 Coffee Break			
16h00 - 17h40 ★ Tutorial SBCCI 1	16h00 - 17h20 EDS Workshop ★ Tutorial 1	16h00 - 17h20 Steering SBCCI Meeting	16h00 - 17h20 Steering SForum Meeting
	17h20 - 18h40 EDS Workshop ★ Tutorial 2	17h20 - 18h40 CECCI Council Meeting	
19h00 - 20h20 Opening Cerimony ★ IEEE EDS Region 9 Outstanding Student Paper Award (CMOS Auditorium)			
20h20 - 22h20 Networking Cocktail - Pe. Landell de Moura Award & Theses and Dissertations Awards (External Location)			

★ Sessions indicated with GREEN STARS are open to the public free of charge.

General Schedule

Tuesday 30/08/2016

FPGA	Wafer	Transistor	Diode (satellite lower level)
★ 08h40 - 19h00 (Lower and Upper levels) Technology Exhibition			
09h00 - 10h40 Tutorial SBCCI 3	08h40 - 09h40 Tutorial SBMicro 1 09h40 - 10h40 Tutorial SBMicro 2	09h40 - 10h40 IEEE/ CEDA Talk	09h20 - 10h40 CI Brazil Meeting
10h40 - 11h00 Coffee Break			
09h00 - 10h40 Tutorial SBCCI 3	11h00 - 12h00 Tutorial SBMicro 3 11h00 - 12h00 Tutorial SBMicro 4	11h00 - 12h20 IEEE CEDA (Brazil Chapter) Meeting	11h00 - 13h00 CI Brazil Meeting
13h00 - 14h00 Lunch			
14h00 - 15h20 (FPGA Room) CECCI/SBC Assembly			
★ 14h00 - 19h00 (PIN) LIVE prototype demos			
15h20 - 15h40 Coffee Break			
15h40 - 18h00 (CMOS Auditorium) SBMicro Assembly			
18h00 - 18h40 (Wafer Room) CNPq CA-ME Meeting			
18h40 - 19h00 Coffee Break			
★ 19h00 - 21h00 (CMOS Auditorium) Exhibition Opening and Welcome Lecture			

★ Sessions indicated with GREEN STARS are open to the public free of charge.

General Schedule

Wednesday 31/08/2016

FPGA	Wafer	Transistor	CMOS	Diode <small>(satellite lower level)</small>
08h40 - 10h00 (CMOS Auditorium) Keynote Rajiv Joshi - From Low Power to Predictive Analytics - Beyond Guessing				
★ 08h40 - 19h00 (Lower and Upper levels) Technology Exhibition				
10h00 - 10h40 Coffee Break (Upper level) SFORUM Posters w/ authors				
★ 10h40 - 16h40 (PIN) LIVE prototype demos				
10h40 - 12h20 SBCCI Session 1	10h40 - 11h20 SBMicro Invited 1 11h20 - 12h20 SBMicro Session 1	11h20 - 12h20 INSCIT Session 1	10h40 - 12h20 WCAS Session 1	★ 10h40 - 12h20 Business Forum
12h20 - 12h40 SForum Paper	12h20 - 12h40 SForum Paper			13h00 - 14h20 Brunch Forum
12h40 - 14h00 Lunch (Conference Restaurant)				
14h00 - 15h40 SBCCI Session 2	14h00 - 14h40 SBMicro Invited 2 14h40 - 15h40 SBMicro Session 2	14h00 - 15h40 INSCIT Session 2	14h00 - 15h40 WCAS Session 2	★ 14h20 - 16h00 Business Forum
15h40 - 16h00 SForum Paper	15h40 - 16h00 SForum Paper			
16h00 - 16h40 Coffee Break (Upper level) SFORUM Posters w/ authors				
16h40 - 17h20 SBCCI Invited 1 17h20 - 19h00 SBCCI Session 3	16h40 - 17h20 SBMicro Invited 3 17h20 - 19h00 SBMicro Session 3	17h20 - 19h00 INSCIT Session 3	17h20 - 19h00 WCAS Session 3	★ 16h40 - 19h00 Business Forum
★ 19h00 - 21h00 (CMOS Auditorium) Strategic PANEL				

★ Sessions indicated with GREEN STARS are open to the public free of charge.

General Schedule

Thursday 01/09/2016

FPGA	Wafer	Transistor	Diode (satellite lower level)
08h40 - 10h00 (CMOS Auditorium) Keynote - Lorenzo Faraone Optical MEMS Technologies for Infrared Spectroscopy, Sensing, and Imaging			
★ 08h40 - 19h00 (Lower and Upper levels) Technology Exhibition			
10h00 - 10h40 Coffee Break (Upper level) SFORUM Posters w/ authors			
★ 10h40 - 16h40 (PIN) LIVE prototype demos			
10h40 - 12h20 SBCCI Session 4	10h40 - 11h20 SBMicro Invited 4 11h20 - 12h20 SBMicro Session 4	10h40 - 11h20 INSCIT Invited 1 11h20 - 12h20 INSCIT Session 4	10h40 - 12h20 WCAS Session 4
12h20 - 12h40 SForum Paper	12h20 - 12h40 SForum Paper		
12h40 - 14h00 Lunch (Conference Restaurant)			
14h00 - 15h40 SBCCI Session 5	14h00 - 14h40 SBMicro Invited 5 14h40 - 15h40 SBMicro Session 5	14h00 - 15h40 INSCIT Session 5	14h00 - 15h40 WCAS Session 5
15h40 - 16h00 SForum Paper	15h40 - 16h00 SForum Paper		
16h00 - 16h40 Coffee Break (Upper level) SFORUM Posters w/ authors			
16h40 - 17h20 SBCCI Invited 1 17h20 - 19h00 SBCCI Session 3	16h40 - 17h20 SBMicro Invited 3 17h20 - 19h00 SBMicro Session 3	17h20 - 19h00 INSCIT Session 3	16h40 - 19h00 WCAS Session 3
19h00 - 21h00 (CMOS Auditorium) Technical PANEL			
20h40 - 22h20 (External Location) Conference Dinner			

★ Sessions indicated with GREEN STARS are open to the public free of charge.

General Schedule

Friday 02/09/2016

FPGA	Wafer	Transistor	Diode (satellite lower level)
★ 08h40 - 16h00 (Lower and Upper levels) Technology Exhibition			
08h40 - 10h20 SBCCI Session 7	08h40 - 10h20 SBMicro Session 7	08h40 - 10h20 INSCIT Session 7	08h40 - 10h20 WCAS Session 7
10h20 - 10h40 Coffee Break			
★ 10h40 - 16h00 (PIN) LIVE prototype demos			
10h40 - 12h20 SBCCI Session 8	10h40 - 12h20 SBMicro FLASH / POSTER Session	10h40 - 11h20 INSCIT Invited 2 11h20 - 12h20 INSCIT Session 8	
12h40 - 14h00 Lunch (Conference Restaurant)			
13h20 - 14h00 SBCCI Invited 3	13h20 - 14h00 SBMicro Invited 8	14h00 - 15h00 INSCIT Round table	
14h00 - 15h40 SBCCI Session 9	14h00 - 15h40 SBMicro Session 8	15h00 - 15h40 Steering INSCIT	
10h20 - 10h40 Coffee Break			
★ 16h00 - 17h40 (CMOS Auditorium) Closing Session			

Saturday 03/09/2016

08h40 - 10h40 Transport to Inhotim 10h40 - 17h00 Inhotim 17h00 - 19h00 Transport to Belo Horizonte
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★ Sessions indicated with GREEN STARS are open to the public free of charge.

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Friday, September 2nd

Session 7 - Materials, Processing and Sensors
New devices electronics

Room: Wafer

Chair: **Stanislav Moshkalev**

08h40

**Use of Protek-PSB as structural material for MEMS:
Measurement of elastic modulus**

Gustavo Alves and Ronaldo Mansano

09h00

Pulse oxymeter based in InN thin film

Marina Sparvoli, Ronaldo Mansano, José Fernando Chubaci and Fábio Jorge

09h20

The use of DBD plasmas for treatment of PDMS surfaces and adhesion improvement

Fellype Nascimento, Stanislav Moshkalev and Munemasa Machida

09h40

**Teraohm Pseudo-resistor Experimental Characterization
Aiming at Implementation of Bio-amplifiers**

Cleiton Pereira, Pedro Benko, Júlio Lucchi and Renato Giacomini

10h00

**Influence of Proton Radiation and Strain on nFinFET Zero
Temperature Coefficient**

Vinicius Nascimento, Paula Agopian, Luciano Almeida, Caio Bordallo, Eddy Simoen, Cor Claeys and Joao Martino

Session 8 - Sensors
Room: Wafer
Chair: **Frank Sill Torres**

13h20

III-V/Si integration: new application perspectives and related technological advances - Invited

Mircea Guina

14h00

A three dimensional model for a graphene guided SH-SAW sensor using Finite Element Method

Ioannis Nikolaou, Hamida Hallil, Ollivier Tamarin, Corinne Dejous and Dominique Rebiere

14h20

A Compact Eighth-terminal Piezotransducer for Stress Measurements in Silicon

Jose Luis Ramirez and Fabiano Fruett

14h40

Analysis of Heavy-Ion Particles Striking Regions Inside and Between SiGe PIN Photodetectors

Rudolf Buhler, Andre Perin, Carla Novo, Marcilei Silveira and Renato Giacomini

15h00

Responsivity Improvement for Short Wavelengths Using Gated PIN Lateral SiGe Diodes

Carla Novo, Rudolf Buhler and Renato Giacomini

15h20

Layout and Fabrication of Long Legs Microbolometer

Marcelo S. B. Castro and Marcio S. Souza

Poster Session (10h40 - 12h20)

Room: Wafer and 2nd floor

Chair: **José Alexandre Diniz**

1: Vibrational and electronic properties of the proton transfer fluorophore 2 - (5' - amino - 2' - hydroxyphenyl) benzothiazole

Nathalie Lunardi, Louise Etcheverry, Fabiano Rodembusch and Eduardo Moreira

2: Hafnium-Indium-Zinc Oxide thin film transistors using HfO₂ as gate dielectric, with both layers deposited by RF sputtering

César Adrián Pons-Flores, Isai Hernández, Magali Estrada, Ivan Garduño, Antonio Cerdeira, Israel Mejia, Julio Tinoco and Rodrigo Picos

3: Low-Frequency Noise of Submicron Graded-Channel SOI nMOSFETs at High Temperature

Allan Molto, Rodrigo Doria, Michelly Souza, Denis Flandre and Marcelo Pavanello

4: Influence of Gold nanoparticles on Eu³⁺ doped GeO₂-Bi₂O₃ glasses covered Silicon solar cell

J. Augusto M. Garcia, Luciana R. P. Kassab, Roberto K. Onmori, Bismarck C. Lima, Luis A. Gómez-Malagón and Anderson S. L. Gomes

5: Mg-doping of GaAs thin films grown by MBE

Henrique Limborço, Marcus Vinicius Baeta Moreira, Franklin Massami Matinaga, Alfredo Gontijo de Oliveira and Juan Carlos González

6: Plasma-Treated Multilayer Graphene: Synthesis and Applications

Rogério Gelamo, Luis Machuno, Gabriel Augusto, Stanislav Moshkalev, Alfredo Vaz, Chandra Rout and Surjit Sahoo

7: Chemically modified platinum screen-printed electrodes for electrochemical detection of acetylene

Fábio Izumi, Cesar Souza, Sebastião Gomes dos Santos Filho and Mário R. Gongora Rubio

8: FinFET Prototypes Fabricated by Aluminium Hard Mask FIB Milling for Fin Definition and SiON/TiN/Al Gate Stack

Alessandra Leonhardt, Lucas Petersen Barbosa Lima, Frederico Hummel Cioldin, Marcos Vinicius Puydinger dos Santos, José Alexandre Diniz and Leandro Tiago Manera

9: A Methodology to Identify Critical Interconnects Affected by Electromigration

Rafael Oliveira Nunes and Roberto Lacerda de Orio

10: Ground plane influence on Zero-Temperature-Coefficient in SOI UTBB MOSFETs with different silicon film thicknesses

Christian N. Macambira, Vitor T. Itocazu, Luciano M. Almeida, João A. Martino, Eddy Simoen and Cor Claeys

11: Formation of Nanofibers Containing Aloe Vera Using a Non-Conventional Electrospinning Setup

Rogério Furlan, Steven de Leon and Ana da Silva

12: Electrolyte-Insulator-Semiconductor Structure (EIS) with TiO₂ thin film for Pb⁺ detecting

Rodrigo Reigota César, Angélica Denardi de Barros, Ioshiaki Doi, José Alexandre Diniz and Jacobus Willibrordus Swart

13: DIBL in enhanced dynamic threshold operation of UTBB SOI with different drain engineering at high temperatures

Katia Regina Akemi Sasaki, Eddy Simoen, Cor Claeys and Joao Antonio Martino

14: Influence of spacer materials on underlapped and self-aligned UTBB SOI nMOSFET

Fernando Teixeira, Paula Agopian and Joao Martino

15: Development of an On-Chip Real Time PCR for Bordetella pertussis Diagnosis

Najua Zahra, Rita Rampazzo, Keren Leite, Pedro Schluga, Marco Cereda, Marco Bianchessi, Luis Gustavo Morello, Marco Krieger and Alexandre Costa

16: Structural and Microfluidic Analysis of Microneedle Array for Drug Delivery

Jennifer García, Ismael Rios and Faruk Fonthal

17: Electronic transport in nontoxic p-type doped GaAs Nanowires

Nestor Cifuentes Taborda, Henrique Limborço, Marcus Vinicius Baeta Moreira, Geraldo Mathias Ribeiro, Alfredo Gontijo de Oliveira, Juan Carlos González Pérez, Emilson R. Viana, Daniel Bretas Roa and Arturo Abelenda

18: Boosting the MOSFETs Matching by Using Diamond Layout Style

Vinicius Vono Peruzzi, Christian Renaux, Denis Flandre and Salvador Pinillos Gimenez

19: Novel self-catalyzed GaAs nanowires with electrical contacts

Marcelo Rizzo Piton, Eero Koivusalo, Soile Suomalainen, Teemu Hakkarainen and Mircea Guina

Vencedores do 4º Concurso de Teses e Dissertações em Microeletrônica

Tese de Doutorado

20: **Metal Gate Work Function Engineering for Future CMOS Technology Nodes**

Lucas Petersen Barbosa Lima

Área: *Tecnologias, Dispositivos e Processos de Fabricação de Semicondutores*

21: **Asynchronous Circuits: Innovations in Components, Cell Libraries and Design Templates**

Matheus Trevisan Moreira

Área: *Projeto (Design), CAD e Teste de Circuitos Integrados*

Dissertação de Mestrado

22: **Modelagem de Nanofios Transistores MOS sem Junções de Porta Dupla e Tripla**

Bruna Cardoso Paz

Área: *Tecnologias, Dispositivos e Processos de Fabricação de Semicondutores*

23: **MOSFET Zero-Temperature-Coefficient (ZTC) Effect Modeling and Analysis for Low Thermal Sensitivity Analog Applications**

Pedro Filipe L. Correia de Toledo

Área: *Projeto, CAD e Teste de Circuitos Integrados*

INSCIT 2016

International Symposium on Instrumentation Systems, Circuits and Transducers

The International Symposium on Instrumentation Systems, Circuits and Transducers – INSCIT is a forum dedicated to the presentation and discussion of research and development in instrumentation focusing systems, subsystems and circuits required for measurement, and including transducers, data conversion, storage and transmission, power management and testing.

The goal of the symposium is to bring together researchers in the fields of instrumentation and measurement science with circuits, transducers and systems design, modeling, characterization and simulation, covering both integrated and discrete solutions.

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Technical Sessions

Wednesday, August 31st

Session 1

Room: Transistor

Chair: **Raimundo Freire**

Co-chair: **Tulio Albuquerque**

11h20

Determination of solids and fat contents in bovine milk using a phase-locked Resonant Cavity Sensor

Heron Eduardo de Lima Ávila, Roddy Romero Antayhua, Silvani Verruck, Gabriela Rodrigues de Liz, Luiza Cirra Pereira, Elane Schwinden Prudencio, Fernando Rangel de Sousa and Daniel J. Pagano

11h40

Symulink Framework for Cartesian Feedback Power Amplifier Linearization Systems

Camilo Coelho, Dominique Dallet, Nathalie Deltimple and Eric Kerhervé

12h00

A miniaturized Low-Power Radio Frequency Identification Tag Integrated in CMOS for biomedical applications

Juan Sebastian Moya, Fabián Cabrera and Fernando Rangel de Sousa

Session 2
Room: Transistor
Chair: **Yuri Catunda**
Co-chair: **Catherine Pancotto**

14h00

Micrometric displacement measurement using CMOS 0.35 μ m technology Quad-Cell

Gabriel Lemos, Maria Tereza Souza, Victor Muniz, Frank Torres and Luciana Salles

14h20

An Analog Front-End for an ISFET-Based Sensor Using Off-The-Shelf Components

Ronaldo Ponte and Fernando Sousa

14h40

Instrument based on MEMS accelerometer for vibration and unbalance analysis in rotating machines

Luciane Agnoletti dos Santos Pedotti, Ricardo Mazza Zago and Fabiano Fruett

15h00

Wavefront Sensor For Spatial Scan using the Hartmann-Shack Method

Carlos Felipe G. Souza, Henrique A. Cordeiro, Davies W. de Lima Monteiro, Telson Emmanuel O. Crespo, Úrsula V. Abecassis and Luciana P. Salles

15h20

Microelectrodes Array technology: a review of integrated circuit biopotential amplifiers

Catherine Pancotto, Yuri Catunda and Jacobus Swart

Session 3
Room: Transistor
Chair: **Diomadson Belfort**
Co-chair: **Jean Winter**

17h20

WINSS: A Simulation Platform of the IEEE 802.15.4 Standard for Network Simulator 2 (NS-2)

Talison A. C. de Melo, Felipe D. M. de Oliveira, Rodrigo S. Semente, Xiankleber C. Benjamim and Andres O. Salazar

17h40

Application of Wavelet Coding in a Control System Using Wireless Sensor Networks

Felipe Gama, Jefferson Fernandes, Rodrigo Semente, Andrés Salazar and Luiz Silveira

18h00

Identification of IEEE 802.11g and IEEE 802.15.4 signals using energy and cyclostationarity detection approach

Giancarlo Zanuz, Jean Michel Winter, Ivan Muller, Johan Garzon and Carlos Eduardo Pereira

18h20

Energy Detection Method Enhanced by Autocorrelation

Johan Tellez Garzon, Jean Michel Winter, Ivan Muller, Carlos Eduardo Pereira and Alvares Augusto Salles

18h40

A Architecture Proposal to Distributed Sensing in Internet of Things

Anderson Cardozo, Adenauer Yamin, Rodrigo Souza, João Lopes and Cláudio Geyer

Thursday, September 1st

Session 4
Room: Transistor
Chair: **Ado Jório**

10h40

Platform Integration of Novel Materials: From Nanoscale Electronics to Industrial Scale Applications - Invited

Mathias Steiner

11h20

Experimental Equipment Design and Setup for Measuring Electronic Devices Under Magnetic Fields

André Perin, Rudolf Bühler and Renato Giacomini

11h40

Simple Measuring System for Impedance Spectroscopy Analysis of Fluids

Jean Paulo Nakatu Longo, Juliana Padilha Leitzke, Rigoberto E. M. Morales and Marco José da Silva

12h00

Vision-Based Position Control Applied to Probe Positioning for Tip Enhanced Raman Spectroscopy

Laura Amorim, Hudson Miranda, Johnathan Melo, Cassiano Rabelo, Luiz Gustavo Caçado, Luiz Fernando Etrusco and Ado Jório

Session 5
Room: Transistor
Chair: **Raimundo Freire**
Co-chair: **Tulio Albuquerque**

14h40

Mechanical Vibration Energy Harvesting based on Variable Silicone-Barium Titanate Composite Capacitor

Pamela Svetllana S. Souza, Débora A. Vieira and Cleonilson P. de Souza

15h00

Contactless Battery Charger Controller for Wireless Sensor Node

Roger Willian P. da Silva, Valner Brusamarello, Diego Eckhard, Carlos Eduardo Pereira and Ivan Muller

15h20

Self-Tuning of Impedance Matching for Wireless Power Transfer Devices

Reinaldo Abreu, Leonardo Zoccal, Tales Pimenta and Danilo Spadoti

Session 6
Room: Transistor
Chair: **Diomadson Belfort**
Co-chair: **Bruno Vitorino**

17h20

Fabrication of leadless NTC thermistors on LTCC substrates for automotive applications

Newton J A. Júnior, Flávio Almeida, Izabela Bicalho, Igor Monteiro, Rodrigo Vilaça and Sergio Lopera

17h40

A Low Cost Automated Data Acquisition System for Urban Sites Temperature and Humidity Monitoring Based in Internet of Things

Natanael Augusto Viana Simões and Gracinete Bastos de Souza

18h00

Data Acquisition System for Continuous Monitoring of Grounding Grids in Energized Substations

Leonardo Ramalho, Willian Rocha, Andrey Nakamura, Adalbery Castro, Bruno Araújo, Ribamar Lima, Raimundo Freire and Aldebaro Klautau

18h20

Influence of Integrators in the Performance of Analog-to-Information Converters

Vanderson Reis, Edmar Gurjão, Raimundo Freire and Pertov Lobo

18h40

Second-order Thermal Sigma-Delta applied to Resistive Bolometers on Infrared Detection

Bruno Augusto Ferreira Vitorino, Diomadson R. Belfort, Sebastian Yuri Cavalcanti Catunda, Matthieu Denoual and Raimundo Carlos Silvério Freire

Friday, September 2nd

Session 7

Room: *Transistor*

Chair: **Yuri Catunda**

Co-chair: **Rodrigo Semente**

08h40

ubiMeter: A Proposal for Remote Instrumentation in IoT

Lucas Xavier, Huberto Kaiser Filho, Patrícia Davet, Wemerson Parreira and Adenauer Yamin

09h00

FPGA-Based Testbed for Synchronization on Ethernet Fronthaul with Phase Noise Measurements

Joary Fortuna, Igor Freire, Ilan Sousa, Chenguang Lu, Miguel Berg, Igor Almeida and Aldebaro Klautau

09h20

Arbitrary Waveform Generator based on the Berlekamp-Massey Algorithm

Veronica Maria Lima Silva, Cleonilson Protásio de Souza and Raimundo Carlos Silvério Freire

09h40

Work function measurement system (Optimization of schottky barrier)

Marcos Hamanaka, Vinicius Pimentel, Wellington Avelino, Viviane Hamanaka and Fernando Dall'Agnol

10h00

Methodology for Uncertainty Evaluation of Interferometry Systems Applied Fourier Transform Infrared Spectroscopy

Fabiano Sanches Rocha, Hilton de Oliveira Mota and Flávio Henrique Vasconcelos

Session 8
Room: Transistor
Chair: **Frank Sill Torres**

10h40

MEMS Module Integration into SiGe BiCMOS Technology for Embedded System Applications - Invited

Mehmet Kaynak

11h20

Bio-Inspired Antenna for UWB Systems

Paulo Fernandes Silva Júnior, Raimundo Carlos Silvério Freire, Alexandre Jean René Serres, Paulo Henrique da Fonseca Silva and Jefferson Costa Silva

11h40

Modified Wilkinson Power Divider and Dipole Antenna for Beamforming Systems at 5.8 GHz

Tulio Albuquerque, Raimundo Freire, Alexandre Serres, Thaís Silva, Jonas Walheim, Florence Podevin, François Burdin, Philippe Ferrari and Tan Phu Vuong

WCAS 2016

6th Workshop on Circuits and System Design

WCAS is devoted to the presentation and discussion of design experiences with a high degree of relevance in industrial, educational and research contexts, as well as innovative design methodologies and application of specific design technologies in an industrial context.

The workshop is organized within two tracks: industrial and academic. Contributions should illustrate state-of-the-art designs, design methodologies or tools, which will provide viable solutions in tomorrow's silicon and embedded systems. The contribution should present electronic circuit and system design results from FPGA and/or ASIC prototypes, or from simulation. Designs that achieve a specific record in terms of performance, power management or any other concrete advantage compared to the state-of-the-art for a given application domain should also be submitted to this workshop. Methodologies and techniques validated through demonstration are welcome.

WCAS 2016

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Publication Chair:

Tales C. Pimenta, MinasTec and UNIFEI, Brazil

Technical Sessions

Wednesday, August 31st

Session 1 - Analog & Mixed Signal design

Room: CMOS

Chair: **André A. Mariano**

10h40

Analysis and Design of 180 nm CMOS Transmitter for a New SBCD Transponder SoC

Nelson Andrade, David Cordova, Diogo Santana, Marcelo Negreiros, Helga Dornelas, Alonso Schmidt, Renê Timbó, Pedro Toledo, Hamilton Klimach, Eric Fabris and Sérgio Bampi

11h00

Design of 180 nm CMOS Integer-N Synthesizer for a New SBCD Transponder SoC

Rodrigo Wrege, David Cordova, Diogo Santana, Marcelo Negreiros, Helga Dornelas, Alonso Schmidt, Renê Timbo, Pedro Toledo, Hamilton Klimach, Eric Fabris and Sergio Bampi

11h20

Area Optimized Design of a 180 nm BPSK Modulator for a New SBCD Transponder SoC

Leonardo Tomazine Neto, Helder Henrique Avelar, Gustavo Schaefer, Marcelo Negreiros, Pedro Toledo and Lucas Andre de Paris

11h40

The Future of Electronics Design Tools

Guilherme Tondello, Leonardo Vigorit (Creative)

Session 2 - Digital Design
Room: CMOS
Chair: **José Augusto Nacif**

14h00

A Novel Interface for Locally-Clocked Synchronous Modules in a Globally-Clocked Synchronous Design

Duarte Oliveira, Tiago Curtinha, Lester Faria and Orlando Verducci

14h20

Automatic Fault Injection into SystemC Designs

Tulio Leao and Frank Torres

14h40

A FPGA-Based Trigger and DAQ System for Neutrinos Angra Detector

João Marcelo Silva Souza, Eduardo Furtado Simas Filho, Herman Lima Junior, Paulo Cesar Machado Abreu Farias and Otto Rocha

15h00

First Year of Brazilian Multiuser Project

Fernando Chávez (CEITEC)

Session 3 - Libraries and fabrication

Room: CMOS

Chair: **André Reis**

17h20

CTC06 Standard Cell Library Design

Cícero Nunes, Lauro Puricelli, Paulo Butzen, Eric Fabris and Renato Ribas

17h40

Standard Cell Library Validation Methodology

Mauricio De Carvalho, Cícero Nunes, Bruno Canal, Luis Reinicki, Lauro Puricelli, Gilson Webber, Augusto Neutzling, Mauricio Altieri, Eduardo Conto, Thiago Nagel, Paulo Butzen, Renato P. Ribas and Eric Fabris

18h00

Four-point bending apparatus for mechanical stress measurements in semiconductor wafers

Jose Ramirez and Fabiano Fruett

18h20

Substream innovation opportunities

Paul Malisse (IMEC)

Thursday, September 1st

Session 4 - Analog Design 1

Room: Diode

Chair: **Raphael Brum**

10h40

A CMOS I/Q Modulator Design for a New SBCD Transponder SoC

Eduarda Losqui, David Cordova, Diogo Batista Santana, Marcelo Negreiros, Helga Dornelas, Alonso Schmidt, Renê Timbo, Pedro Toledo, Hamilton Klimach, Eric Fabris and Sergio Bampi

11h00

A Floating Voltage Regulator for Applications with Variable High Voltage Supply

Javier Osinaga, Julio Saldaña and Wilhelmus Van Noije

11h20

Temperature compensation bias techniques for very low gain variation of a folded cascode operational amplifier

Roberto Silva and Wilhelmus Noije

11h40

Addressing IC Low Power challenges from Architecture to GDSII

Marcelo Roberto Dias Ferreira (WG3)

Session 5 - Design Flow and Methodology

Room: Diode

Chair: **Andrea Iabrudi Tavares**

14h00

Study Case of Mixed Verification Flow to cope Analog Mixed Signal Mismatch Integration

Vinicius Martins, Wang Jiang Chau, Roberto Rangel and Jerson Gues

14h20

Automatic Synthesis of High-Speed Asynchronous Systems from a Behavioral Specification

Kledermon Garcia, Duarte Oliveira, Lester Faria and Orlando Verducci

14h40

An Approach for De-synchronization: Synthesis of Asynchronous Controllers from Synchronous Design

Duarte Oliveira, Higor Delsolto, Orlando Verducci and Lester Faria

15h00

EDA and IP, a key component of SoC design

Terrance Lee Back (Synopsys)

Session 6 - RF Design
Room: Diode
Chair: **Hamilton Klimach**

16h40

LED's and Smart Cities

Ingrid Teixeira (BNDES)

17h20

FFT-Based Integer Carrier Frequency Estimator and Corrector for IEEE802.15.4g MR-OFDM PHY

Daniel Garcia Urdaneta, Gabriel Santos da Silva, Eduardo Rodrigues de Lima, Jacqueline Gomes Mertes and Luís Geraldo Pedroso Meloni

17h40

Distributed Amplifier Design: Considerations on Discrete, MMIC and CRLH Approaches for RF and Microwave Applications

Renato Silveira Feitoza, Jorge Angelo Mitrione Souza, Gláucio Lima Siqueira, Marbey Manhães Mosso and Gidy Carolina Florez Navarro

18h00

A 52 dB THD 3rd-Order Gm-C CMOS Filter for a New SBCCD Transponder SoC

Bruno Martinelli, Pedro Toledo, Helga Dornelas, Rene Timbo, David Cordova, Alonso Schmidt, Diogo Santana, Marcelo Negreiros, Hamilton Klimach, Eric Fabris and Sergio Bampi

18h20

Unitec Design activities on Minas Gerais - Opportunities for IC designers

Edelweis Ritt (UNITEC)

Friday, September 2nd

Session 7 - Analog Design 2

Room: Diode

Chair: **Tiago R. Balen**

08h40

Ultra Low Voltage Active RC Filter Calibration Structure Analysis

Roberto Silva, Wilhelmus Noije and Lucas Severo

09h00

Push-Pull Based Voltage Amplifier for Ultra Low Voltage Applications

Luis Henrique Rodovalho, Eric Fabris and Hamilton Klimach

09h20

Symmetrical MOS Ladder DAC with Improved Linearity for Ultra-Low Voltage Applications

Israel Sperotto, Hamilton Klimach and Sergio Bampi

SForum 2016

16th Microelectronics Students

The Microelectronics Students Forum is an event promoted by the Brazilian Microelectronics Society (SBMicro) and the Brazilian Computer Society (SBC) with the following main goals:

- Promote the participation of undergraduate students in the most important international event in the area of Microelectronics organized each year in Brazil.
- Promote the realization of student's projects in a variety of topics within the field of microelectronics;
- Provide an opportunity for the presentation and discussion of research projects developed by undergraduate students;
- Promote educational advanced tutorial presentations on microelectronics.

16th SForum 2016

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Ado Jório, DFIS, UFMG, Brazil

Luciana P. Salles, DEE, UFMG, Brazil

Publication Chair:

Cleonilson Protásio de Souza, UFPB, Brazil

Technical Sessions

Best Paper Contest Oral Presentation

Wednesday, August 31st

12h20min - within SBCCI Session 1

Test Matrix Circuit for Schottky Diode Variability Characterization

Marcelo Pedrini, Thales Ribeiro, Yi Chen Wu and Hamilton Klimach

12h20min - within SBMICRO Session 1

Simulation and Electrical Characterization of Fully Depleted SOI MOSFETs with 10 nm Thick Silicon Layer

Flávio Enrico Bergamaschi and Marcelo Antonio Pavanello

15h40min - within SBCCI Session 2

Field-coupled Nanocomputing Energy Analysis Tool

Marco Antonio Ribeiro, Jeferson Chaves and Omar P. Vilela Neto

12h20min - within SBMICRO Session 2

A modified Shichman-Hodges model for OFETs usable in the Quite Universal Circuit Simulator

Alex Lima, Muthupandian Cheralathan and Stefan Blawid

Thursday, September 1st

12h20min - within SBCCI Session 4

Proposal of a Single-Phase Wattmeter Based on Analog Signal Multiplication Employing a Switched Capacitor Modulator

Mateus Castro and Estêvão Teixeira

12h20min - within SBMICRO Session 4

Influence of Substrate Bias in Electric Parameters of Multiple Gate SOI Transistors with Thin Buried Oxide Layer

Érika Yamanaka and Rodrigo Doria

15h40min - within SBCCI Session 5

Analysis and Design of Ultra Low Voltage Dickson Charge Pumps

Marcio Machado, Pedro Machado, Franciele Nornberg, Marcio Schneider and Carlos Montoro

15h40min - within SBMICRO Session 5

Simplified Volterra Series for the Behavioral Modeling of Dual-band Power Amplifiers under Carriers with Integer Multiple Frequencies

Thierry Dompain, Otavio Riba and Eduardo Lima

Wednesday, August 31st

Posters Session 1
Room: *Upper Level*
Chair: **Rudolf Buhler**

10h20 - 10h40 and 16h00 - 16h40

Redesigning state-of-the-art QCA Adders in NML Technology

Vinícius Kodama Reis, Thiago Rodrigues Barros da Silva Soares, Juliana Rezende S. B. Alves, Gustavo Mota de Castro, Omar Paranaíba Vilela Neto and José Augusto M. Nacif

Using an Analog Netlist Generation Tool to Evaluate a Mixed Circuit Verification Framework

Danilo Almeida, Abner Panho Marciano and José Augusto M. Nacif

Improvement for the thermal resistance extraction method related with self-heating effect

Carlos Augusto Bergfeld Mori, João Antonio Martino and Paula Ghedini Der Agopian

Design of a Didactic Chip for Study of the Basic Analog CMOS Building Blocks

Patrick Domingues, Rodolfo Almeida and Estêvão Teixeira

Automating Trace Buffer Post-Silicon Debug

Fredy Alves, Danilo Almeida, Vitor Hugo Pereira, Ana Cláudia Costa and José Augusto M. Nacif

Low Cost pH Meter Using pH Acid-Base Indicator Method And Spectrophotometry Concepts

Jean Rocha, Daniela Suzuki, Ricardo Gonçalves and Jefferson Marques

**Comparative Analysis of Parasitic Resistance Extraction
Methods Applied to FinFETs**

Fernando Haruo Matsunaga Oka, Arianne Soares do Nascimento
Pereira and Renato Camargo Giacomini

Automation of Delay Model for Static CMOS Gates

Lucas Carraro, Felipe Marranghello, André Reis and Renato Ribas

Optimizing Circuits for QCA Routing

Juliana Alves, Pedro Silva, Geraldo Fontes, Ricardo Ferreira and
José Augusto M. Nacif

**Temperature and Wavelegth Impact in Lateral PIN SOI
Photodiode's Current with Second Interface Bias**

Graziele Donato, Rudolf Buhler, Carla Novo and Renato Giacomini

Improvements to the SwitchCraft Framework

Gabriel Pinho, Jeferson Baqueta, André Reis and Renato Ribas

Exploring Alternative Designs of Majority Voters

Ingrid Oliveira, Rafael Schivittz, Eduardo Liebl, Cristina Meinhardt
and Paulo Butzen

Thursday, September 1st

Posters Session 2

Room: Upper Level

Chair: **Ricardo dos Santos Ferreira**

10h00 - 10h40 and 16h00 - 16h40

NML-logic- based ALU

Vítor de Lima, Thiago R. B. S. Soares, Luiz. G. C. Melo and Omar P. Vilela Neto

Study of Irradiated MOSFET Devices at different Temperature Conditions

Karlheinz Cirne, Felipe Leite, Nicolas Araújo, Roberto Santos and Marcilei da Silveira

Reduction of burring effect on LTCC laser cutting

Izabela S. Bicalho, Flávio Almeida, Newton Júnior, Igor Monteiro, Rodrigo Vilaça and Sergio Lopera

Behavioral Modeling of Dual-band RF PAs using Real-valued Radial Basis Function Neural Networks

Walter Pfeffer and Eduardo Lima

Experimental study of underlap UTBB SOI transistors down to 50 nm channel length

Vanessa Cristina Pereira da Silva, Vitor Tatsuo Itocazu, Victor Sonnenberg, Joao Antonio Martino and Paula Ghedini Der Agopian

Study of Breakdown Voltage in Power MOSFETs in Harsh Environments

Natasha Cristine Merzbahcer, Mario Kawano, Kimon Stylianos, Devair Arrabaça, Michele Rodrigues and Milene Galeti

Virtual Reconfigurable Functional Units on Shared-Memory Processor-FPGA Systems

Fernando Ferreira Passe, Vanessa Cristiny Rodrigues Vasconcelos, Lucas Bragança Silva, José Augusto M. Nacif and Ricardo dos Santos Ferreira

Experimental investigation of THT and SMT power transistors under TID radiation

Juan Lima, Marcilei Silveira, Mario Kawano, Kimon Stylianos, Devair Arrabaça and Milene Galeti

Characterization of Ge on-chip and InGaAs discrete photodetectors

Carlos Bortoloto

Single Event Effect: methodology for detecting and analysis of experimental data

Andre Gonçalves, Michele Rodrigues, Marcilei Silveira, Pedro Benko, Marco Melo, Rudolf Buhler, Renato Giacomini and Ricardo Stolf

From And-Inverter Graphs to Majority-Inverter Graphs

Felipe Machado, Vinicius Possani, Augusto Neutzling, Renato Ribas and André Reis

Fórum Empresarial Semicondutores e IoT: Desafios e Oportunidades *(in Portuguese)*

Wednesday, August 31st

1º PAINEL

Mercado Doméstico de semicondutores: desafios e oportunidades

Room: Diode

10h00

Abertura

10h30

UNITEC - Frederico Blumenshain

10h45

MCT - Henrique Miguel

11h00

NXP - Armando Gomes da Silva Jr.

11h15

SMART - Rogério Nunes

11h30

CSEM - Thiago Maranhão

11h45

INATEL - Marcelo Marques

12:00

Painel de debate dos palestrantes

Mediador: **José Scodiero**

12h40

Perguntas e respostas

13h00 - Network brunch

2º PAINEL

Oportunidades de negócios em IoT e Smart City

Room: Diode

14h30

SYNOPSIS - Victor Grimblatt

14h45

FCA - Alexandre Abreu

15h00

GOOGLE - Berthier Ribeiro Neto

15h15

SYNERGY IOT - João Luiz Neves

15h30

AXXIOM - Fabiana Borges Teixeira Dos Santos

15h45

CADENCE - Fabiano Peixoto

16h00 - Coffee

16:30

ABDI - Maria Luisa Leal

16h45

Painel de debate dos palestrantes

Mediador: Prof. Gilberto Medeiros

17h30

Perguntas e respostas

18h00 - Encerramento e convite para participação do
Painel de Semicondutores do Evento Chip on the Mountains

We would like to thank all the volunteers

Alessandra Rocha De Sales Martins	OptMA ^{lab}
Alexander Eick	OptMA ^{lab}
Andrei dos Santos Silva	OptMA ^{lab}
Bruno de Ávila Sbampato	OptMA ^{lab}
Bruno Nogueira Martins Cardoso	NanoComp
Carlos Felipe Gonçalves Souza	OptMA ^{lab}
Cassiano Rabelo e Silva	Nanoespectroscopia
Clarice Ferreira René Oliveira	OptMA ^{lab}
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Jeferson Figueiredo Chaves	NanoComp
Laura Pinto Coelho Amorim	Nanoespectroscopia
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Marco Antônio Ribeiro	NanoComp

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Mário Vinícius Pelegrini Guimarães	OptMA ^{lab}
Patrick Mendes dos Santos	OptMA ^{lab}
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Pedro Henrique Köhler Marra Pinto	OptMA ^{lab}
Pedro Vinícius Ferreira Baptista	NanoComp
Pedro Vitor Ferreira do Rosario	OptMA ^{lab}
Poliana Henriques Bueno	OptMA ^{lab}
Rubens Alcantara de Souza	OptMA ^{lab}
Tatiana Santos Camelo de Araujo	NanoComp
Telson Emmanuel Oliveira Crespo	OptMA ^{lab}
Thiago Rodrigues Barros da Silva Soares	NanoComp
Tiago Abreu Freitas	Nanoespectroscopia
Vinícius Azevedo de Souza e Vecchia	OptMA ^{lab}
Gabriela da Silva Dias	OptMA ^{lab}
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