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VISION FOR THE FUTURE

Emmanuel SABONNADIÈRE – IEDM
December 2nd, 2018





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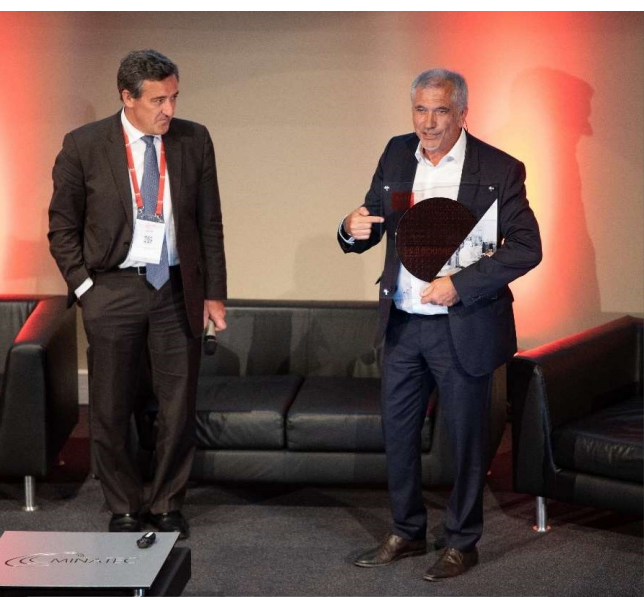
Some key highlights....



LETI'S INNOVATION DAYS 2018: "BRAIN INSPIRED" LETI'S INNOVATION DAYS 2019: "DEEP TECH FOR EDGE AI"

**LETI
INNOVATION
DAYS**
JULY 4-5, 2018
GRENOBLE, FRANCE

June 24-28, 2019
Grenoble, France

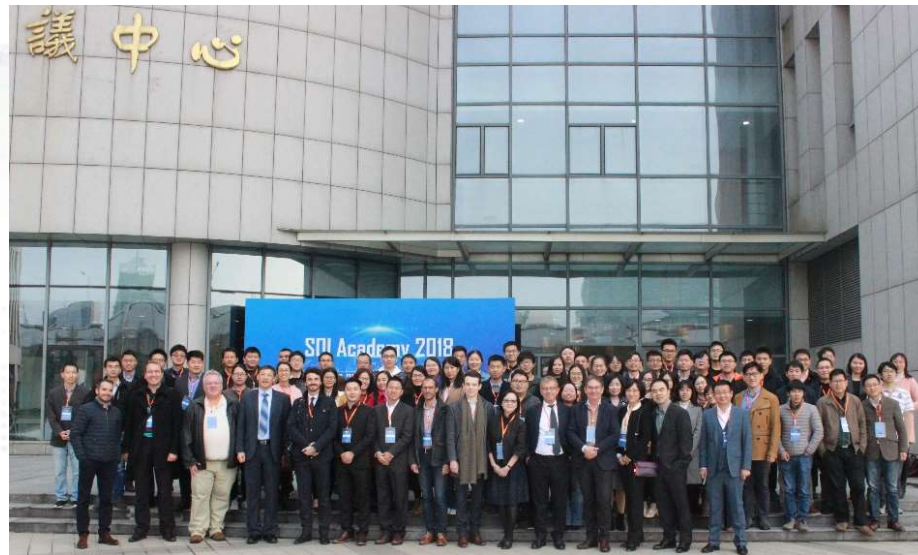


LETI'S INNOVATION DAY IN TAIWAN IN 2018 - FIRST EDITION



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SOI ACADEMY IN CHINA - FIRST EDITION



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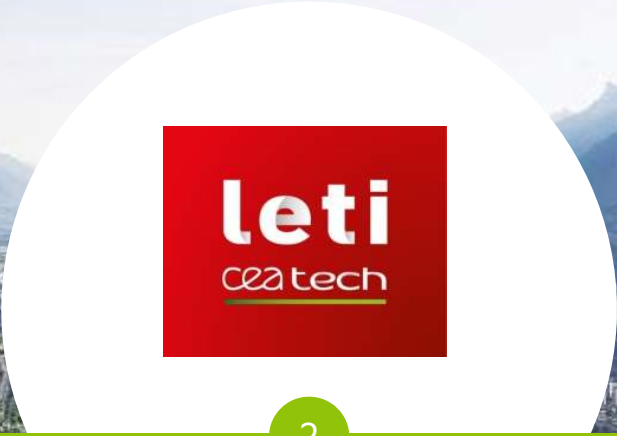
COLLABORATION AGREEMENT LETI & IMEC CREATE A EUROPEAN MOMENTUM



Quantum Technologies + Neuromorphic Architectures



© Belgium Foreign Affairs, Foreign Trade and Development Cooperation



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Some key figures....

© 2018 Leti - Marie-Françoise LONJON / CEA - © Gérard COFFIET / CEA

Emmanuel ABDON / DITEV / CEA - Les Workshops TEDM 2018

LETI, PIONEERING THE FUTURE OF MICROELECTRONICS WITH YOU




 **1,900** experts, engineers & others

 **> 64** startups

 **315 M€** budget

 **> 2760** patents

 **350** industrial partners

 **10,000 m²** of cleanrooms and labs

 **>125** European projects

"Second World Most Innovative Research Institution"

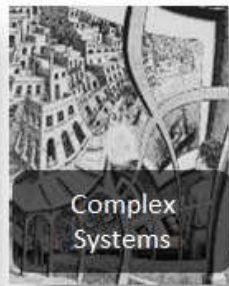


TOP INSTITUTIONS | 2017 RANKING

1	Health & Human Services Laboratories	USA
2	CEA	France
3	Fraunhofer Society	Germany
4	Japan Science & Technology Agency	Japan
5	National Institute of Advanced Industrial Science & Technology	Japan

SCIENCE: AN OPINION LEADER IN THE SCIENTIFIC COMMUNITY

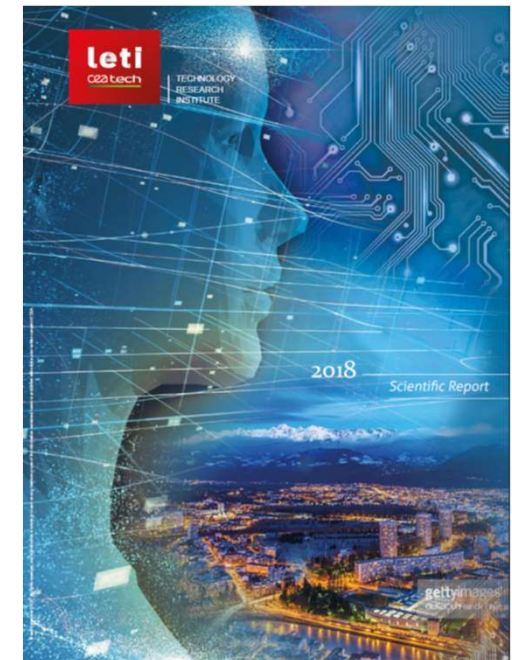
5 domains of Expertise:



Top level academic partners



Massachusetts
Institute of
Technology



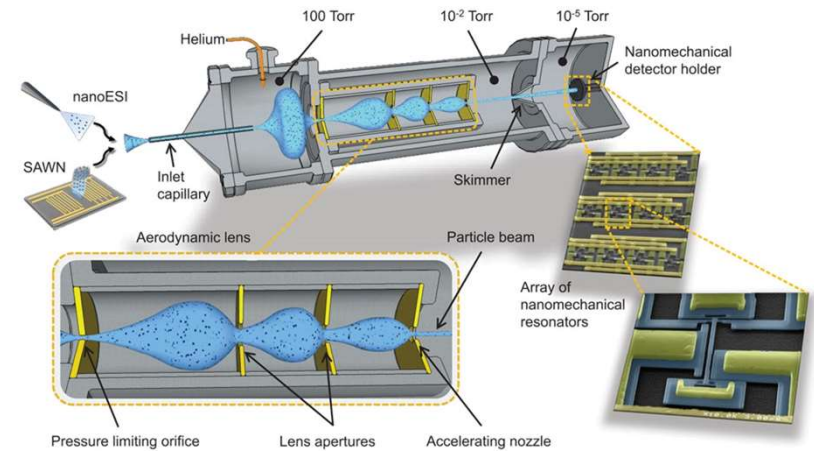
New scientific report 2018

LETI SCIENTISTS BRIDGE THE MASS GAP

NEW MASS-SPECTROMETRY TECHNOLOGY

FRENCH RESEARCHERS WEIGH WHOLE VIRUS CAPSIDS AND EXTEND REACH OF MASS SPECTROMETRY WITH NANOMECHANICAL RESONATORS

A team of French researchers at Leti has demonstrated a new mass-spectrometry technology based on nanomechanical resonators that measures the mass of particles previously beyond the reach of current commercial technology, and which they used to measure the mass of a whole bacteriophage virus capsid.



For more information :
<http://science.sciencemag.org/content/362/6417/918>



HEALTHCARE AT LETI, INNOVATING FOR OVER 35 YEARS...



Grenoble (FR)



160 permanents -
77 PhD & Post-doc



> 5 startups



30 M€ budget



> 445 patents



30 industrial partners



3,000 m² of cleanrooms and labs



Clinical facilities with 6 patient rooms,
a fully equipped operating room with
intraoperative MRI, multimodal
investigation capabilities (MEG, SPECT-CT,
gait analysis)



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How we see the future....

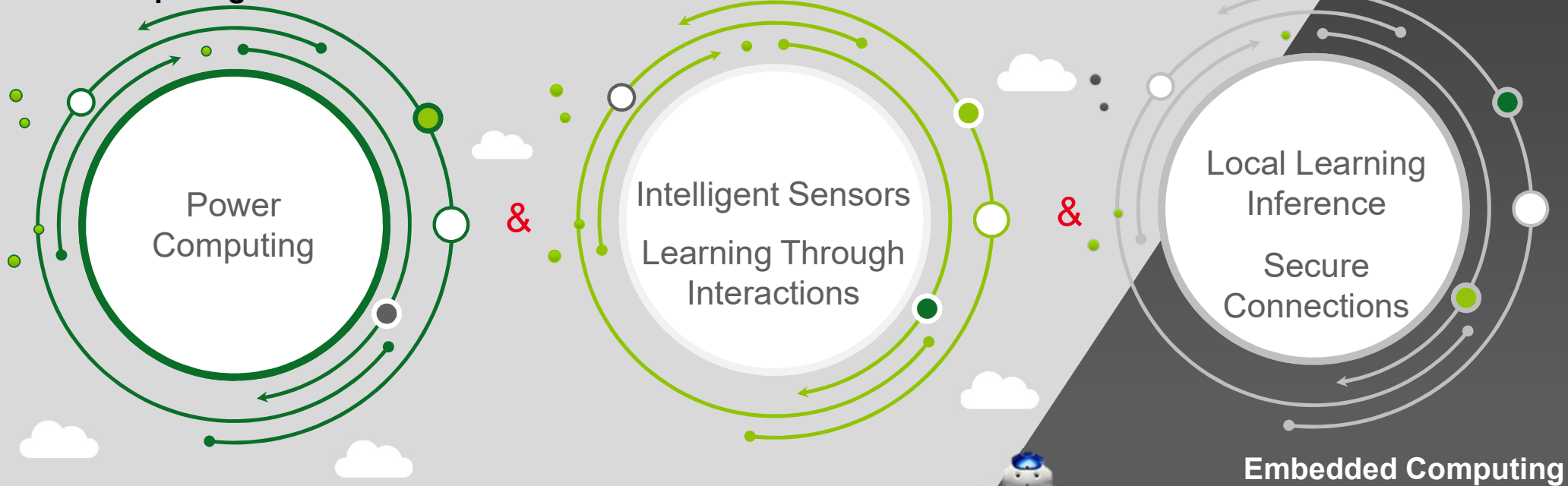




TOWARDS A PERVASIVE INTELLIGENCE

TODAY: STRONG LINK WITH THE CLOUD

Cloud Computing

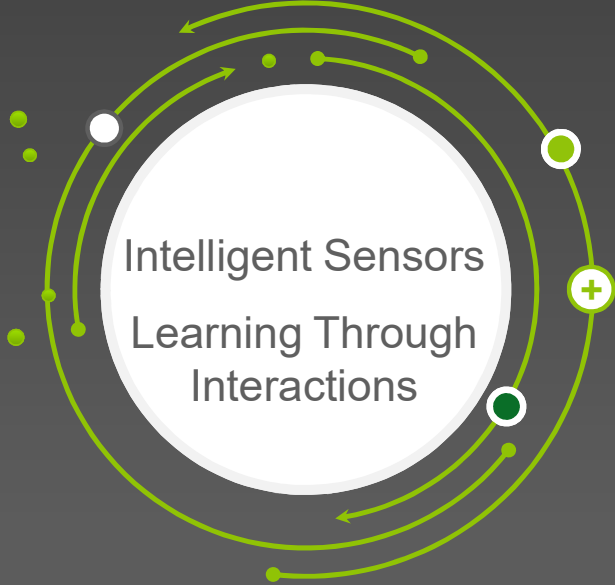
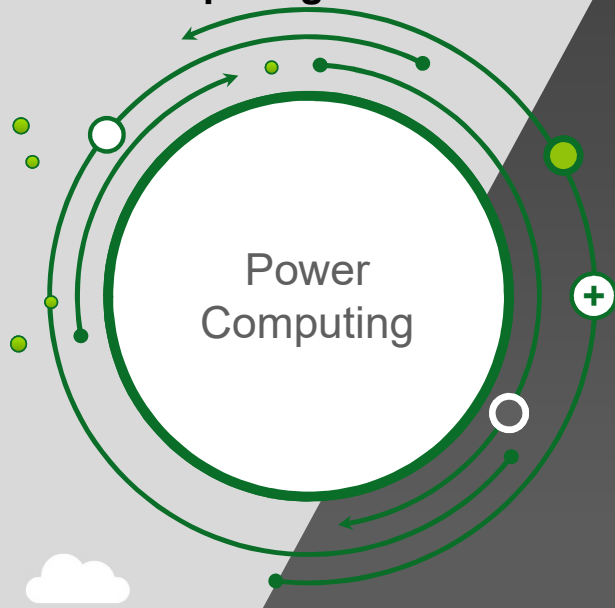




TOWARDS A PERVASIVE INTELLIGENCE

TOMORROW: MORE & MORE EMBEDDED INTELLIGENCE

Cloud Computing



Embedded Computing

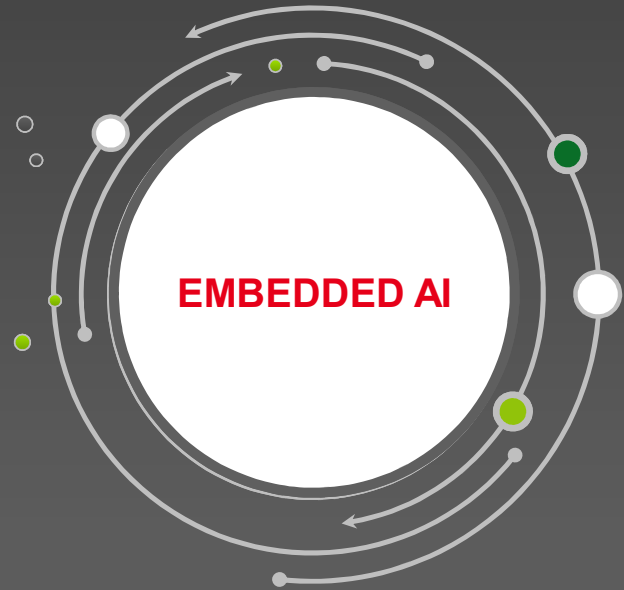
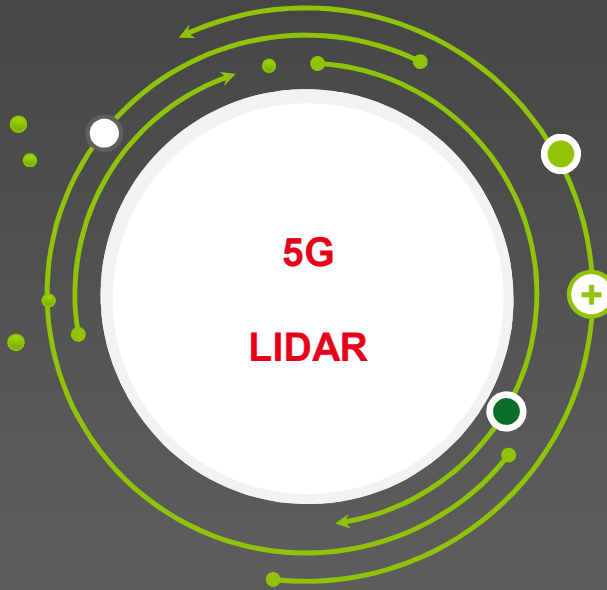
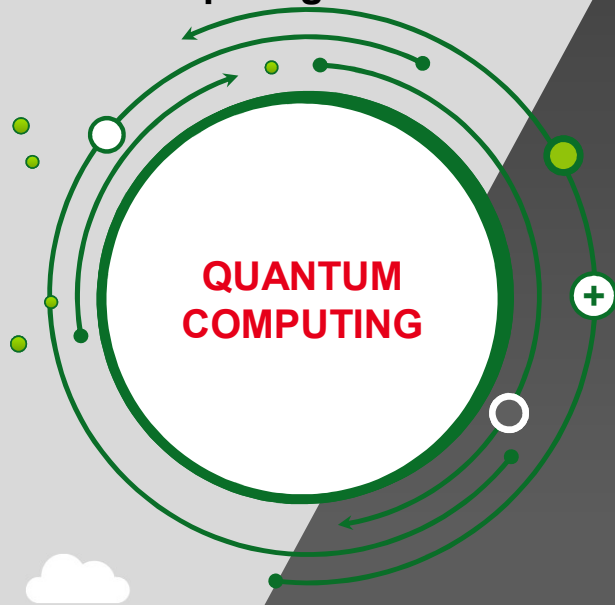




TOWARDS A PERVASIVE INTELLIGENCE

LETI'S 4 KEY PROGRAMS

Cloud Computing



Embedded Computing

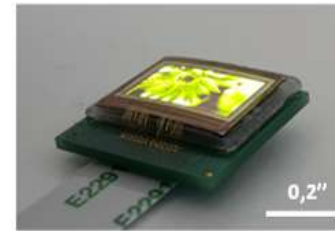


Major Results

- OLED microdisplay Scale-up, diagonal = 1", R=45 mm
- Well-performing displays

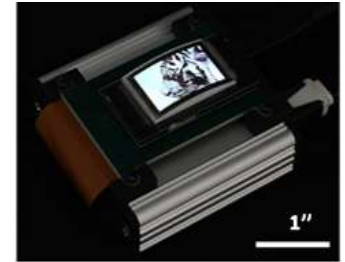
Expected Results

Combine an optical system with a curved microdisplays, and integrate this technology into compact VR head-mounted displays



2017

Maryland display, 0,38", R=45 mm
Monochrome jaune



2018

LOMID display, 1", R=45 mm
Monochrome blanc



LETI IS PRESENTING 11 KEY PAPERS AT IEDM 2018

Monday, Dec. 3

Breakthroughs in 3D Sequential Technology

Session 7.2
Time: 2:00 pm

Towards Scalable Silicon Quantum Computing (invited)

Session 6.2
Time: 2:00 pm

Hybrid Bonding for 3D Stacked Image Sensors: Impact of Pitch Shrinkage on Interconnect Robustness

Session 7.3
Time: 2:25 pm

Tuesday, Dec. 4

Very Large Scale Integration Optomechanics: A Cure for Loneliness of NEMS Resonators?

Session 12.4
Time: 9:00 am

Characterization Methodology and Physical Compact Modeling of in-Wafer Global and Local Variability

Session 17.1
Time: 9:05 am

Development of X-ray Photoelectron Spectroscopy Under Bias and its Application to Determine Band-energies and Dipoles in the HKMG Stack

Session 17.6:
Time: 11:35 am

In-depth Characterization of Resistive Memory-based Ternary Content Addressable Memories

Session 20.3:
Time: 3:10 pm

Tunability of Parasitic Channel in Gate-All-Around Stacked Nanosheets

Session 21.3:
Time: 3:10 pm

Wednesday, Dec. 5

Optimized Reading Window for Crossbar Arrays Thanks to Ge-Se-Sb-N-based OTS Selectors

Session 37.4:
Time: 2:50 pm

Truly Innovative 28nm FDSOI Technology for Automotive Micro-Controller Applications Embedding 16MB Phase Change Memory

Session 18.4:
Time: 4:00 pm

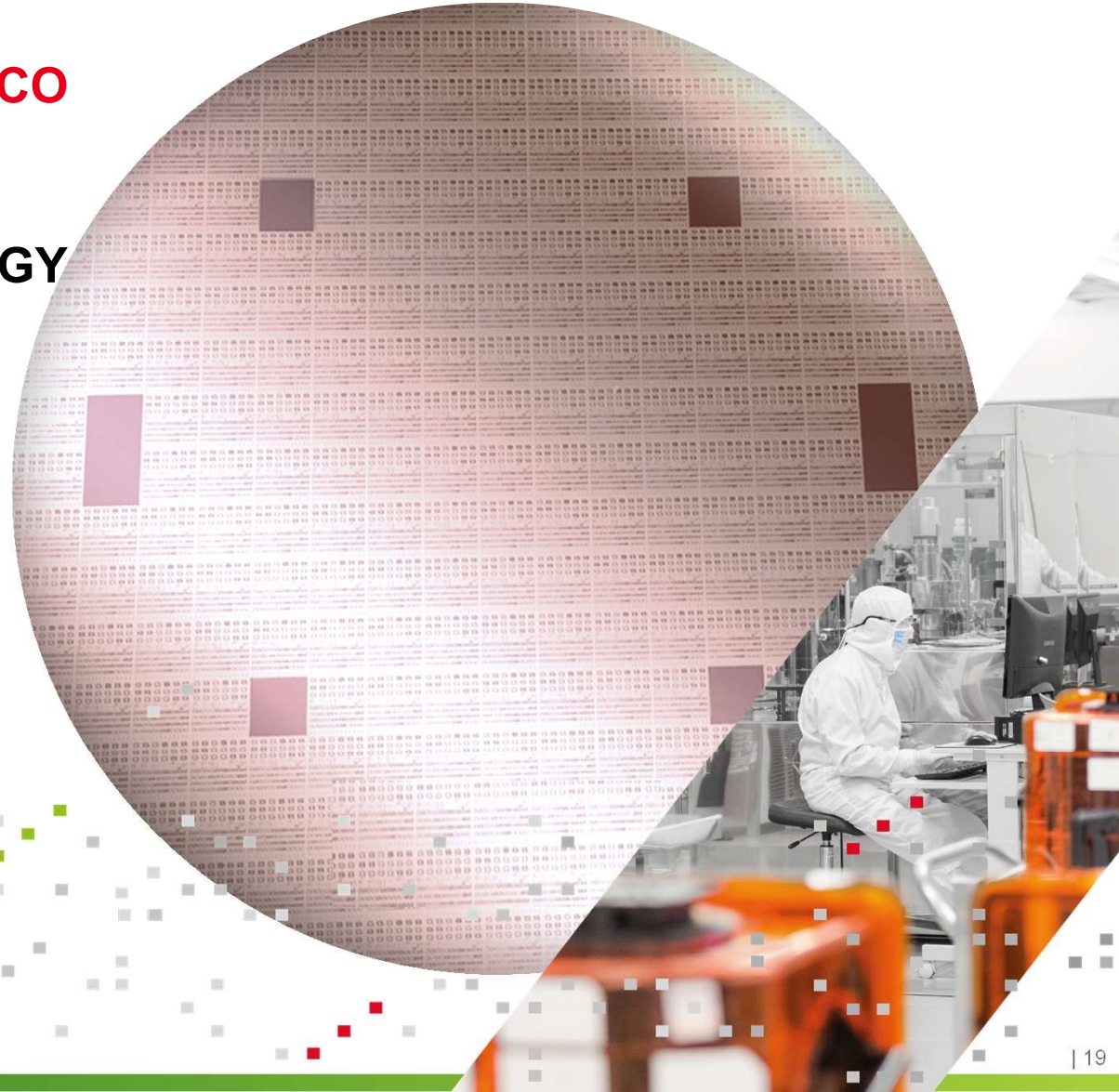
In-Memory and Error-Immune Differential RRAM Implementation of Binarized Deep Neural Networks

Session 20.6:
Time: 4:50 pm

SPICE COMPACT MODELS FOR CIRCUIT DESIGN AND TECHNOLOGY CO-OPTIMIZATION

Project combines CEA-Leti's compact modeling expertise and Silvaco's extensive experience in SPICE compact model integration and extraction

Iliya PESIC
Executive Chairman
Of the Board



December 2, 2018

Leti Devices Workshop

Nikko Hotel, San Francisco



› Technologies for New Computing Paradigms

Dr. Carlo Reita
Director Technical Marketing Strategy, Nanoelectronics, Leti



› Enabling Heterogeneous High Performance Processors

Dr. Denis Dutoit
Director Technical Marketing Strategy, Advanced Computing, Leti



› Future opportunities in high performance and low power computing with emerging technologies and novel architectures

Dr. John Paul Strachan
Rebooting Computing Research Group Manager, HPE



› Emerging Non-Volatile Memories for Computing

Dr. Marie Claire Cyrille
Director Technical Marketing Strategy, Advanced Computing, Leti



› Quantum Computing on Silicon

Dr. Maud Vinet
Advanced CMOS Laboratory Manager, Leti