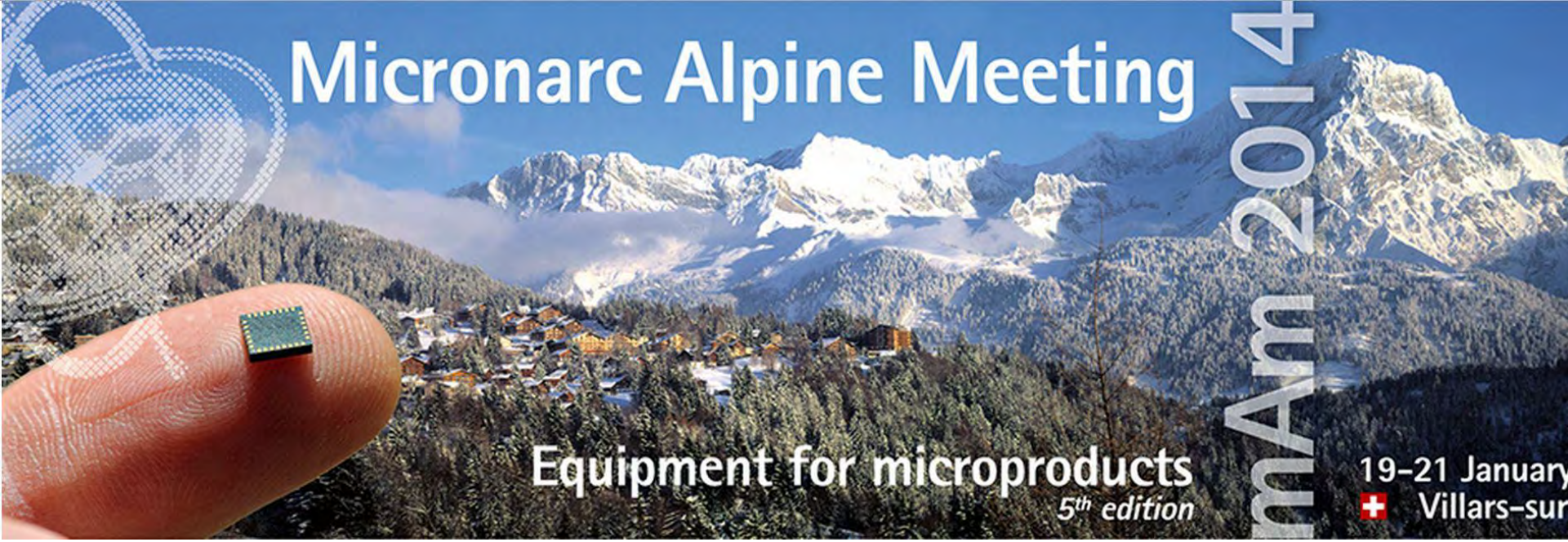
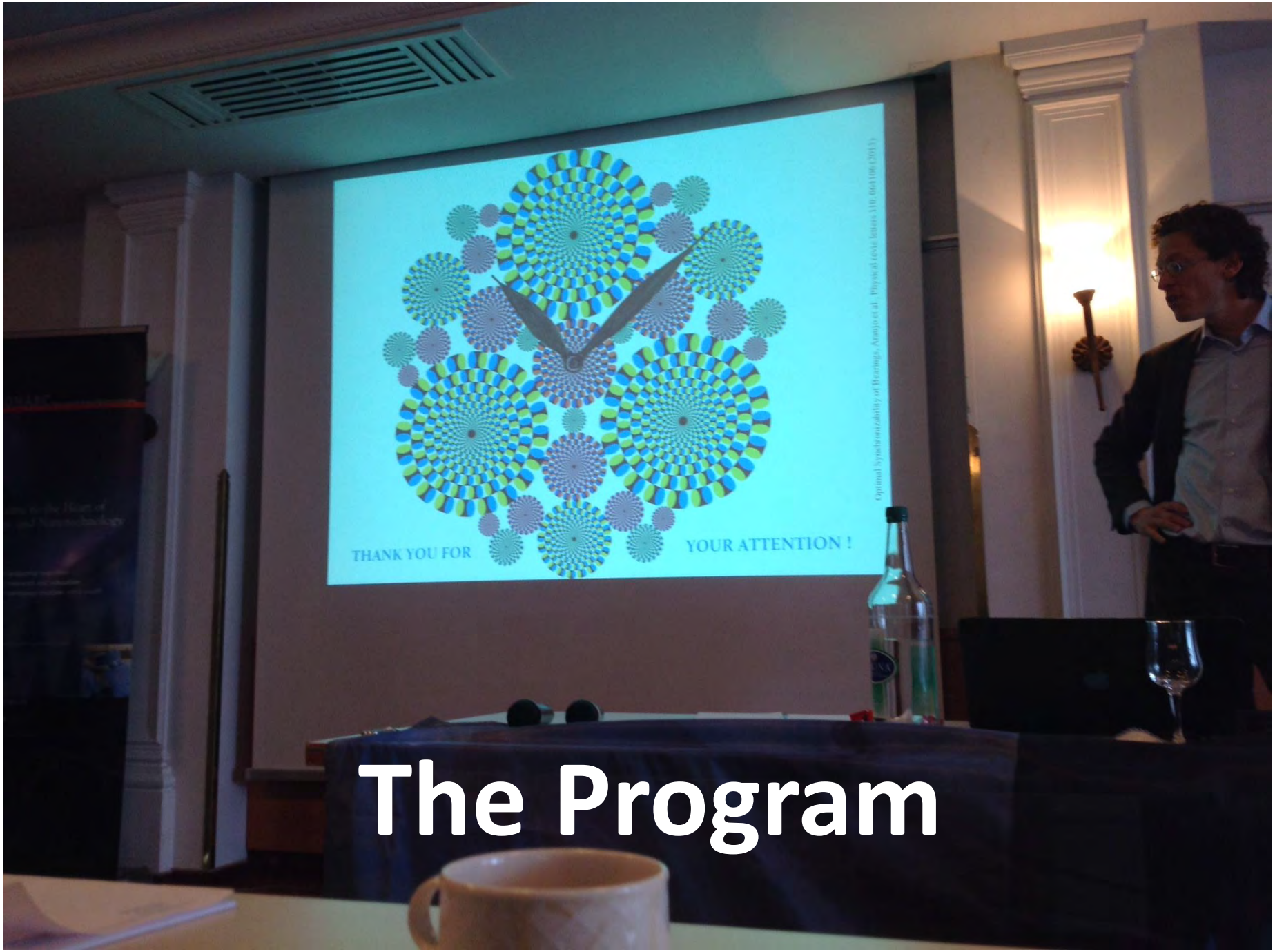


Final Remarks mAm 2014

Volker Saile

Villar-sur-Ollon, January 21, 2014

Sunday, January 19, 2014



The Program

Monday 20 January 2014

09:00-09:20 **Welcome Session**

Edward Byrne, Micronarc
Prof. Dr. Volker Saile, Karlsruhe Institute of Technology, President MANCEF
Yvan Dénéréaz, Office for Economic Affairs, **Canton of Vaud**

80 Participants at mAm 2014

Canton of Vaud, watch-valley
Impressive research and industrial strength area, micronarc

Patrick Barbey, Director, **Innovaud**

Innovaud: new agency for innovation, one stop shop,
Members: seven innovation parks
Supporting connection industry- academia new tools: support of start-ups, and also SME
Examples - Swissto12 (THz)

09:20-10:00 **Invited Keynote on Micro-manufacturing**

Andrea Onetti, General Manager of Analog and Audio Systems Division, **STMicroelectronics**

Smart Microsystems for Internet Of Things

Humanization of Technology
Human interface technology - wearable technology -contextual technology -internet of things: IoT = Smart System + @
Package technology – size, power consumption

Enabling factors: silicon - smaller (Moore, more than Moore), new materials, packaging, IPs&Software

Challenges: technology, society (privacy, security, enviromental impact, safety, social responsibility)

MEMS for personal weather forecast, indoor navigation (Tokyo Station)
ST - 1B$sales in MEMS, 4-5 M units per day, 7B total
Coming: microactuation, mirror systems, smaller systems

10:30-12:00 **Micro-manufacturing Applications I – Watchmaking**

Keynote: **Prof. Dr. Simon Henein**, Micromechanical and Horological Design Laboratory (INSTANT-LAB), **EP FL** (Switzerland)
Instant-Lab: EPFL's new micromechanical and horological design laboratory

INSTANT-LAB, Patek Philippe Chair
Flextures, store energy, guide energy - bearings, 1cm scale - EDM, robots

Watchmaking: time bases, escapements, novel materials and technology, high quality factor oscillators, new kinematic concepts, pivotless designs escapements with flexture technology - very few parts non-linear springs

Surgical protheses: intelligent insert for knee
Teaching - emphasis on design

HOROLOGY

Denis Jeannerat, Director of Technology, **Willemin-Macodel** (Switzerland)

A huge step towards the submicron

New concept of machine tool for submicron accuracy
Small machine, 1m² footprint
Machine design - delta architecture - platform, low mass in platform leads to high speed - 80000 rpm, no tool holder (shrinking)
High natural frequencies and dynamic behavior very fast - lower number of tools, thermal stability
2.1 kW = ten time less than classical machine, no cooling required
Reduction of time - factor 8

Dr. Joachim Schulz, CEO, **microworks GmbH** (DE)

X-Ray LIGA: a new mainstream appeal

Why X-ray lithography: diffraction, sub-micron precision, large depth, inclined structures
New appeal: just three people, new resist mr-x, new mask technology 100 mm layouts, standard prices
Products/applications: watches, apertures, optical resonators and filters, gratings

Exhibitor elevator pitch (3 min) - MicroTec Südwest

13:30-15:30 **Micro-manufacturing Applications II – Medtech**

Keynote: Prof. Dr.-Ing. Roland Zengerle, Laboratory for MEMS Applications
IMTEK - Department of Microsystems Engineering, University of Freiburg
Microfluidic Platforms, Microfluidic Apps and Microfluidic Foundry Services

Platforms - Apps – Designs
Microfluidics is an enabling technology
Point of care applications
System integration challenge
Microfluidic platforms, centrifugal microfluidics
Examples: pathogen detection from raw blood, enrichment of bacteria in water
Functional package of reagents: blisters with micro channels
Profit for customers: run on existing instruments – example: Quiagen instrument Rotorgene, new platform for standard centrifuge

Pascal Carpentier, Sr Business and Solutions Delivery Manager, **NayaMed International Sàrl** (Switzerland)
Hospital Management, towards Remote Technical Support

Business model: remote technical support, hospital management
Provide technical expertise on implant, use and operation - pacemaker has 300 parameters
Traditional: travel based systems – cost high, efficiency low
Replace traditional system by web-based support

Frederic Neftel, MD, President & CEO, **Debiotech** (Switzerland)
MEMS = MC2: Miniaturization, Convenience and Communication; a breakthrough perspective in Diabetes Care.

Diabetes – insuline pump and glucose sensor
JewelPUMP - MEMS pump, close collaboration with ST, 400 pumps per wafer
200 nl per stroke, pizoelectric, long term reliabiltiy (Si), delivery within +-5%
Safety: sensor inside the pump -occlusion alarm
Convenience for patient: thin and small , remote control, app for special mobile phone
Next step: development of closed loop system - artificial pancreas

Jim Ohneck, Chief Marketing Officer, **Valtronic** (Switzerland)
The impact of miniaturization on personal medical devices

Miniaturization – Healthcare
Healthcare cost – see US video
Personal Healthcare Devices (PHD): classical proven technologies, reliability
Future: phone - cloud, contact lens: pressure, pulmonary artery sensor for pressure, wireless hermetic glass seal

Exhibitor elevator pitch (3 min) - Fine Polish TDC

16:00-17:30 **MEMS**

Keynote: **Prof. Dr.-Ing. Helmut F. Schlaak, Laboratory Microtechnology and Electromechanical Systems** - Institute of Electromechanical Design - Department of Electrical Engineering and Information Technology - Technische Universität Darmstadt *3D Micro-Nano fabrication for a new generation of low-cost microsystems*

Silicon micromachining vs polymer-metallic micromachining
Micro-actuators - in-plane movement, out-of-plane movement
3D MEMS, substrates, DUV lithography: SU-8, HAR electroplating, milling
Bistable electrothermal relay - normally-closed electrostatic relay (out-of-plane) 1D-elements in the vertical: UV-Liga, X-ray LIGA, IT LIGA (Ion Track)
One-wire acceleration sensor
Nanowires -bottom up approach, ion tracks 50+ nm, mushroom structures, bridges
Calorimetric sensors, acceleration sensors

Dr. Michel Despont, Manager MEMS Products, **CSEM** (Switzerland)
MEMS, enabler in product innovation

Watches, micro-mirrors, soft-MEMS, gratings
MEMS: 10B Market, fragmented, also for small companies, customized technologies
Large added values
CSEM most on watch parts, sensors, X-ray sources and detectors
Patek Philippe examples, Si and Si+Gold (inertia), escapement, 2cm part
Miniature atomic clock
Micromirrors fo harsh environment, large powers load
Soft MEMS: tactile graphical Braille display, stroke 500 microns, pneumatic actuation, PDMS, EU project
X-ray scatter gratings - non-destructive testing, phase contrast imaging

Dr. Kilian Bilger, Director Microsystem Technologies - Corporate Research at **Robert Bosch GmbH** (Germany)
Challenges and trends in Microsystem Technology

Automotive in Reutlingen, Bosch Sensortec, Akustika, Bosch Connected Devices and Solutions (from sensors to solutions)
Last year 3B sensor level, MEMS pioneer, 1000 patents
Markets: growth rates 10%, automotive, still growth, consumer and mobile: tremendous growth
Technology: Bosch process, sacrificial layers, ...porous thin film technology
Success factors: high integration via system on chip, MEMS packaging
Chip scale packages, 1.2x1.5 mm^2 footprint
Three success factors: speed and flexibility (1) – combos, functional integration and software (2) - human-machine interface (3)

Exhibitor elevator pitch (3 min) - Lyncée Tec

Tuesday 21 January 2014

08:30-10:00 **Assembly and Automation**

Keynote: Dr. Marcel Tichem, Dept. of Precision and Microsystems Engineering, Delft University of Technology (The Netherlands)
Self-assembling and self-adjusting micro-assembly processes

Assembly in the small domain
Self assembly of ultrathin chips (UTC) - for packages, smart blisters for therapy compliance, assembly challenge
Self assembly, examples from the academic domain, solution for UTC, Chip2Foil, magnetic force (Ni on chip), adaptive connection
Self adjustment of photonic components
Active alignement using MEMS
Chip-to-Chip passive alignement, interposer chip, passive alignement features in litho step, final solution: combination of passive and active alignement
Nano-scale assembly and pattering: discrete pattern of nanoparticles by dielectrophoresis
Nanomanufacturing yet to be developed

Lukas Schädler, SLS Detector Group, **Paul Scherrer Institute** (Switzerland)
Micro assembly of X-ray hybrid pixel detectors

Applications at SLS: protein crystallography, ptychography
Detector portfolio: single photon and charge integrating, strip-detectors and pixel detectors
Bonding process: FEMTO machine for placing, alignement, bonding
Pixel sizes: new Mönch detector - 25 micrometer, also larger gap-less modules

Prof. Dr.-Ing. Dominik Rabus, Portfolio Managt., Bürkert Fluid Control Systems (Germany)
Optofluidic System Technology

Bürkert: system integration company
Optofluidic systems: flipper valve for dosing, rocker valve for media separation, membrane pumps, pneumatic dosing
Applications: fluid control systems, optofluidic control system, microfludic board including syringe pumps
Book on optofluidics to be published in September by de Gruyter

Exhibitor elevator pitch (3 min) - IcoFlex
Exhibitor elevator pitch (3 min) – KNMF

10:30-12:00 **Novel Manufacturing Technologies I**

Keynote: Dr. Ralf Mauer, Business Development, **InnovationLab** GmbH (Germany)
Liquid processing in Organic Electronics

Materials, equipment, processes, applications
OLEDs, OPV, printed sensors, flexible logic
Vacuum technology (subtractive technology) - towards liquid processing, printing
InnovationLab: open access, partners, cluster partners: 30
Printing equipment

Materials: cynora GmbH - copper based materials, BASF replacement for silver ink
Equipment: spin-off from TU Darmstadt, fast 5 m/s, registration 4 micrometer, also Heidelberg machine
Processes: flexibel battery tester with OLED devices, thermal power generator by KIT
Developing applications: COLAE EU-project, standardization, end-user involvement

Dr. Giovanni Nisato, Business and technology development senior manager, **CSEM** (Switz.)
Printable electronics at CSEM

CSEM - non-profit, not production company, not university, but enabler, risk reduction
MEMS, surface engineering, systems, ultra-low power
Printable electronics - complicated field, different from Si-electronics
Cost per unit vs units produced (includes also Moore's law)
Competence plot for Switzerland - physically in Basel
Coating and printing techniques are available
Printable circuits, printable lighting, printable sensors (are reality - glucose)
Components and metrology, printable PV - EU projects and activities

Michiel de Bruijcker, Managing Director, **Formatec Technical Ceramics BV** (The Netherlands)
Additive manufacturing of full functional ceramic components

Printing functional components: ceramics and additive manufacturing
High complex ceramic components
Printing technology project at FORMATEC: joint project with partners
Material-printing-process
Powder+photosensitive resin, expose, de-binding and sintering, shrinkage approximately 20%
ADMAFLEX - Additive Manufacturing Technologies - new company
Examples, customers
Roadmap: ceramics, building size, metals

Exhibitor elevator pitch (3 min) - Microtechnics Alliance
Exhibitor elevator pitch (3 min) - Euris / Tousimis

13:30-15:00 **Novel Manufacturing Technologies II**

Juan Franco, Eichenberger AG (Switzerland)

Additive Manufacturing: a view into the future

Future of additive manufacturing, layer-by-layer
Stark Trek 35 years ago - today we can teleport objects.
Laser sintering, fused deposition modelling, stereolithography, selective lasermelting
Selective lasermelting at Eichenberger
Gold chain layer-by-layer from gold powder, alloys, precious metals
Development of powders, grain size
Advantages: no clamping systems or supports, no special programming, no delivery time for tools, very short delivery times, integration of functions in one production stage, liberty of design, small quantity of metal needed, cost independent of complexity, CNC is cheaper, but only if you have time and the design allows for CNC
Vision: future after sale service - only file for part needed
Build part near customer's place. Act global - produce local
Governments are investing
To come: special alloys, spare parts logistic
Consumer goods: mass production will decrease

Enric Sirera, Sales Director at **Ultrasion** (Spain)
Ultrasonics in Micro Molding

Ultrasonic molding
New technology - new opportunities
Molded plastic parts
Machines: principle stayed the same since along time.
Micro injection molding machines since 1995
New: 2010 ultrasonic molding machine for melting
Pressure, volume of raw material, material degradation, go green!
Pellets, ultrasound, injection, material is not pre-heated
Opportunities: dental tip, cap with filter - ear protection, contact holder - hearing aid device, eye retina surgery tip,...

Exhibitor elevator pitch (3 min) - Femto Engineering
Exhibitor elevator pitch (3 min) - Finetech / Pontago

15:30-16:15 **Invited Keynote on the Future of Micromanufacturing**

Dr. A. Frank de Jong, Director, Technology Partnerships, **FEI Company** (The Netherlands)
Electron and ion beam tools supporting nanotechnology

FEI – Eindhoven (NL, Hillsboro (US), CZ
Semiconductor industry, oil and gas, life science, science
Financials: 12% CAGR
Workflow solutions: electronics, natural resources, materials
From resolution to contrast improvements: sub-A resolution, 3D, also for SEM, also detector side, 3D SEM
Analytical results: new X-ray detector- sees even As dopants
Nano-prototyping: E-beam induced deposition – conductance of Pt lines, combination with ALD, direct-write ALD, contacting graphene, in-situ Raman for graphene, Fe-pillars (spintronic)

16:15-16:30 **Final Remarks**

Prof. Dr. Volker Saile, Chief Science Officer, **Karlsruhe Institute of Technology** (Germany) **President**, **Mancef**

Venue and Conference Dinner

Great – proven Concept

Conference Dinner

Thanks

Edward Byrne
Philippe Fischer
Suzanne Schwendener
Sikha Ray
VS

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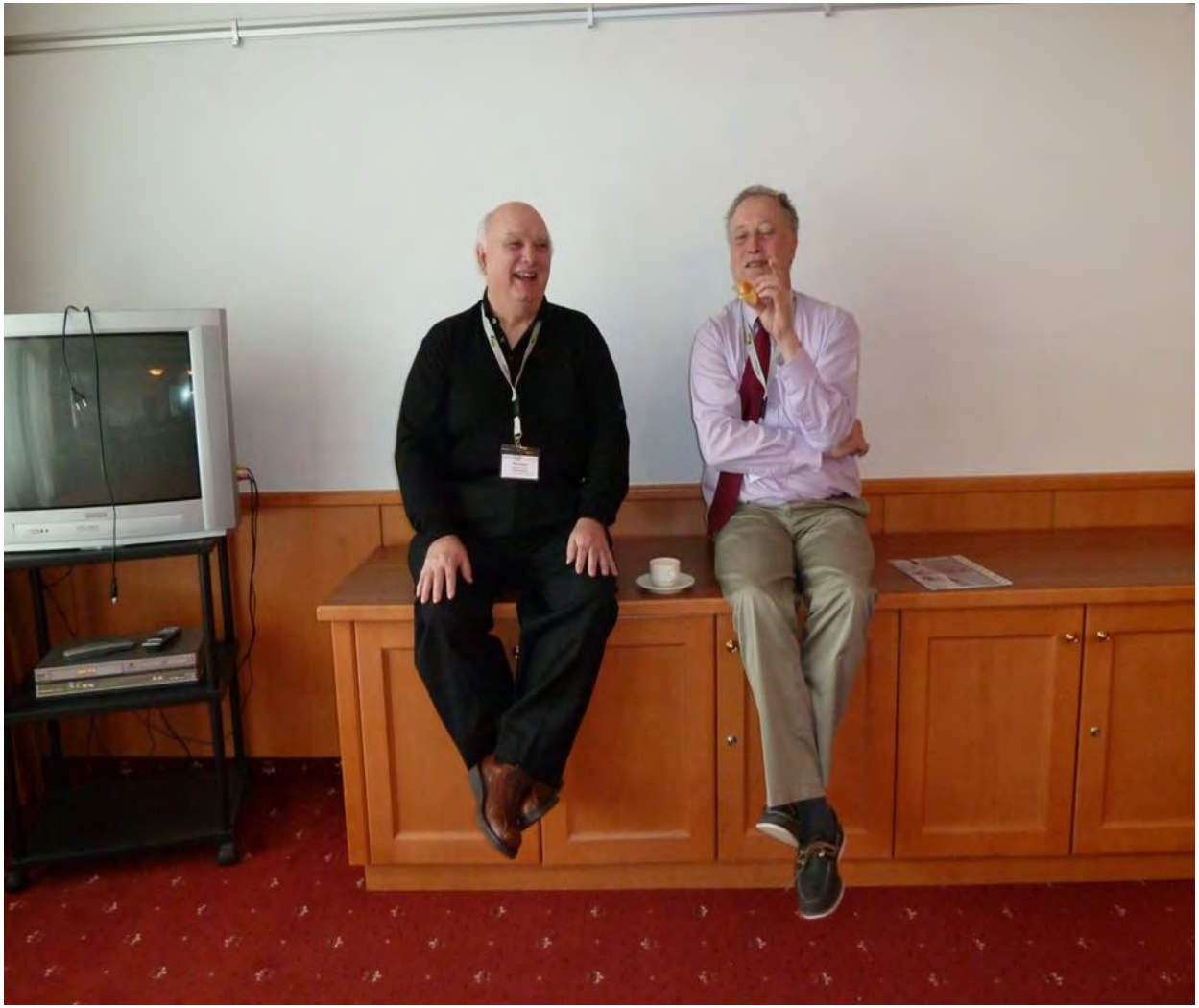
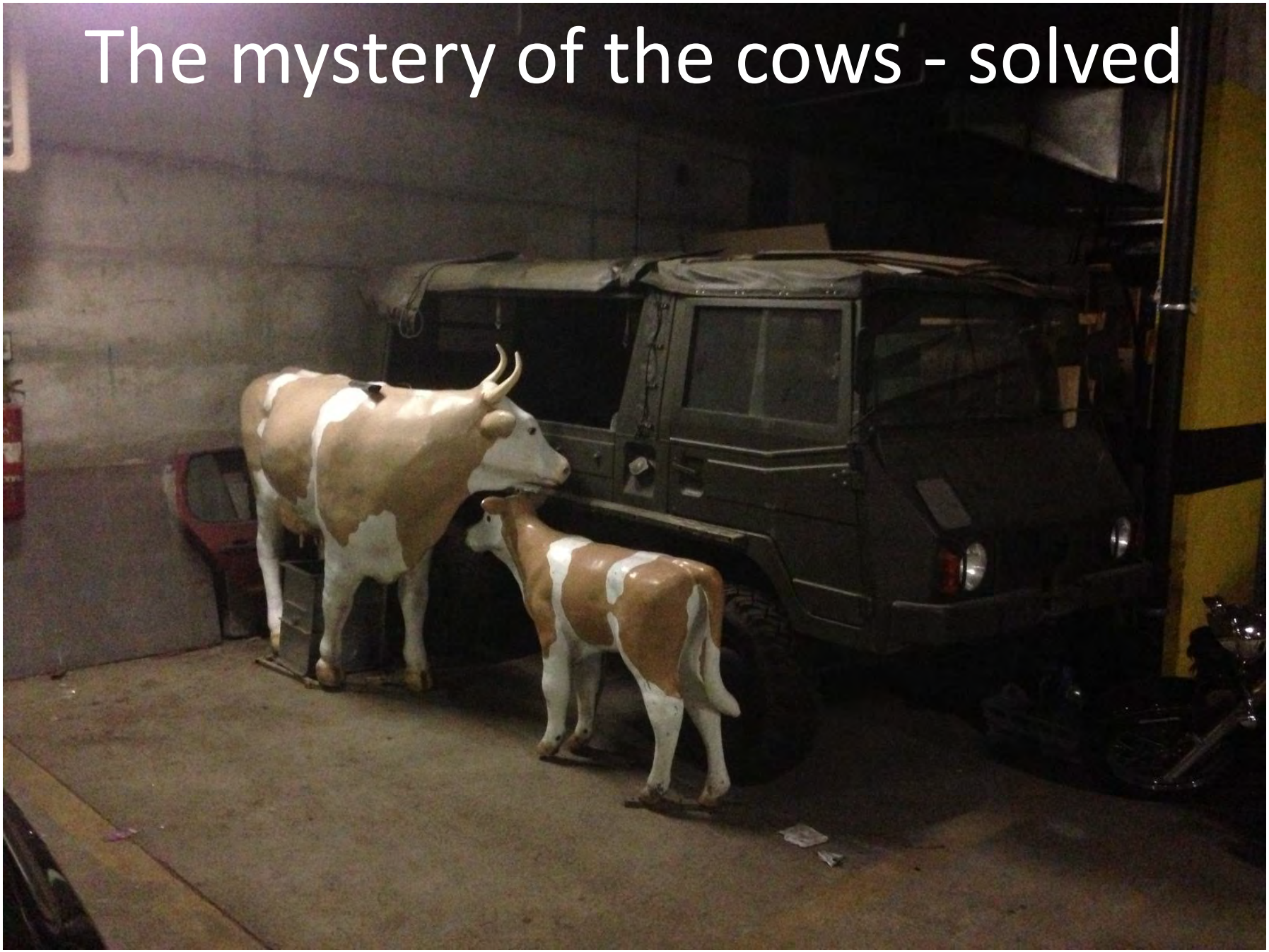
2012: Scenic view in the Swiss Alps

Ron Lawes



Great venue

The mystery of the cows - solved



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Thank you!

Exhibitors

Thank you!

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