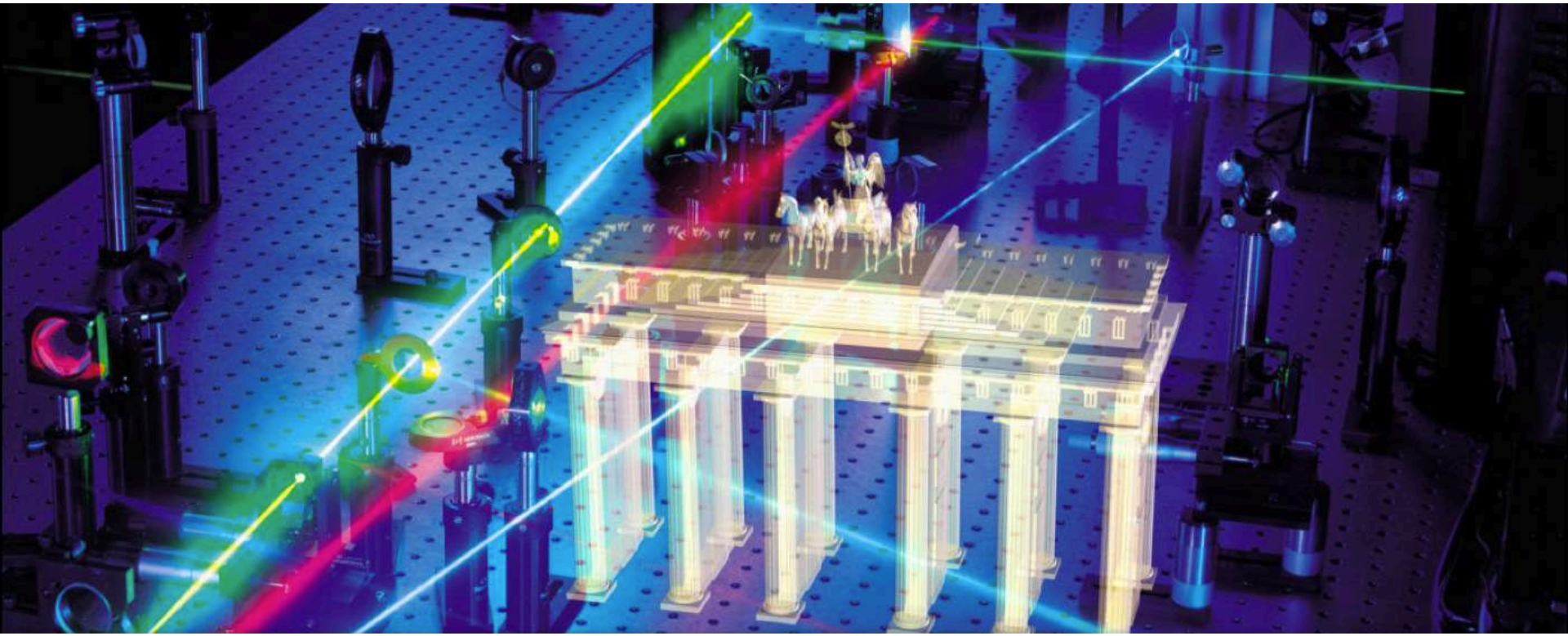
OpTecBB

Photonics in the German Capital Region

28 November 2019

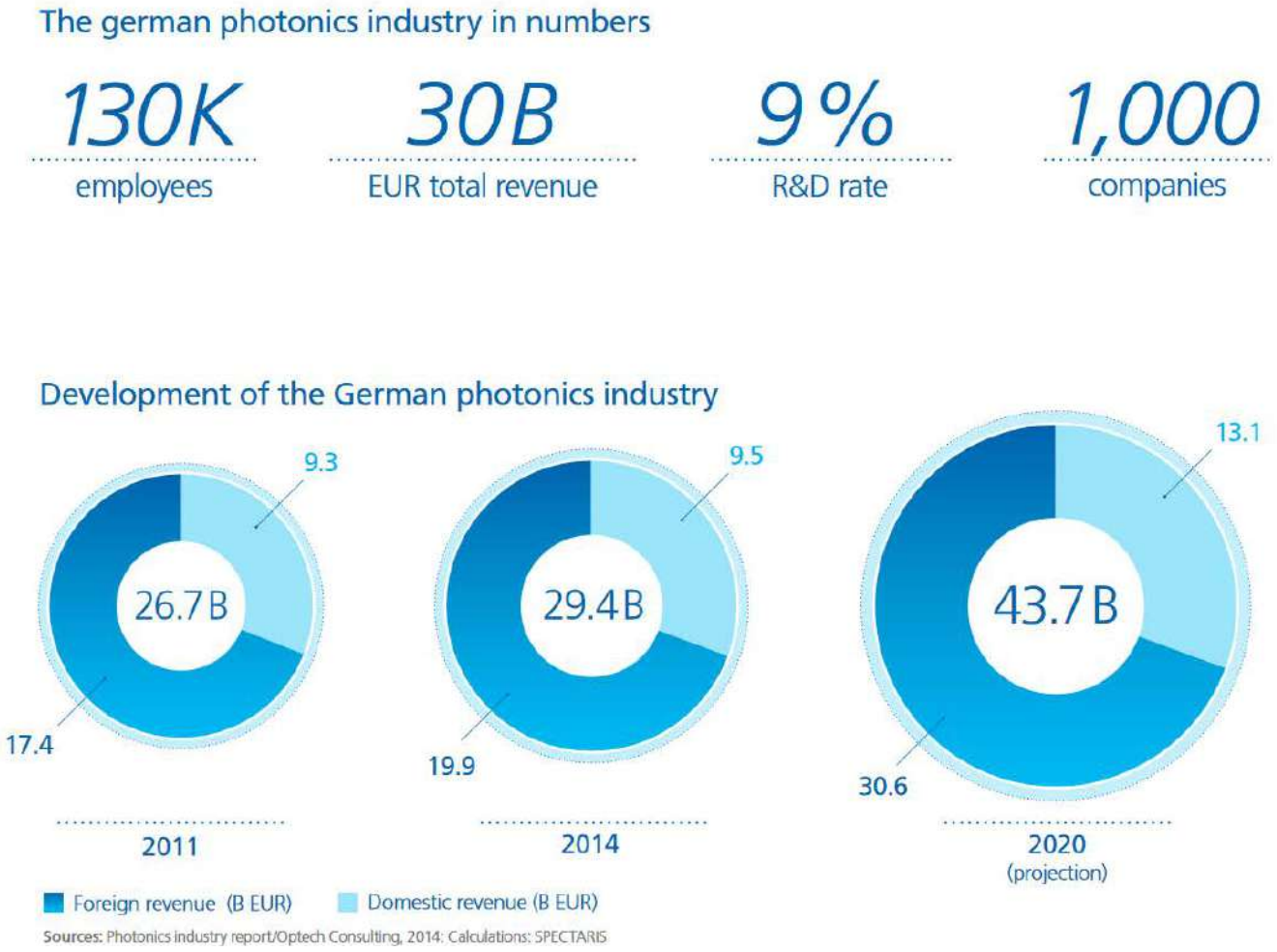
Dr. Janina Bolling (OpTecBB e.V.)



Industry/market data photonics in Germany

OpTecBB

The Photonics Industry in Germany



Photonics Networks in Germany

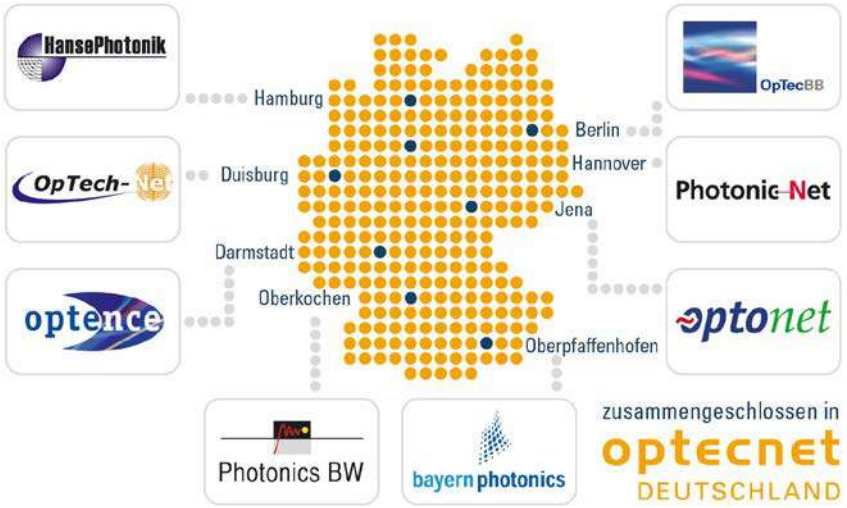
OpTecBB

OptecNet Deutschland – An interregional national Meta-Network

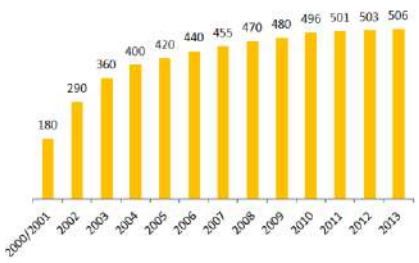
– More than 500 members in the eight regional networks

– Services of OptecNet Deutschland for ist members

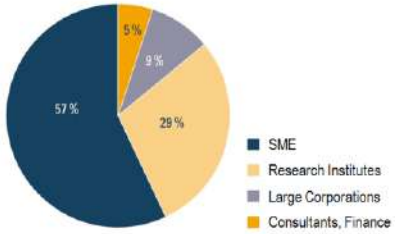
- Annual conference
- Workshops/further education (discounts for members)
- Start-up Challenge
- Photonik magazine Abo
- Participation in EU projects (H2020 CSA)
- Public Outreach, dissimination
- Consultation at national level (BMBF, BMWi DPG, …) and international (OSA, SPIE, IOA…)
- Partnerships with events/congresses, trade fairs
- Job board
- Web and social media communities
- …



OptecNet Deutschland e.V.
has the most members of all the Photonic associations in Germany



Membership development 2000 - 2013



Member structure: 57% SME

About OpTecBB

- Optec-Berlin-Brandenburg (**OpTecBB**) e.V. is ***the competence network*** for optical technologies and micro systems technologies in the federal states of Berlin and Brandenburg.
- **OpTecBB e.V. is and initiative of companies and research institutions in Berlin and Brandenburg that collaboratively explore and exploit the possibilities of these technologies**
- OpTecBB e.V. was **founded** on **September 14th 2000** by **companies, universities, research institutions and associations** and with the support of the **Berlin Senate** and the relevant **ministries in Brandenburg**
- **Today** the association has about **120 institutional members.**
- National collaboration in **OptecNet Deutschland** (more than 500 member organizations)
- Member of **go cluster** (former Kompetenznetze.de)
- Member of **European Photonics Industry Consortium** (EPIC) and engaged in **Photonics21**
- Awarded with the **Bronze Label** of **Cluster Management Excellence**

About the Berlin Photonics Cluster

OpTecBB

- Photonics has a **200 year tradition** in Berlin and Brandenburg.

- The innovative core of the cluster:
  - **390 technology oriented companies** (298 in Berlin and 92 in Brandenburg)
  - **10 universities and 26 non-university research organizations** (11 in Brandenburg and 25 in Berlin).

- **Approx. 16.600 employees** and approx. **2,8 bn. Euro revenues**

- Annual **growth (revenues)** on average **5 to 8%, export share 70 %, R&D share almost 10 %**.

- **Competences**
  - Lighting technology,
  - Laser technology,
  - Sensors, metrology and optical analytics,
  - Biomedical optics,
  - Ophthalmology,
  - Optical communication,
  - Microsystems technology,
  - Displays and components.

Support to Members

- recruitment,
- qualification,
- internationalization, market access,
- start-up support, mentoring,
- public relations, location marketing,
- consultation to politics, lobbying,
- cluster management.

OpTecBB members 2016

OpTecBB

Status: 03/2016

Organization of the focus areas

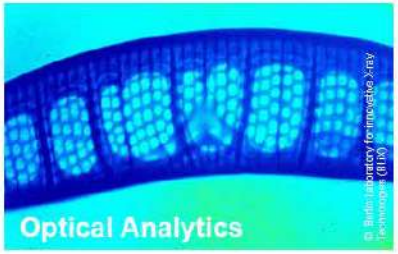
OpTecBB

LAND BRANDENBURG

be Berlin

Technological Focus Areas

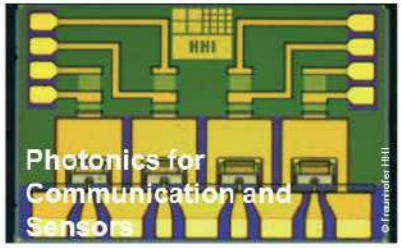
- Beam sources & guidance systems
- material processing/ selective laser melting
- Medicine/ Biotech
- Communication/ data
- measurement technology
- Laser components and materials



- UV / x-ray / IR/ THz technology
- Process metrology
- Spectroscopy

- Smart lighting
- Semiconductor light sources
- Applications in mobility, therapy, wearables, design, architecture etc.

- Ophthalmic optics
- Image processing
- Diagnostics



- Photonic components for data and telecommunication
- Sensor and measurement technology
- Quantum technology
- Visible light communication (VLC)
- System integration

- Packaging
- Interconnection technology
- Reliability

Organization of the focus areas

OpTecBB


Photonics and quantum tech for communication and sensors
Dr. Henning Schröder
(FhG IZM)

Support
Dr. Frank Lerch
(OpTecBB)

Active Group
Schell (FhG HHI), Kropp (InBeCon), Roth (ADVA), Graurock (Fisba), Krutzek (FBH), Hofmann (Tektronix), Daedlow (Finetech), Schuhmann (Berliner Glas), Schiefelbein (Siemens), Grallert, Schulz, …


Micro systems technology

Peter Krause
(First Sensor AG)

support
Dr. Frank Lerch
(OpTecBB)

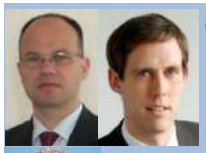
Active Group
Lang (FhG IZM), Oberschmidt (TUB), Schenk (FhG IPMS), Lancki (Lancki), Mai (IHP), Jung (VDE), Luxem (Pepperl & Fuchs), Kürbis (Finetech), Paschke (FBH)


Lighting technology

Prof. Dr. Stephan Völker
(TU Berlin)

support
Dr. Frank Lerch
(OpTecBB)

Active Group
Jordan (FhG IZM), Mahlkow (OUT), Schumacher (TUB), Rotsch (OSA), Hufnagel (Siemens), Lancki (Lancki), Rupp (DRIVERY), Smida (LichtKunstLicht)




Optical analytics
Dr. Michael Kolbe
(PTB)
Prof. Dr. Stefan Kowarik
(BAM)

support
Dr. Frank Lerch
(OpTecBB)

Active Group
Beckhoff (PTB), Kanngießer (TUB), Hertwig (BAM), Stiel (MBI), Esser (ISAS), Boslau (Bruker), Kemmler (greateyes), N.N.(Sentech), Hübers (DLR), Schiller LTB, Löhmannsröben (Uni P), Haberland (Laytec)


Biophotonics and ophthalmology
Prof. Dr. Justus Eichstädt
(FH Brandenburg)

support
Dr. Frank Lerch (OpTecBB)
Dr. Anne Techen (WFBB)

Active Group
Dietze (Beuth), Sichting (Berliner Glas), Berlien (EK), Macdonald (PTB), Graurock (FISBA), Eichler (TU Berlin), Feld (C. Zeiss Meditec), Kleinert (FhG HHI), Zude-Sasse (ATB)


Laser technology

Thomas Beck
(Siemens & Laserverbund)

support
Gerrit Rössler
(BPWT)

Active Group
Ringlhan (LaserPhoton), Sowoidnich (FH Brandenburg), Metge (OWIS), Raab (Raab Photonik)

OpTecBB Activities - Workshops

Workshops 10/11 2019

OpTecBB

© Fraunhofer IZM (Assembled nano-spectrometer for medical diagnostics, EU H2020 project InSpect)

Die Sensorikbranche in Berlin-Brandenburg zeichnet sich durch eine hohe Diversifizierung bei den Produkten und in der Kundenstruktur aus. Der Einsatz von photonischen Sensoren wird dabei immer vielfältiger. Die Ursachen dafür sind im Wesentlichen die Vielfalt der Anwendungsgebiete und sensorischen Prinzipien sowie die überlagernden Trends hin zu stärkerer Miniaturisierung und Integration bei zumeist hohem Kostendruck. Der Workshop bietet Einblick in ausgewählte Themen mit dem Schwerpunkt auf die Systemintegration und kommerzielle Umsetzung und bietet Gelegenheit zur Diskussion mit den Vortragenden und unter den Teilnehmern.

WORKSHOP

PHOTONISCHE SENSORIK aus Berlin Brandenburg

28. Oktober 2019

Anlässlich des MST-Kongresses
Estrel Hotel Berlin
Sonnenallee 225
12057 Berlin

THE GERMAN CAPITAL REGION
excellence in photonics

Veranstalter: OpTecBB in Kooperation mit: Fraunhofer IPK LASER VERBUND

© Foto: FhG IPK

Workshop: additive manufacturing and analysis of printed structures

The International Workshop on Additive Manufacturing Technologies is an initiative of the Optec-Berlin-Brandenburg e.V. (OpTecBB) and the Fraunhofer Institute for Production Systems and Design Technology IPK in Berlin, aiming to foster the interaction of local and global players active in the field of Additive Manufacturing. Creation and strengthening of business relationships as well as R&D partnerships and strategic cooperation between academia, research organizations and industry are the focus of this initiative. The workshop will present the latest developments on several topics of the Additive Manufacturing value chain: from machinery/systems and respective processing technologies to quality inspection and final application in the sectors of aerospace, energy and metal working, among others. We are looking forward to welcoming you at the International Workshop on Additive Manufacturing Technologies!

Date: Dienstag, 04.11.2019

Venue: Fraunhofer-Institut für Produktionsanlagen und Konstruktionstechnik IPK
Pascalstraße 8-9, 10587 Berlin

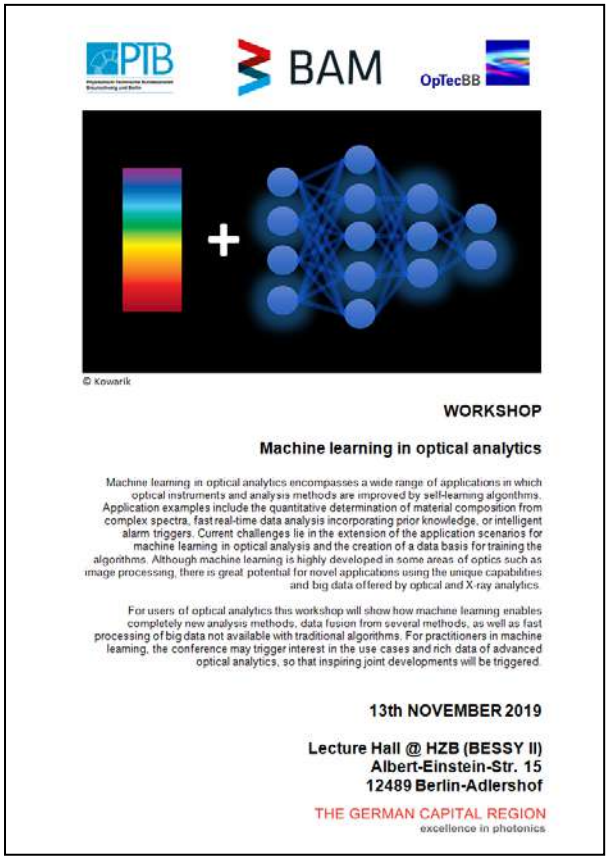
A workshop for: Specialists and executives from manufacturing and R&D departments interested in Additive Manufacturing technologies

Further information: The workshop language is English. There will be admission charges.

Registration to: https://optecbb.de/veranstaltungen/veranstaltung/workshop-additive-manufacturing-and-analysis-of-printed-structures-1051/

Contact: OpTecBB office (optecbb@optecbb.de, +49 30 6392 1720)

Admission: 150,00 (excl. VAT) for members*, 300,00 (excl. VAT) non-members*
*) members of one of the innovation network optical technologies OptecNet Germany & IVAM



PTB BAM OpTecBB

© Kowarik

WORKSHOP

Machine learning in optical analytics

Machine learning in optical analytics encompasses a wide range of applications in which optical instruments and analysis methods are improved by self-learning algorithms. Application examples include the quantitative determination of material composition from complex spectra, fast real-time data analysis incorporating prior knowledge, or intelligent alarm triggers. Current challenges lie in the extension of the application scenarios for machine learning in optical analysis and the creation of a data basis for training the algorithms. Although machine learning is highly developed in some areas of optics such as image processing, there is great potential for novel applications using the unique capabilities and big data offered by optical and X-ray analytics.

For users of optical analytics this workshop will show how machine learning enables completely new analysis methods, data fusion from several methods, as well as fast processing of big data not available with traditional algorithms. For practitioners in machine learning, the conference may trigger interest in the use cases and rich data of advanced optical analytics, so that inspiring joint developments will be triggered.

13th NOVEMBER 2019

Lecture Hall @ HZB (BESSY II)
Albert-Einstein-Str. 15
12489 Berlin-Adlershof

THE GERMAN CAPITAL REGION
excellence in photonics

OpTecBB Activities - Photonics Days

Photonics Days
Berlin Brandenburg 2020, October 7-8

WISTA, Berlin-Adlershof

Preliminary program

© WISTA


© WISTA

October 7th	October 8th
OIDA topical meeting	Quantum Optics (Sensorik)
Dutch German PIC Workshop	HECMIR Laser Workshop
German Israeli AgriPhotonics symp.	Faseroptik
LVBB Workshop	Optics manufacturing
HZB Workshop nanophotonics/solar	HZB Workshop nanophotonics/solar

Start-up support

Start-up support

- Photonics start-up monitoring
- Free membership (three years)
- Mentoring
- Inclusion of photonics start-ups in workshop programs
- Photonics Start-up challenges
- Seminars with photonics start-ups at TU Berlin
  - Berlin --> Start-up Capital
  - OpTecBB/Cluster needs new companies
  - Companies needs new ideas/innovations
  - ecxellent conditions for formations of companies in Berlin Brandenburg

Challenge:

Data collection of plant material for knowledge-based, locally adapted, and sustainable plant production using optical and photonic methods

Tasks:

- **Optical measurements of soil parameters**
- **Identification of plant conditions**
- **Determination of growth factors (e.g. water content and water status)**
- **Analysis of biomass development**
- **Detection of plant diseases and pathogen organisms**
- **Detection of beneficials**
- **Detection of foreign objects and materials**

- **…**

ZIM network international

OpTecBB

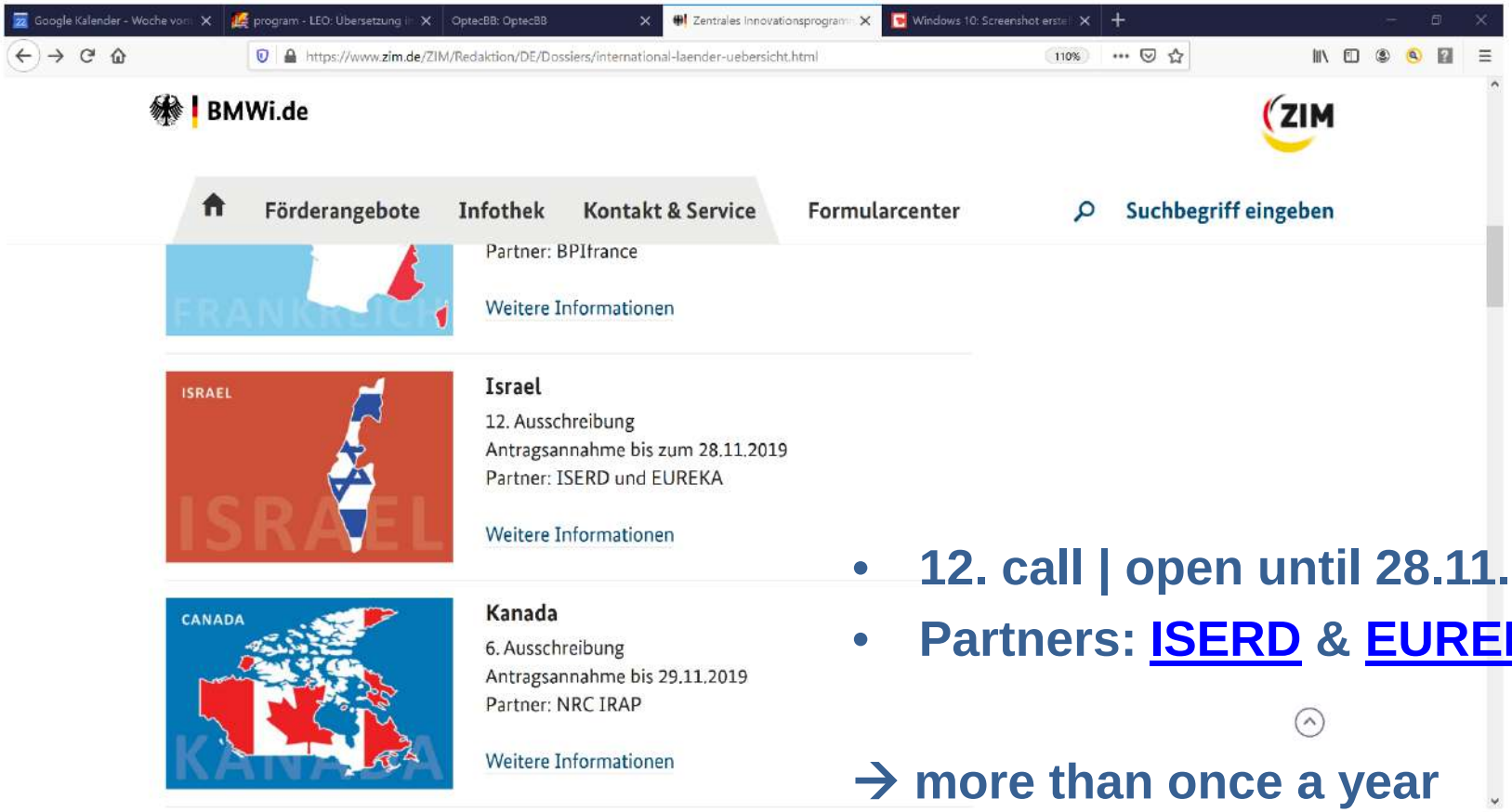
"ZIM" - Zentrales Innovationsprogramm Mittelstand:

Central Innovation Programme for small and medium-sized enterprises (SMEs): a funding programme of the Federal Ministry for Economic Affairs and Energy aiming to foster the innovative capacity of SMEs and thus to contribute to economic growth and the creation of new jobs.

ZIM - International Network

- **minimum: 4 SMEs in Germany + 2 international SMEs + research and technology organisations (RTOs)**
- **2 steps of funding:**
  - **1) 1,5 year: maximum 190.000 € (95% funding quota)**
  - **2) year 2-3: declining funding quota: 80%, 60% and 40% respectively**
  - **A total of 450.000€ for both steps (maximum 4,5 years)**
- **ZIM programme provides financial support only for the German partners involved. International organisations (coordinators, companies, RTOs and others) are responsible for their own funding.**

ZIM international cooperation projects



- **12. call | open until 28.11.2019**
- **Partners: ISERD & EUREKA**

→ **more than once a year**

AgriPhotonics - Projekt management

OpTecBB

OpTecBB

ATB
Leibniz-Institut für
Agrartechnik und Bioökonomie

Photonics Israel
The Association of Photonics Industries in Israel

OpTecBB e.V.	ATB	Photonics Israel
Optec-Berlin-Brandenburg (OpTecBB) e.V. Rudower Chaussee 25 12489 Berlin Dr. Frank Lerch Dr. Janina Bolling +49 30 6392 1720 lerch@optecbb.de bolling@optecbb.de www.optecbb.de	Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB) Max-Eyth-Allee 100 14469 Potsdam-Bornim Dr. Manuela Zude-Sasse +49-331-5699612 mzude@atb-potsdam.de www.atb-potsdam.de	Photonics Israel 29 Hamered Tel-Aviv Haim Rousso

Cooperation with Israel

iCampus COTTBUS

BERLINER GLAS BERLINER GLAS GROUP

SWISSOPTIC BERLINER GLAS GROUP

Technische Universität Berlin

Cooperation Partners

Fraunhofer IZM

Universität Potsdam

SENTECH Erfolg durch Leistung

Hahn Schickard

YOUR PARTNER FOR OPTICAL OEM SOLUTION.

FROM CONCEPT TO VOLUME PRODUCTION.

The Berliner Glas Group is one of the world's leading providers of optical key components, assemblies and systems, high-quality refined technical glass as well as glass touch assemblies.

With its understanding of optical systems and optical production technology, the Berliner Glas Group develops, produces and integrates optics, mechanics and electronics into innovative system solutions for its customers.

With more than 1,500 qualified and experienced employees the Berliner Glas Group develops and produces optical system solutions at five locations in Germany, Switzerland and China.





SPECIALIZED IN SELECTED MARKETS.

WE HELP OUR CUSTOMERS TO ACCELERATE INNOVATION.

Semicon

- Lithography
- Wafer handling
- 3D Integration
- Coating
- Inspection
- Metrology

Photonics Solutions

- Space
- Laser technology
- High-precision optical components

Metrology

- Geodesy
- Photogrammetry
- Industrial surveying
- Industrial metrology

Medical Applications

- Ophthalmology
- Dentistry
- Endoscopy
- Life Sciences

Technical Glass

- Display glass and glass touch assemblies
- Glass for devices
- Structured surfaces

BUSINESS UNIT METROLOGY.

MARKETS AT A GLANCE.

1) **Surveying** (Theodolites)
2) **Laser Scanner**
3) **Airborne & LiDAR Systems**
4) **Industrial Metrology** (Laser Tracker / White Light Scanner)

Geodesy

Photogrammetry

Industrial Surveying

existing market segments

Industrial Metrology

1) **Optical Sensors & Measurement Lenses**
2) **Hyperspectral Imaging**
3) **Precision Farming** Measurement Systems for agriculture

additional market segments

Customized components and opto-mechanical systems according to customer requirements. No off the shelf optics but pure OEM.

SENTECH

SENTECH Erfolg durch Leistung

Private company founded in 1990

85 employees

ISO 9001 (2015) certificated

Business fields

Thin Film Metrology

Plasma Process Technology

Strengths:

Low damage processing of compound semiconductors
for III-V and II-VI, laser, VCSEL, µ lenses, waveguides, …

Non-invasive optical metrology
ellipsometry, reflectometry

Partner for equipment and technology
Application support, Application labs
Service

SENTECH Instruments GmbH (Berlin)

SENTECH GmbH (Krailling near Munich)

TU Berlin – Member of AgriPhotonics

Technische Universität Berlin - Forschungsschwerpunkt Technologien der Mikroperipherik
Gustav-Meyer-Allee 25, 13355 Berlin - in cooperation with Fraunhofer IZM

www.tmp.tu-berlin.de

contact:

gunnar.boettger@campus.tu-berlin.de

In cooperation with TU Berlin – sharing resources

Fraunhofer IZM – World-class High Tech Environment

10,700 m² laboratory space

70 laboratories & measuring rooms

7,071 units of equipment

in 2018
3.7 million €
Infrastructure investments

locations
Berlin and Dresden
(additional facilities)

LABORATORY TYPES

- LAB OF INTEGRATION AT WAFER LEVEL
- LAB OF INTEGRATION AT SUBSTRATE LEVEL
- ADVANCED SYSTEM ENGINEERING LAB
- MATERIALS, RELIABILITY AND SUSTAINABLE DEVELOPMENT LAB

Technische Universität Berlin

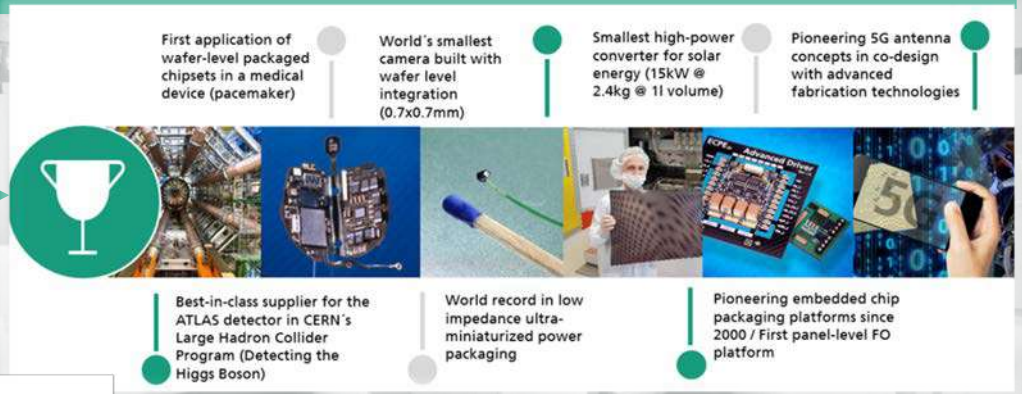
Fraunhofer IZM

In cooperation with TU Berlin – sharing resources

Fraunhofer IZM – World-class High Tech Environment

RESEARCHING THE PRODUCTS OF TOMORROW

BREAK TROUGH SOLUTIONS IZM



- Projects from Start-Up to Main Players
- Bundled Core Competences of 4 FhG Institutes for Bio, Tech & Energy
- Patent for Plant Metabolism Indication
- Long Term Reliable Assembly Technologies
- Water Resistant Illumination & Sensing

STRATEGIES IN AgriPhotonics

Technische Universität Berlin

Fraunhofer IZM

Combining synergies in the Berlin area

Four high-class institutes are combining there strengths together in Cottbus at BTU Cottbus-Senftenberg

Starting conditions: 40 scientists, 7.5 million €, 26 months

High-class quality in MEMS sensors, wireless systems, system integration and circuit design is used

iCampus
COTTBUS

www.b-tu.de/icampus

Special solutions in sensor technology require Know-how

Research & Development

Fraunhofer IZM

ihp innovations for high performance microelectronics

b-tu Brandenburgische Technische Universität Cottbus - Senftenberg

Leibniz FBH Ferdinand Braun Institut

Fraunhofer IPMS

iCampus COTTBUS

Industry & Society

Special and customer oriented applications require specific sensor solutions

Example: Integrated, aseptic pH-value-sensor for process engineering

Industrial needs:

Miniaturization, connectivity, integration, functionality, energy efficiency, cost efficiency, adaptivity, …

Focus on transfer into industrial applications

Two projects with focus on photonics

Development of new Si-based gas sensors

R&D at new concept of photonic sensors

- new *Si-Fotodiode with higher sensitivity in NIR (>1100 nm)*
- *usage of cost-efficient common CMOS-processes*

- Concept: Usage of photonic and plasmonic nanostructures

Real life lab µ-spectra

- Development of **miniaturized Resonance Raman measuring system**
- Key technical feature: avoidance of a spectrometer
- Combining expertise in Laser (FBH) – MEMS arrays (IPMS) – detector (IHP)
- Use case: Small detection systems for *Agar 4.0* or Process analysis

www.b-tu.de/icampus

Your contact:

Prof. Harald Schenk
Fraunhofer IPMS
Project director
T +49 (0) 355 69 3693

harald.schenk@ipms.fraunhofer.de

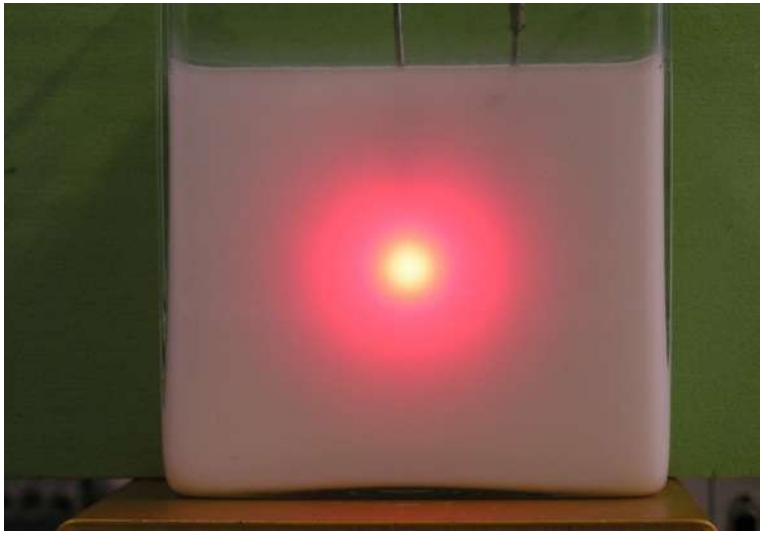
www.fraunhofer.ipms.de

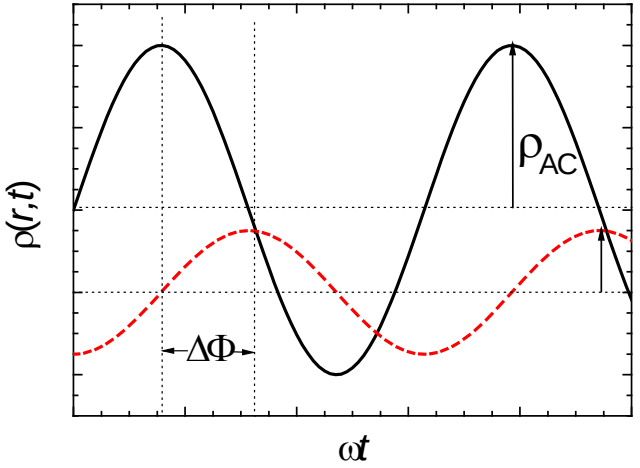
M.Sc. Jonas Pantzer
Fraunhofer IPMS – BTU Cottbus-Senftenberg
Innovation Management
T +49 (0) 355 69 3693

jonas.pantzer@ipms.fraunhofer.de

www.b-tu.de/icampus

Spectroscopy & Imaging of/in highly turbid media





- Frequency domain, intensity modulated light propagates spherically outward from the source through turbid medium
- Multiple scattering conditions
- On-line monitoring system for the real-time independent examination of absorption and scattering properties of turbid media (μ_a and μ'_s)

Abundance and importance of nano- and microstructured materials in nature: all are higly turbid

Biological tissue and suspensions (algae, bacteria, fungi)

Soil (sand, clay, organic matter)

Foodstuff (milk and milk products, ketchup, fruit juice)

Optical Spectroscopy & Imaging in highly turbid media

Hans-Gerd Löhmannsröben, innoFSPEC Potsdam & UPPC
Roland Hass, PDW Analytics GmbH

University of Potsdam
Institute of Chemistry - Physical Chemistry

Prof. Dr. Hans-Gerd Löhmannsröben

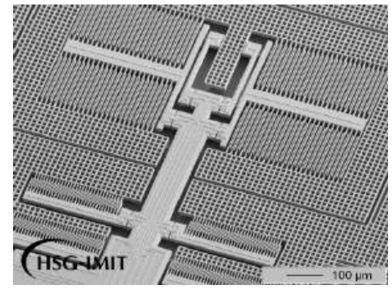
University of Potsdam
Institute of Chemistry
Physical Chemistry
Karl-Liebknecht-Str. 24-25
14476 Golm

Tel: ++49 / 331 / 977 5222
Fax: ++49 / 331 / 977 6137
email: loeh@chem.uni-potsdam.de
Web: https://www.chem.uni-potsdam.de/groups/pc/index_en.htm

Hahn-Schickard-Gesellschaft für angewandte Forschung e.V.

Hahn-Schickard at Villingen-Schwenningen

Two Cleanrooms



MEMS-based gyroscopes

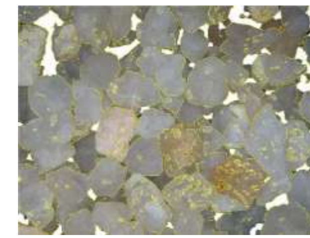
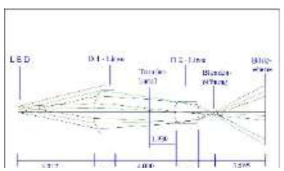


Image processing about soil samples

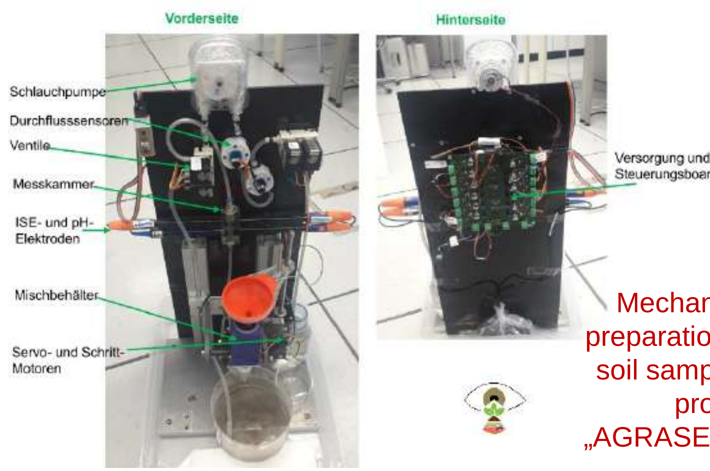


Asperical lenses: Raytracing

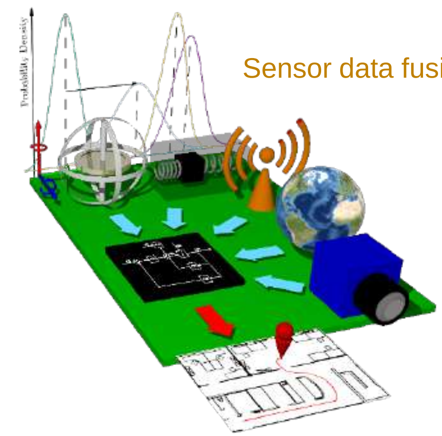
(Measurement of drop diameters)

Lenses designed by Hahn-Schickard

3 D-Printing of housings



Mechanical preparation of soil samples, project „AGRASENS“



Sensor data fusion

Presentation about Hahn-Schickard - 28.11.2019 - AgriPhotonik

Hahn-Schickard-Gesellschaft für angewandte Forschung e.V.

Contact details

Hermann Scheithauer
Hahn-Schickard

Wilhelm-Schickard-Straße 10
D-78052 Villingen-Schwenningen

Tel. +49 7721 943 135
E-Mail: Hermann.Scheithauer@hahn-schickard.de
Web: www.hahn-schickard.de

Thanks!

Q & A …

Contact details

Dr. Janina Bolling
Dr. Frank Lerch
OpTecBB e.V.
Rudower Chaussee 25
12489 Berlin

Tel.: +49 30 6392 1727
Mail: bolling@optecbb.de
Mail: lerch@optecbb.de
Web: www.optecbb.de