



RhySearch
The Rhine Valley Research
and Innovation Centre

www.rhysearch.ch

Who we are

■ Public Research Institute

- Established on April 1, 2013/ 26 employees (as of March 2024)
- Funding Bodies: Canton of St. Gallen and Liechtenstein
- Eligible for Innosuisse funding since 2017

■ Industry partner for research and innovation support

- Facilitating the connection between business and academia
- Providing research as a service to initiate high-tech products and processes
- Board of directors composed of industry and research representatives
- The industry advisory board consolidates the interests and research needs of regional companies
- Supported by an internationally diverse scientific advisory board

Where we are – the Alpine Rhine valley:

- 
- One of the top 10 high-tech regions in Europe
 - Optical and microtechnological Industry
 - Vacuum thin-film industry

What we do

Basic Research

Applied R&D

Scaling

Market success

RhySearch: Innovative Projects



Optical Coating and
Characterization Lab

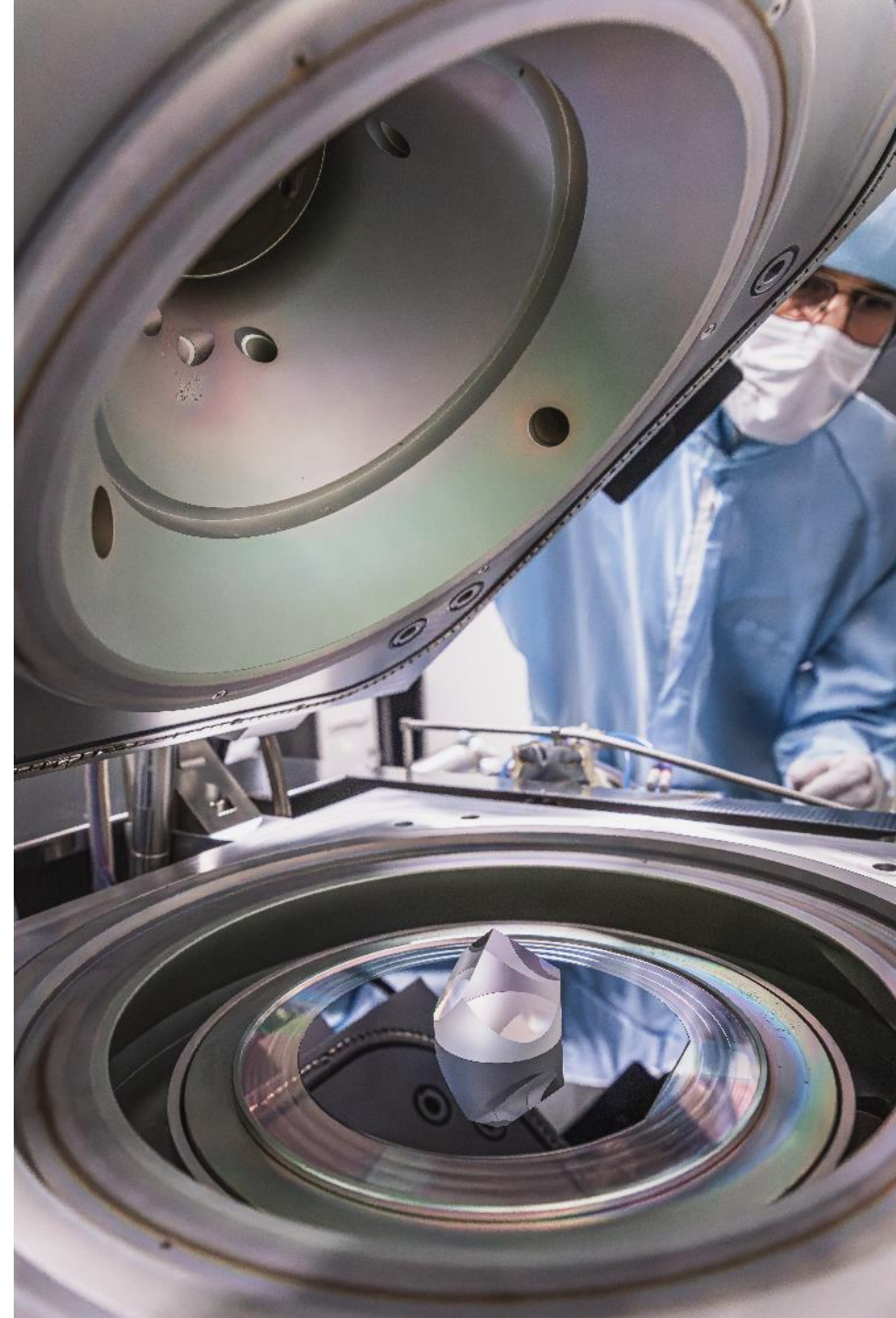


Ultra-Precision
Manufacturing Lab



Digital Innovation
Lab

Optical Coating and Characterization Lab



The Swiss and Liechtenstein Center of Excellence for Optical Coatings and Characterization

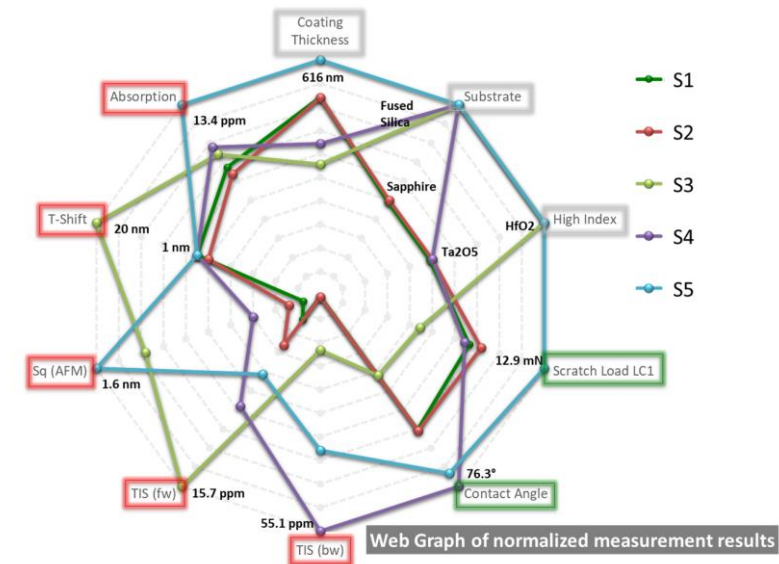
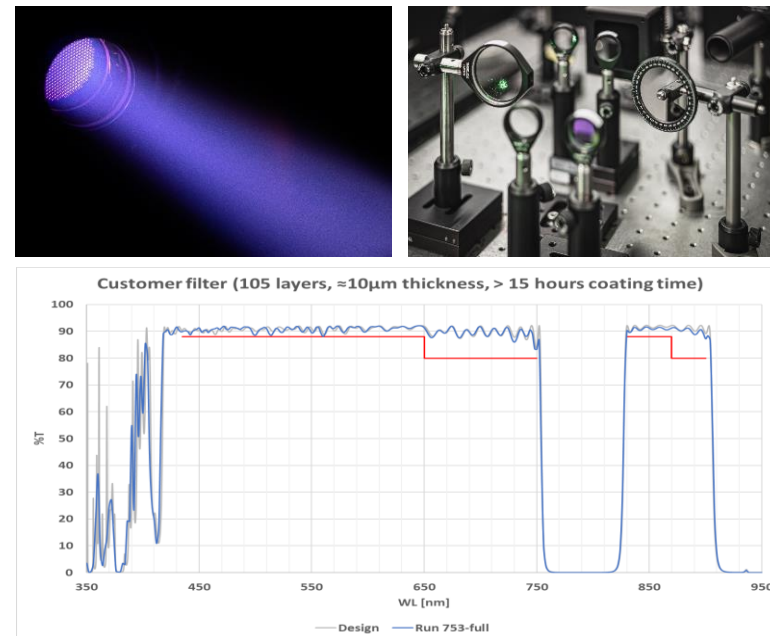
- Innovative solutions along the optical manufacturing chain
 - Substrate preparation, cleaning, and post-treatment
 - Coating: Development of dielectric materials with novel optical properties
 - Research into the industrialization of new coating technologies for the optics industry
 - Quality control using highly precise characterization techniques
- Expert knowledge and state-of-the-art infrastructure
- A wide range of services in the areas of measurement, substrate treatment, and coating
- Member of EPIC, Swissphotonics, Swissvacuum, Photonics Austria and the Swissmem Photonics Specialist Group



Mission



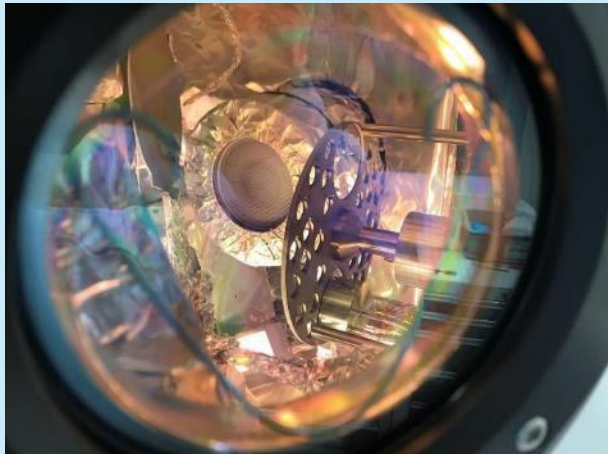
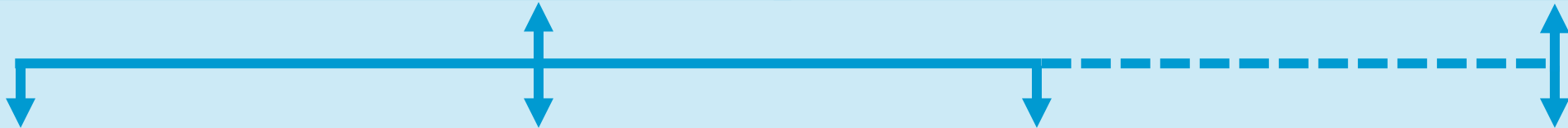
- Design, manufacture and characterization of **complex, high-quality coatings** such as
 - steep filter characteristics with highly complex coating design
 - reproducible ultrathin ITO layers
 - coating process development for 2D materials
- **Combination** of optical coating with measurement technology and analytics!
- **Characterization Center** with unique measurement equipment for low-loss coatings, surfaces and broad-based analyses of individual optics
- Unrivalled expertise in ultra-precision manufacturing and optical coating **at one location**



Coating Center



Characterization
Center



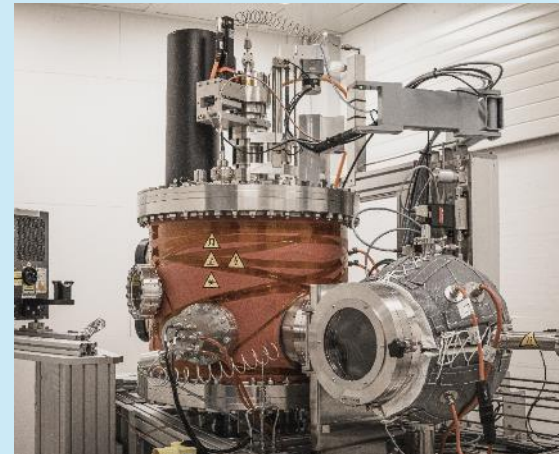
DIBS – Ion Beam Sputtering System

Production of precise optical thin-film interference coatings.



Atomic Layer Deposition System

Key technology for coating freeform and highly curved geometries.



Flexible Research Facility

Cutting-edge coating system featuring pulsed laser deposition and ion beam sputtering.



Process Monitoring and Analytics

A wide range of measurement tools for precise, low-loss, and standard coatings. Unique in Switzerland.

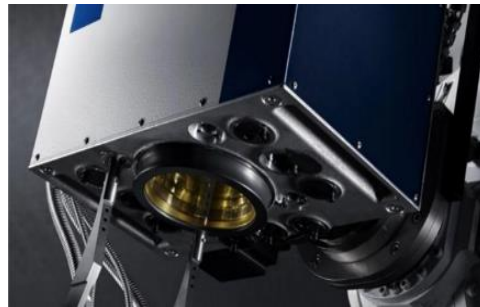
Optical Coating and Characterization Lab

Application examples:

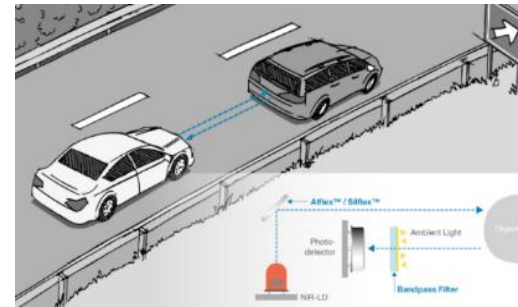
High concentration of manufacturers and users of optical thin films, components and coating equipment



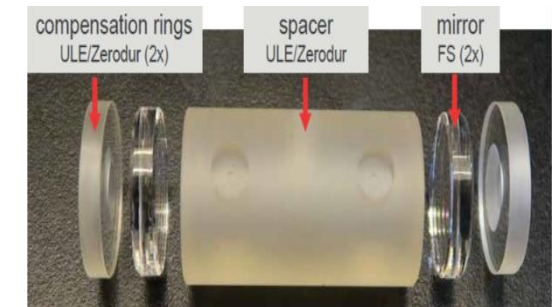
Coatings for biometric sensors produced with Evatec equipment



Processing optics for lasers from TRUMPF



Coatings for driver assistance systems from Materion Balzers Optics



Ultra stable lasers for gravitational wave detection from WZWOptic



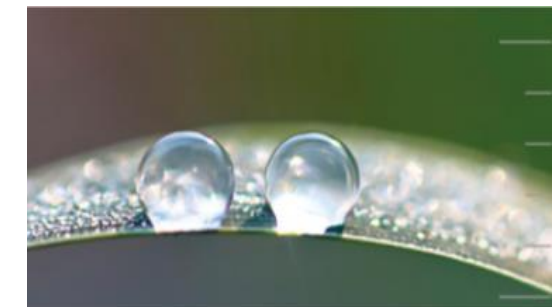
Optics for endoscopy from FISBA



Coated lenses for imaging and cameras from SwissOptic

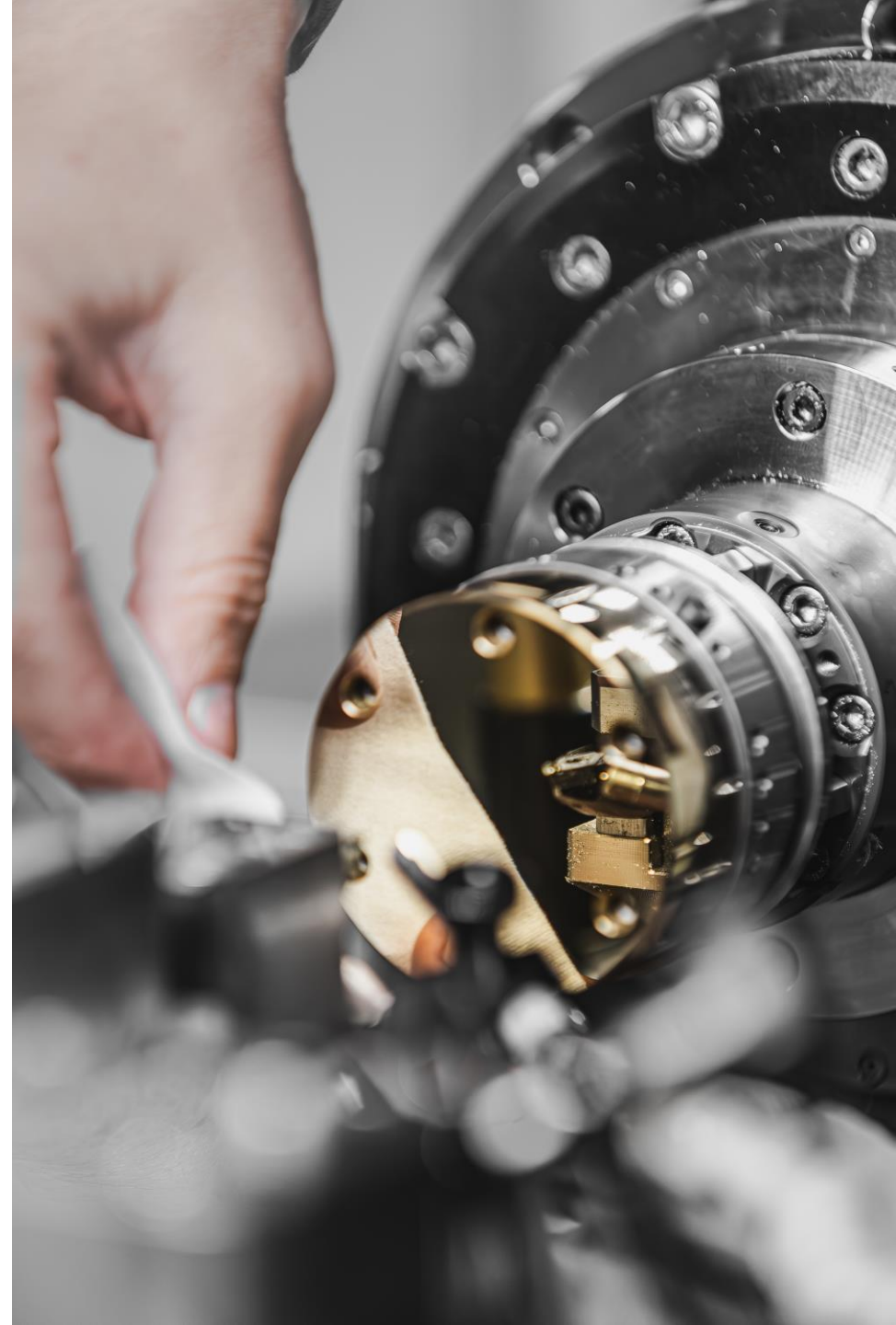


Coatings for telescopes from SCHOTT



Easy-to-clean coatings for the watch industry from Blösch

Ultra Precision Manufacturing Lab



The first research center for ultra and high-precision manufacturing in Switzerland

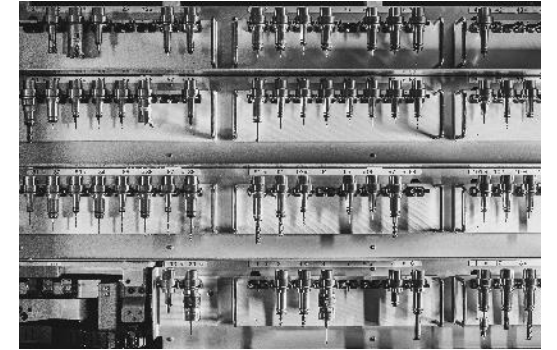
■ Main topics

- Ultra-precision turning
- High-performance milling / high-precision milling / jig grinding
- Laser material processing with ultrashort pulse lasers

■ Our contribution to your success:

Applied research on

- Process optimization
- Processing of new materials, e.g. brittle-hard materials
- Cutting tools and coatings
- Automation and digitalization of machining processes
- Prototype and small series production



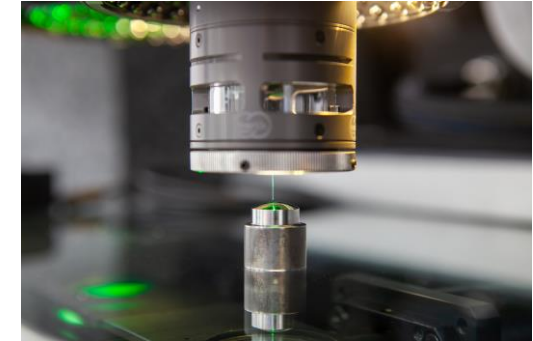
Mission



- **Ultra-precision machining** and **ultra-precision measuring** of tolerances in form, dimension and position in sub-micron range
- Economic manufacturing processes for **new materials**, e.g. ceramics or sintered carbides
- **End-to-end production chain** with repeatability $< 2 \mu\text{m}$ on industrial machine tools



Ultra-precision turning for highest surface qualities



Ultra-precision coordinate metrology



Manufacturing processes for new materials
(high-performance milling / ultra-short pulse laser machining)



End-to-end production chain
enabling new functionalities

Ultra-Precision Manufacturing Lab Infrastructure

Process control system




Process monitoring



Performance analysis



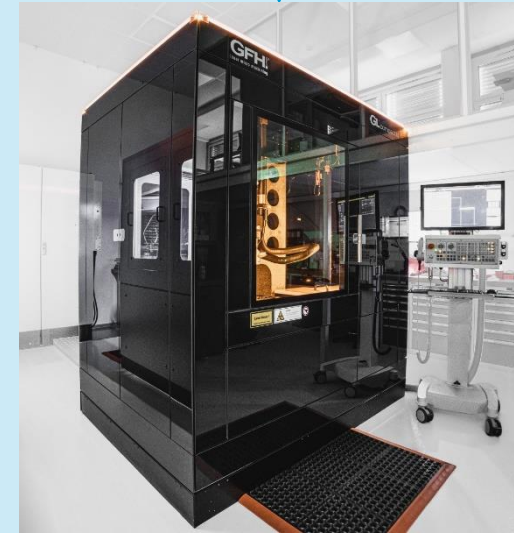

*Air-conditioned
laboratory*



5-axis machining centre
Kern-Microtechnik «Micro HD»
(Part accuracy <math>< 2 \mu\text{m}</math>)



Ultra-precision turning
LT-Ultra «MTC 650 UP»
(Part accuracy <math>< 0.1 \mu\text{m}</math>)



**5-axis machining centre
with ultra-short pulse laser**
GFH «GL.compact II»
(λ : 1030 / 515 / 343 nm)



**Multisensor coordinate
measuring machine**
WERTH «VideoCheck UA»
(measurement uncertainties
<math>< 0.1 \mu\text{m}</math>)

Ultra Precision Manufacturing: A key technology

Application examples - assemblies and systems with high-precision components:



Laser scanners or cameras from Leica Geosystems or SwissOptic



Vacuum valves from VAT for the semiconductor industry



EUV lithography for the next chip generation (VDL-ETG)



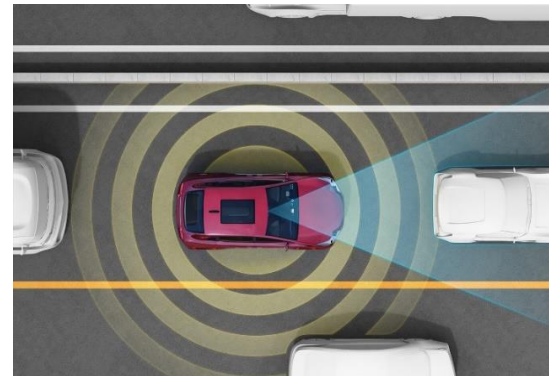
Miniaturized camera by Feinwerkoptik Zünd



Microtechnology, e.g. for unmanned aerial vehicles or laboratory automation from maxon motor



Temperature sensors in space from IST



LIDAR sensors for autonomous driving from AMS



Watch and jewelry industry

Workpiece dimensions ranging from mm to m / Form deviations ranging from nm to μm

Digital Innovation Lab

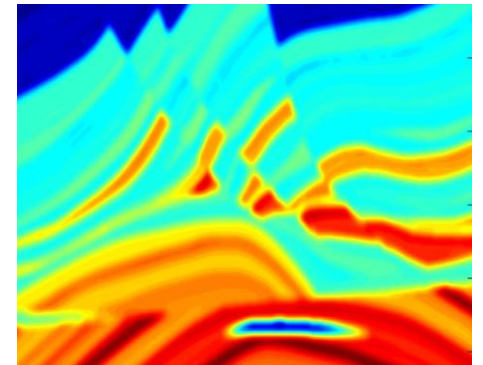


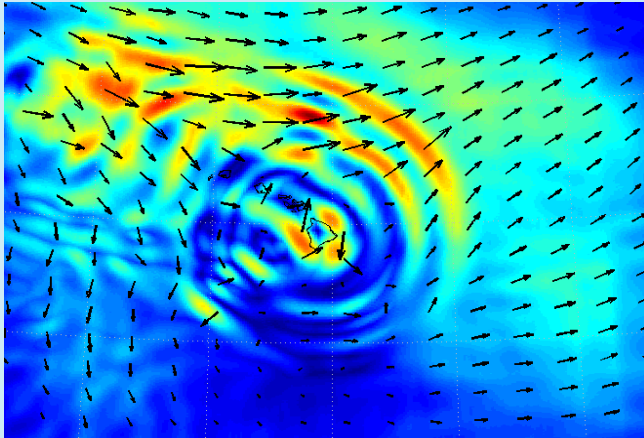
■ Main topics:

Extended Reality - Modelling/ Simulation - Data Science/ Artificial Intelligence

■ Main areas of application:

- Virtual product development and numerical simulations
- Optimization methods for product design
- Digital twins for model-based control of machine tools and manufacturing processes
- Data-centric methods and AI for monitoring and optimizing production processes
- Machine learning methods
- Risk minimization through statistically based decision processes
- Development of virtual training with extended reality methods

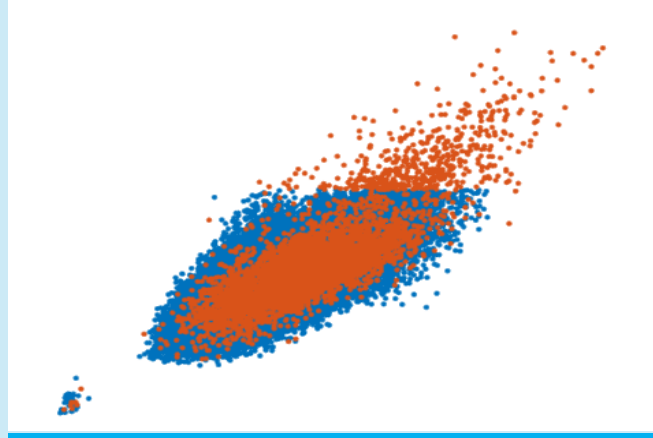




Modeling/Simulation

- (Nonlinear) mechanics
- Metal forming
- Fluid mechanics
- Heat transfer
- Electro magnetics
- Multiphysics

- Several simulation tools
- HPC-Cluster



Data Science/ Artificial Intelligence

- Data-Engineering
- Statistics
- Design of experiments
- Statistical process control
- Image processing
- Optimization
- Neuronal Networks

- Workstations/High-End-graphic cards
- GPU cluster
- Cloud solutions

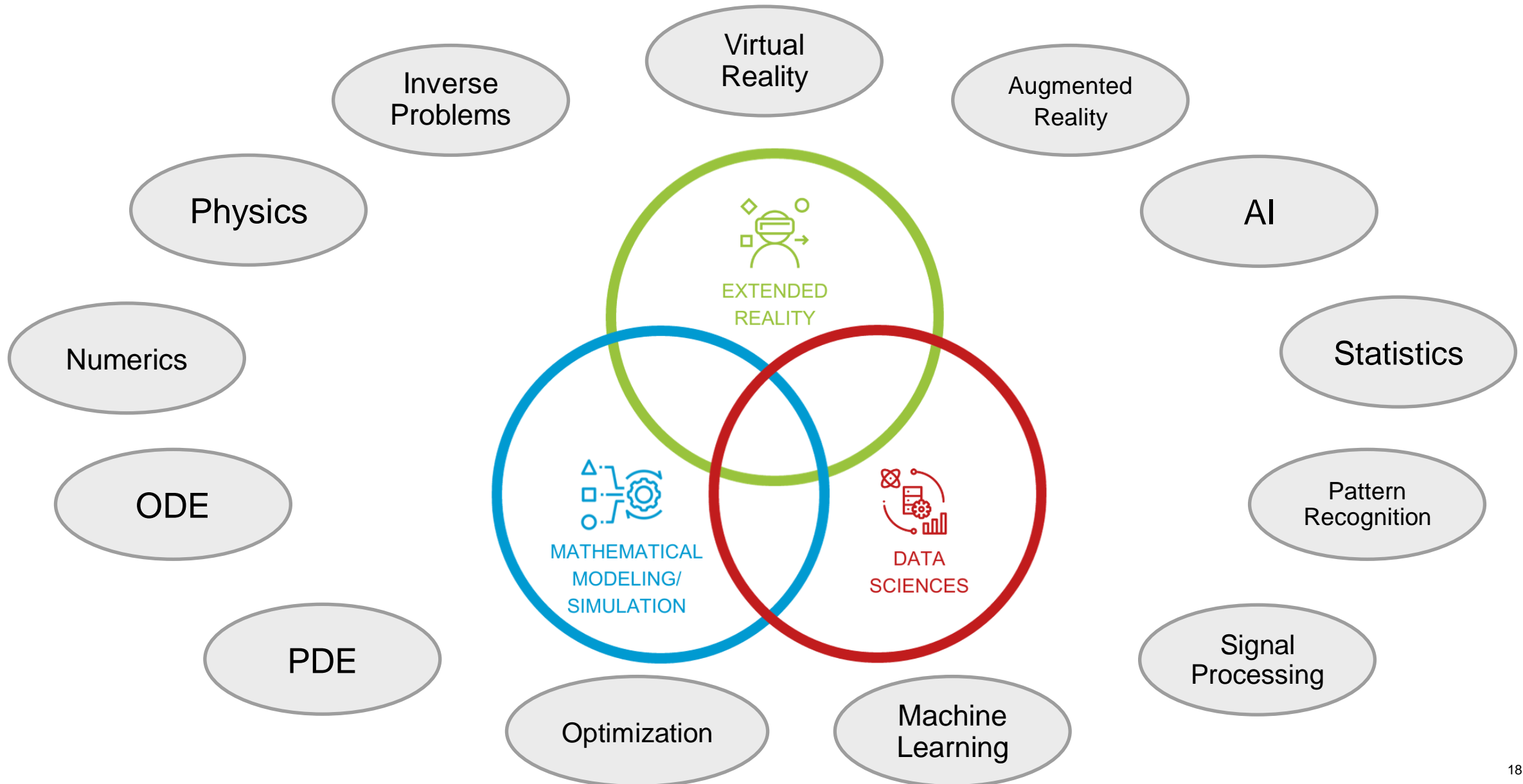


Extended Reality

- Virtual Reality
- Augmented Reality
- Photogrammetry

- Several vision systems
- Camera Drones
- Blender
- Unity
- Unreal-Engine
- Nvidia Omniverse

Competencies of the Digital Innovation Lab



Who is RhySearch?

Our Team



**Thank you
for your attention**



www.rhysearch.ch