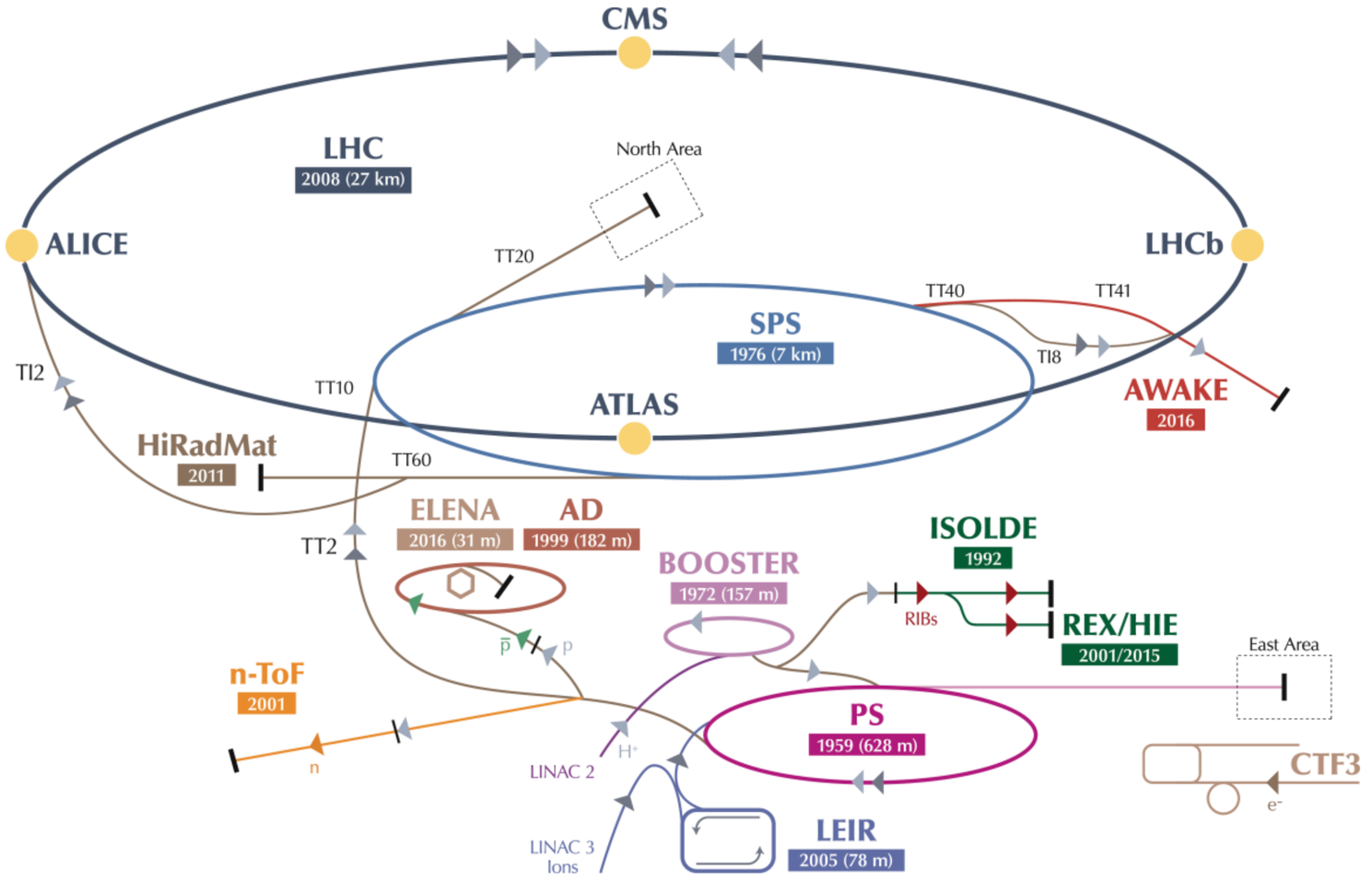
Knowledge transfer at CERN and Nikhef

Jan Visser

- *Coordinator ILO-net*
- *Industrial Liaison Officer for CERN*

LHCb
ATLAS
CERN Meyrin
CERN Prévessin
SPS 7 km
SUISSE
FRANCE
CMS
ALICE
LHC 27 km



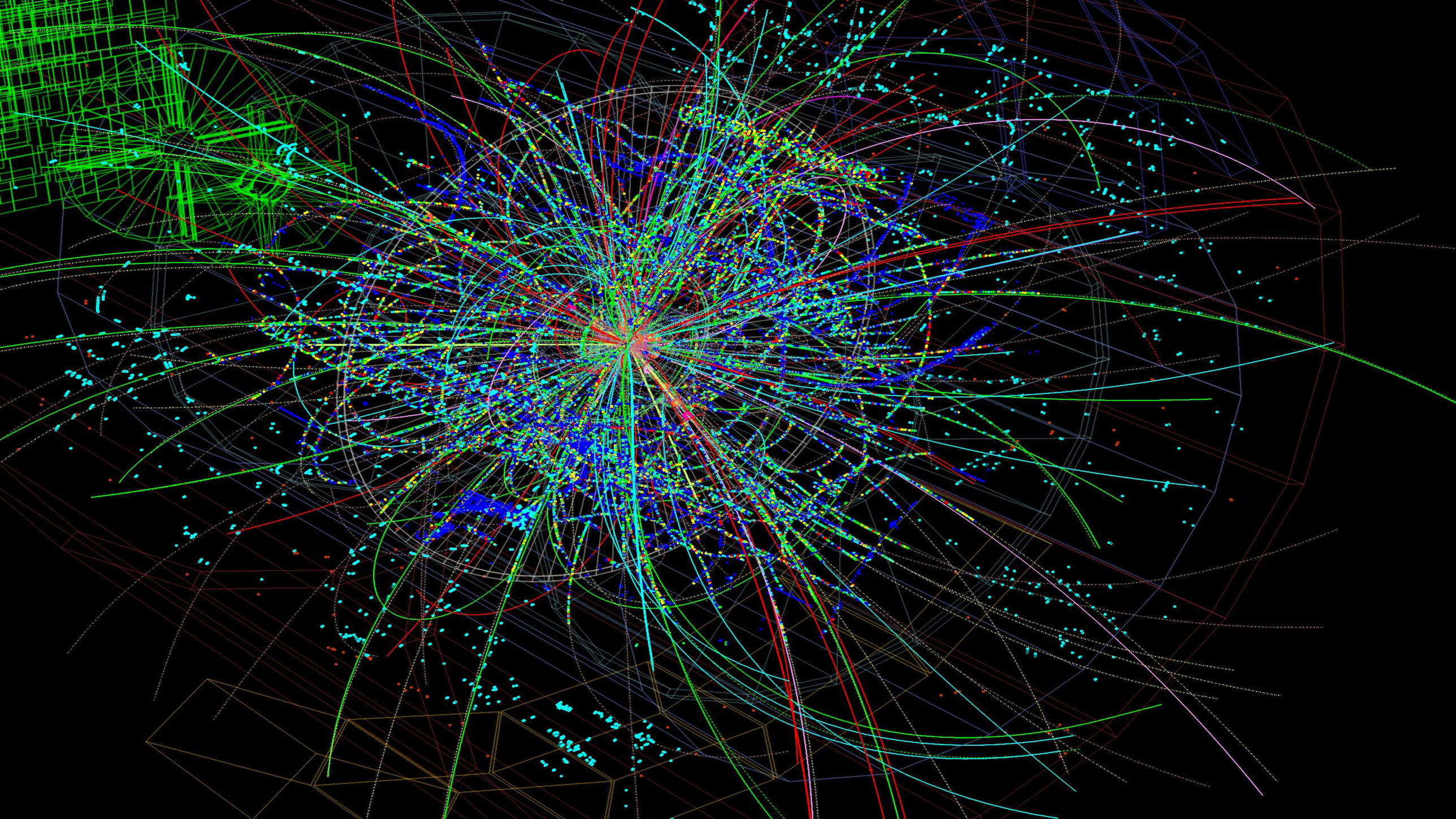
p (protons) ions RIBs (Radioactive Ion Beams) n (neutrons) $\bar{p}$ (antiprotons) e^- (electrons) proton/antiproton conversion proton/RIB conversion

LHC Large Hadron Collider SPS Super Proton Synchrotron PS Proton Synchrotron AD Antiproton Decelerator CTF3 Clic Test Facility

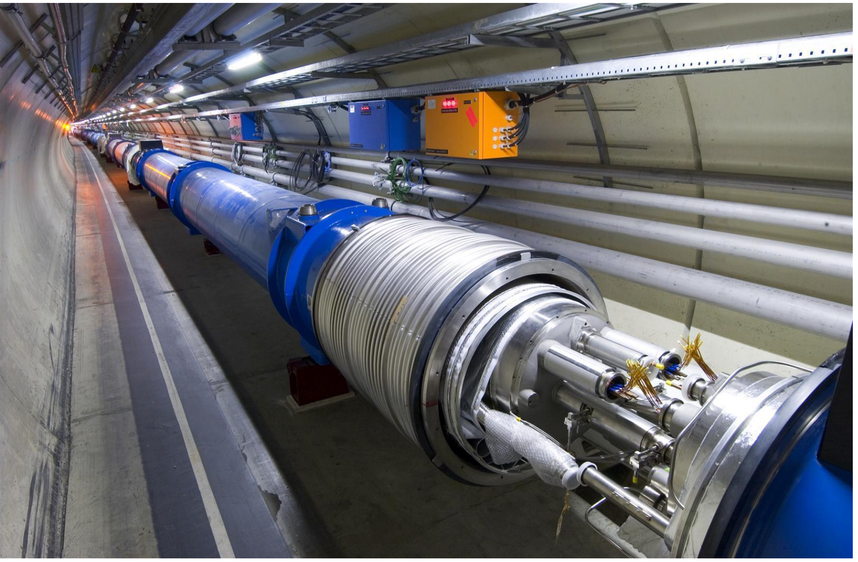
AWAKE Advanced WAKefield Experiment ISOLDE Isotope Separator OnLine REX/HIE Radioactive EXperiment/High Intensity and Energy ISOLDE

LEIR Low Energy Ion Ring LINAC LINear ACcelerator n-ToF Neutrons Time Of Flight HiRadMat High-Radiation to Materials

CERN Accelerator Complex - © CERN copyright 2018

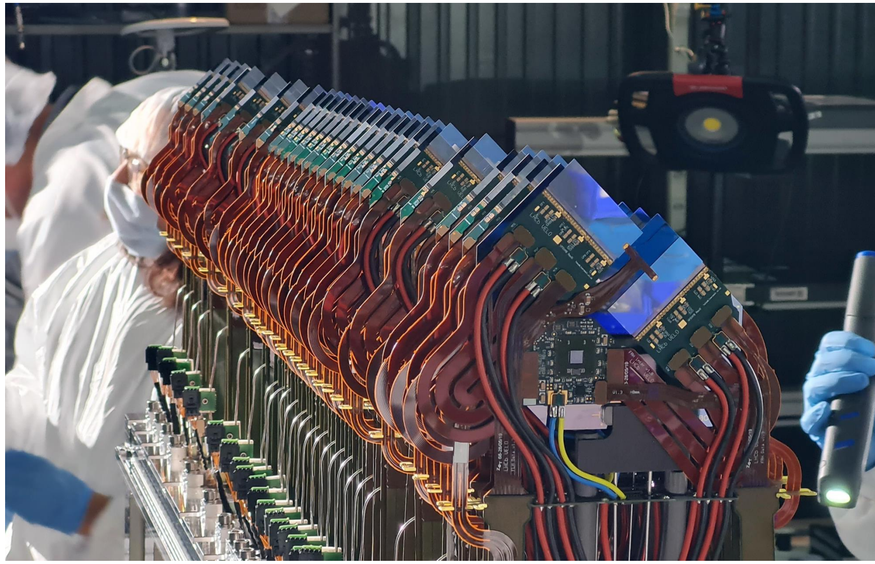


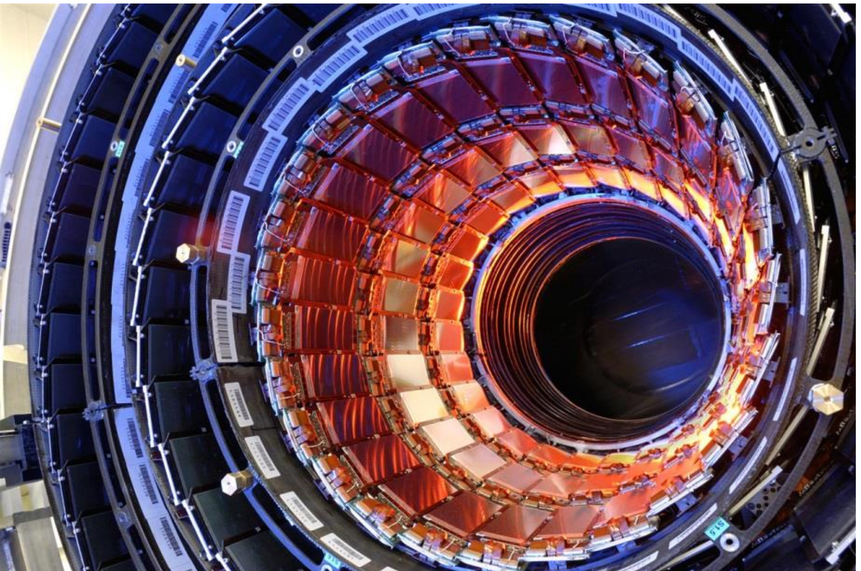
Cutting edge hardware



LHC dipole magnets

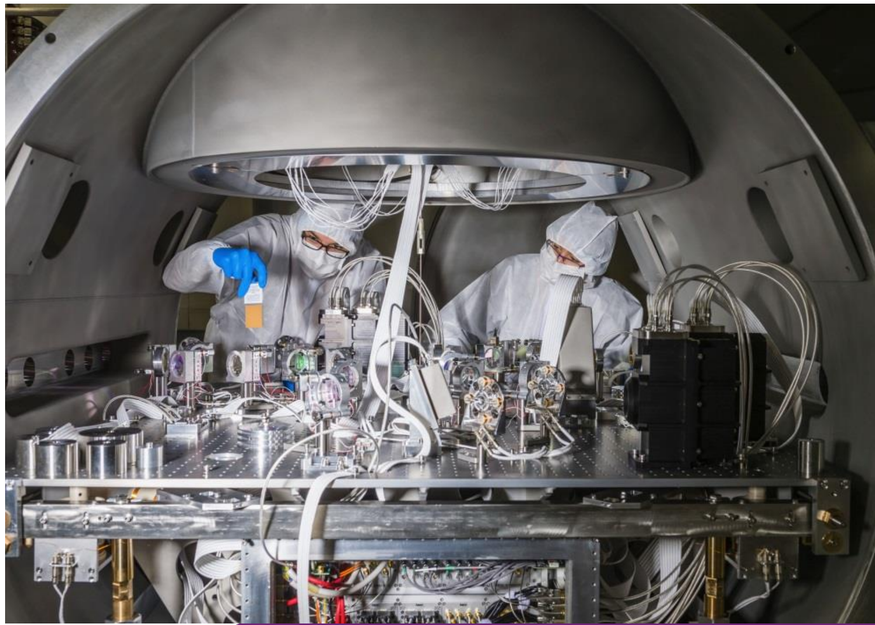
LHCb Vertex Detector





Atlas Vertex Detector

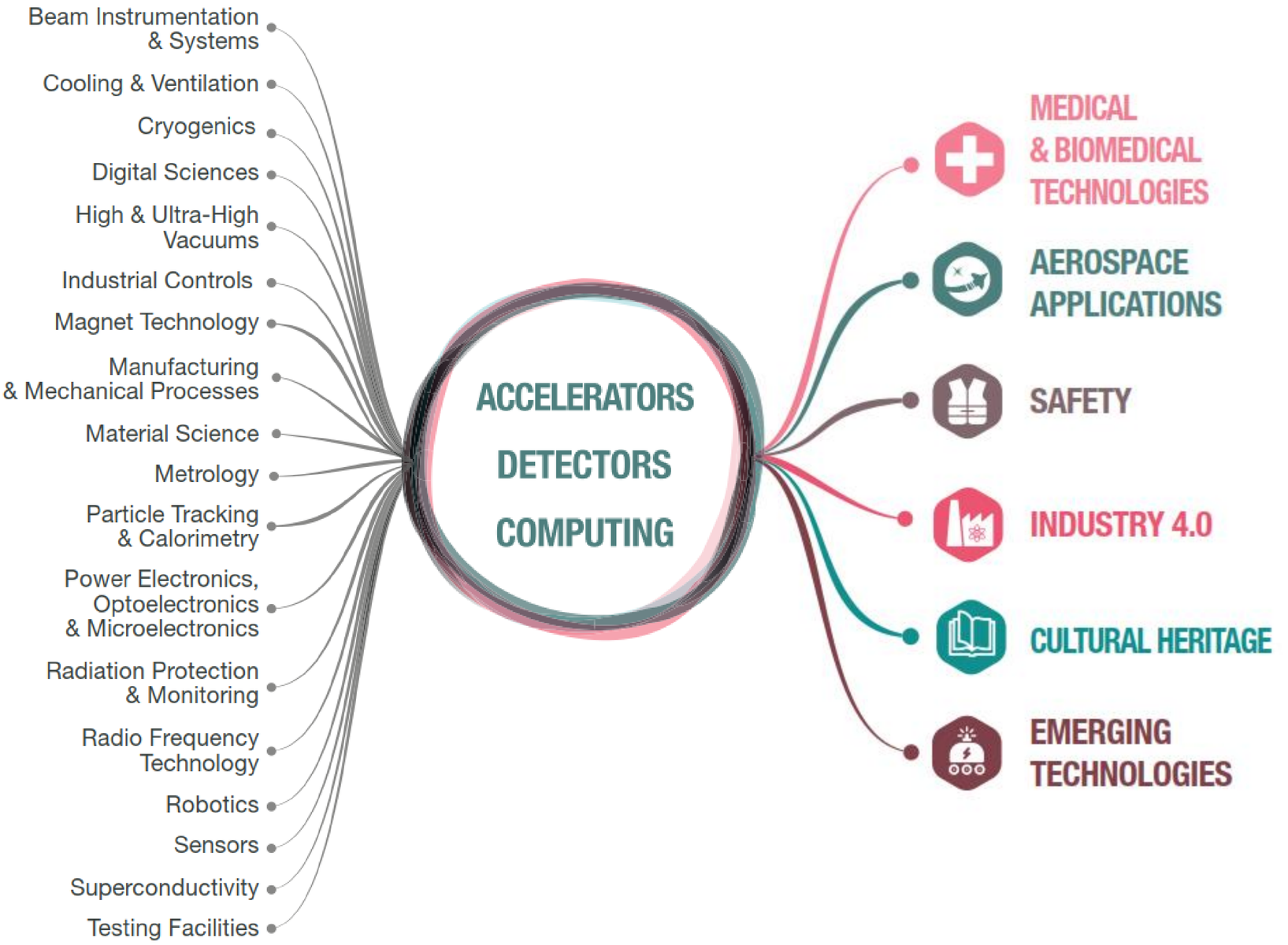
Virgo Vibration Suppression



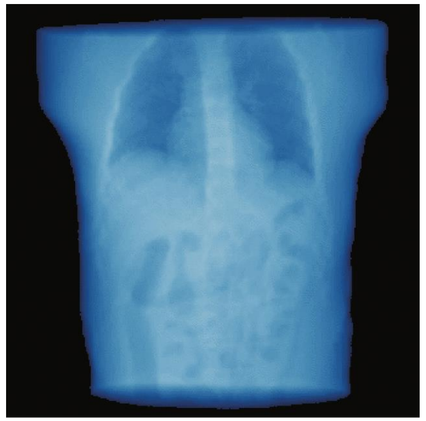
World Wide Web

&

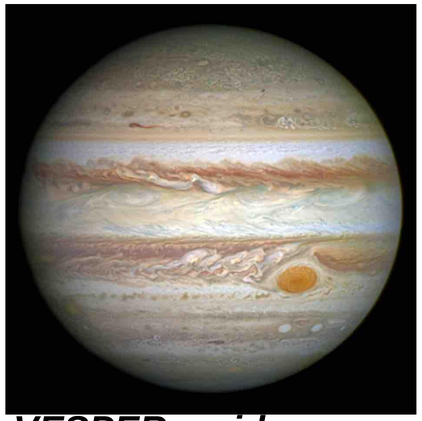
Touch screen


Beam Instrumentation & Systems
Cooling & Ventilation
Cryogenics
Digital Sciences
High & Ultra-High Vacuums
Industrial Controls
Magnet Technology
Manufacturing & Mechanical Processes
Material Science
Metrology
Particle Tracking & Calorimetry
Power Electronics, Optoelectronics & Microelectronics
Radiation Protection & Monitoring
Radio Frequency Technology
Robotics
Sensors
Superconductivity
Testing Facilities
ACCELERATORS
DETECTORS
COMPUTING
MEDICAL & BIOMEDICAL TECHNOLOGIES
AEROSPACE APPLICATIONS
SAFETY
INDUSTRY 4.0
CULTURAL HERITAGE
EMERGING TECHNOLOGIES

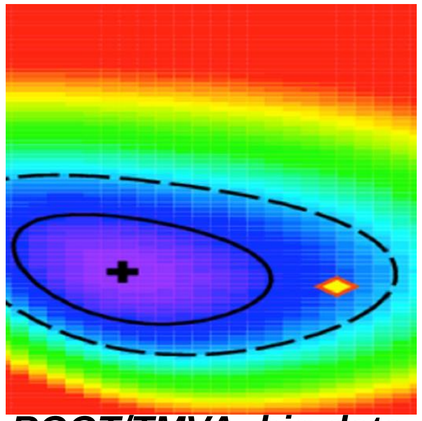
Applications in many surprising directions



TIGRE: open source software for medical imaging



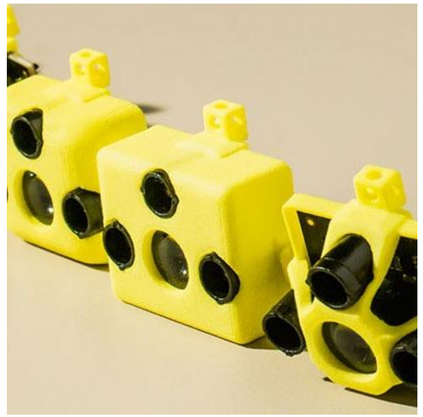
VESPER maiden test for jupiter environment



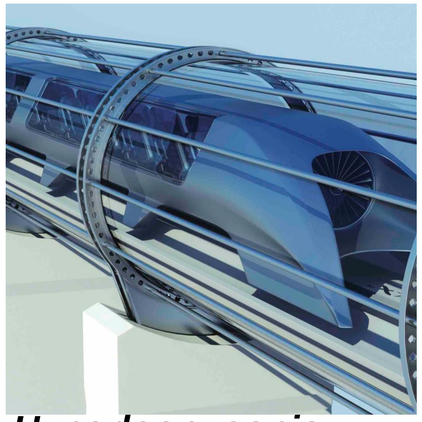
ROOT/TMVA: big data and machine learning software

HPL: high pressure laminates with anti-dust properties

FOSS4I: help with water shortage



Sensor technology on drones



Hyperloop: sonic speeds in high-vacuum tubes

TIM: autonomous safety monitoring system

medipix collaboration spin-off

Nikhef

PANalytical

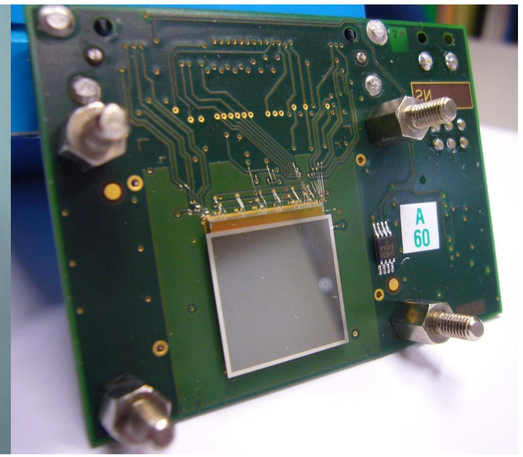
AMSTERDAM SCIENTIFIC INSTRUMENTS

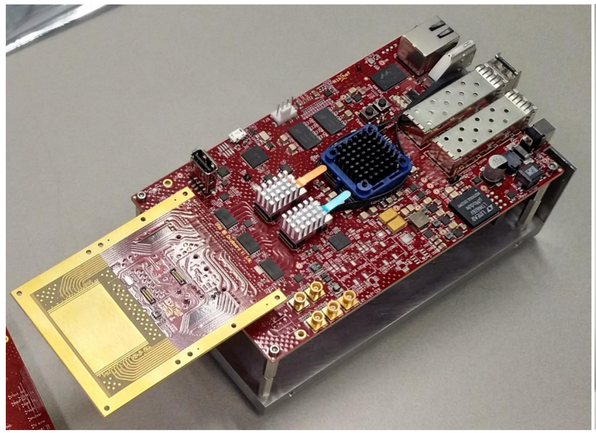
Started the involvement towards a commercial product 20 years ago

Roelof de Vries will present details

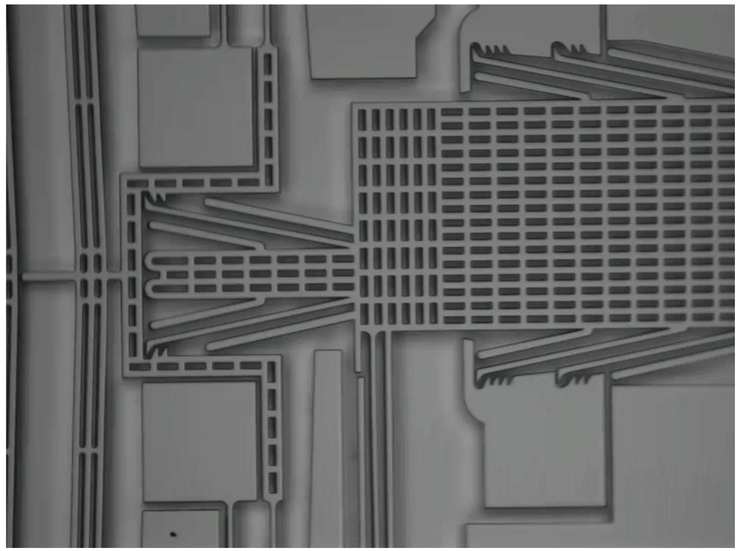
Founded in 2011
Grown to ~25 employees

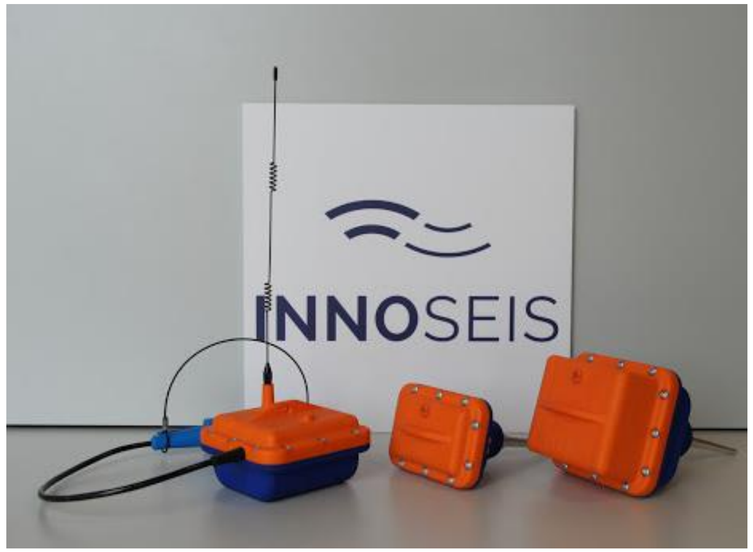
Hans Brouwer will present experience





Spin off from gravitational physics





INNOSEIS

Founded in 2013
Grown to ~ 15 employees

Distributed wireless networks
- Advanced sensors: e.g. accelerometers
- Mesh network protocols

Femtometer positioning
- Vibration attenuation systems with 10^6 suppression factor

CERN
HIGH TECH XL
CERN Hackathon

CERN technology

HIGH TECH XL

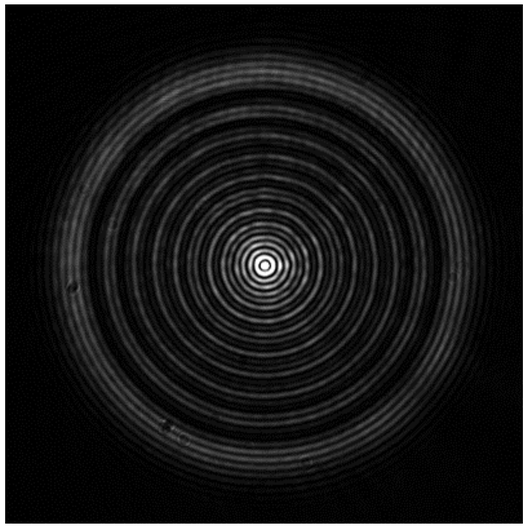
Nikhef

Business incubator

CO2 cooling

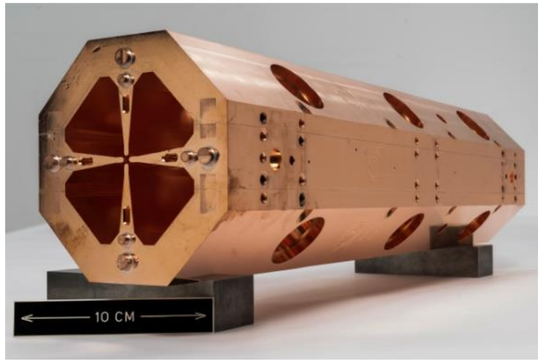
incooling

Structured laser beam



inPhocal

Compact accelerator



Dynaxion

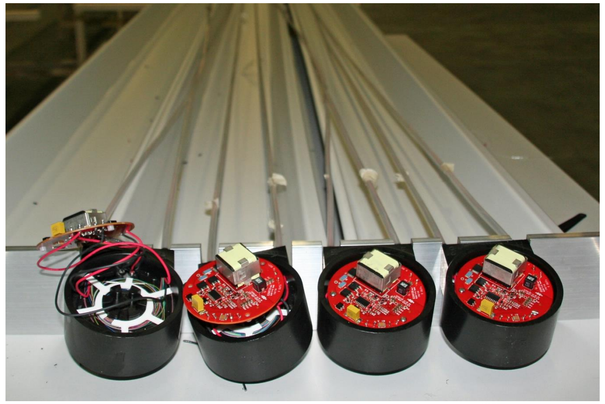
Co-development

TECH FOR FUTURE

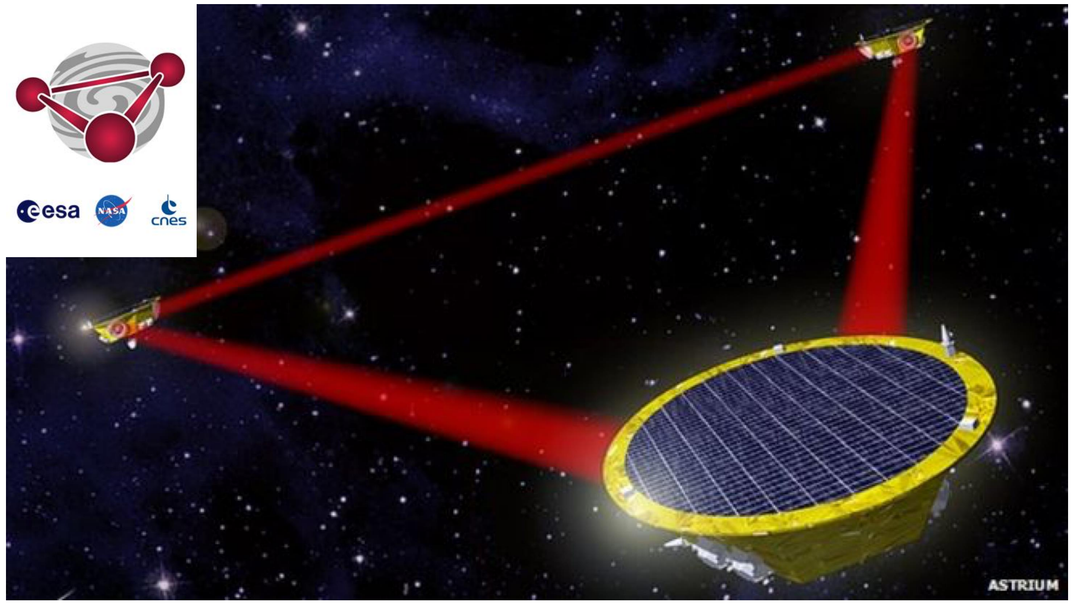
Windesheim

MCAP

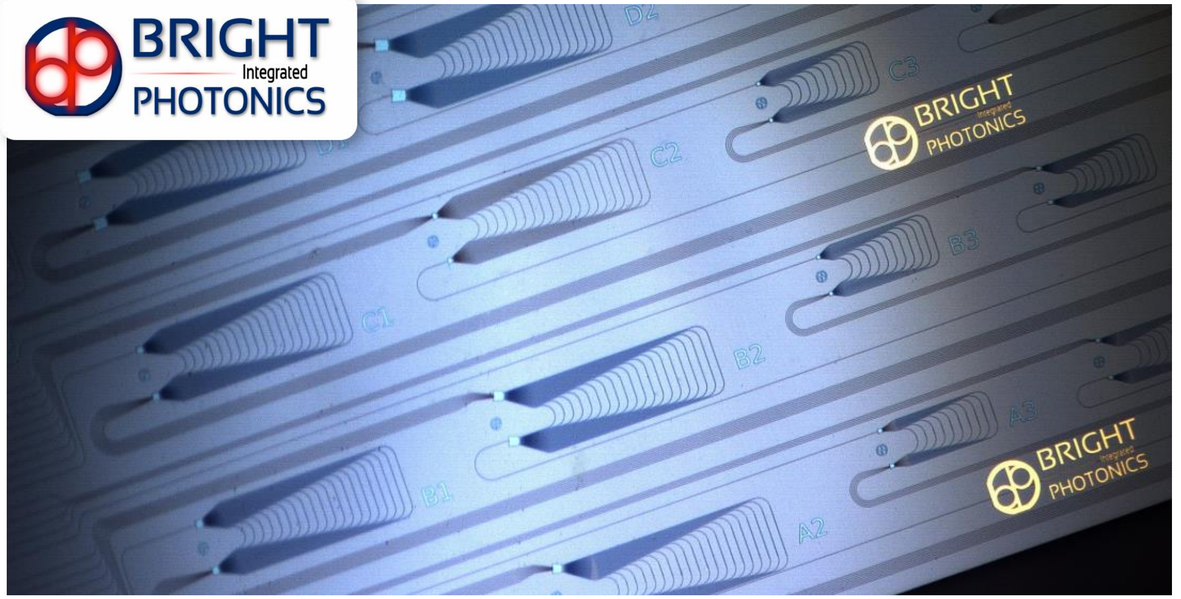
CABLE & GLASSFIBER ASSEMBLIES BV



Learning from each other



LISA (Laser Interferometer Space Antenna)



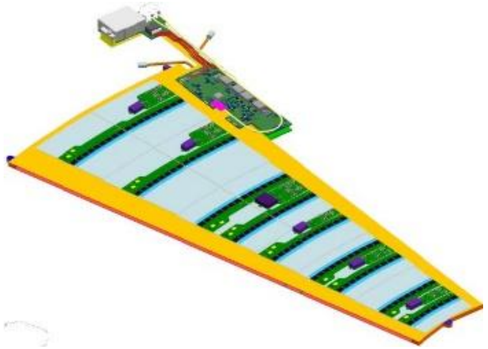
Detecting gravitational waves in space requires sensitive photon detectors pushing the domain towards the use of different materials, simulations and applications.

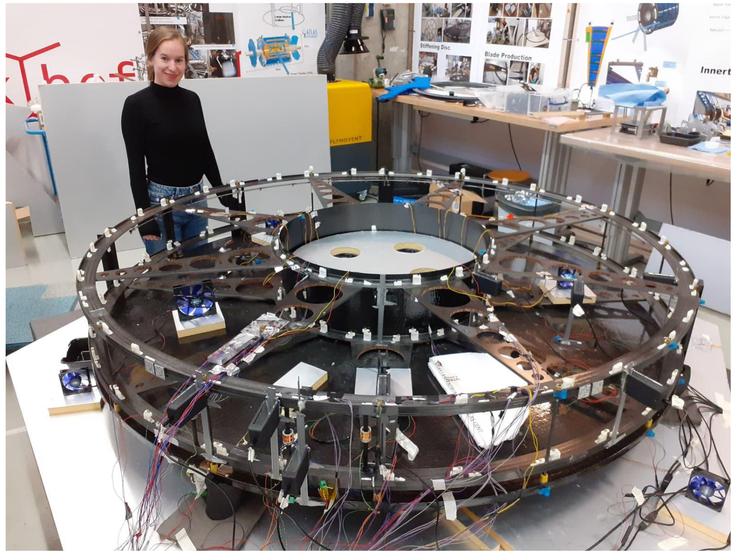
SMART PHOTONICS

Niels van Bakel
nielsvb@Nikhef.nl

Outsourcing

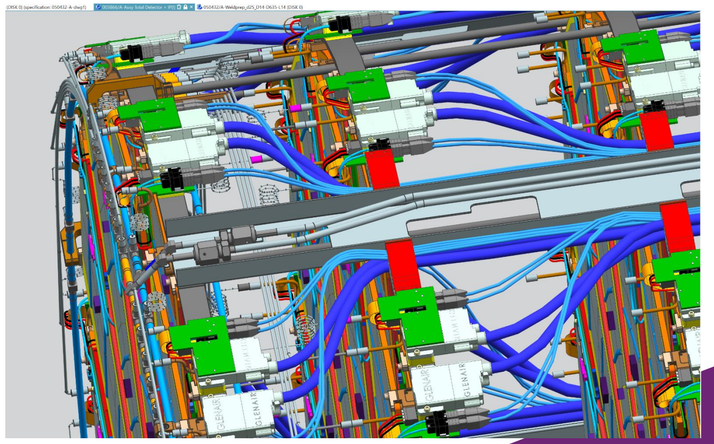
Airborne



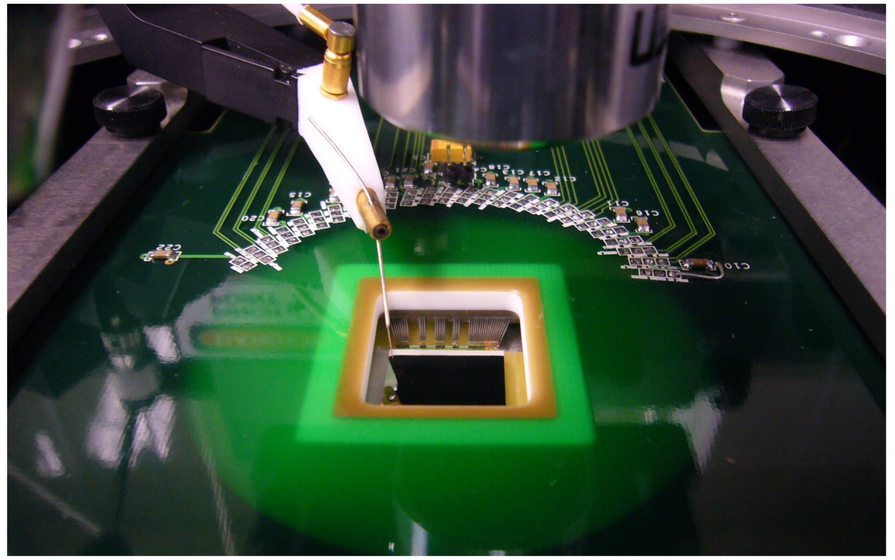


MFI medical industrial

High-end solutions for demanding signals

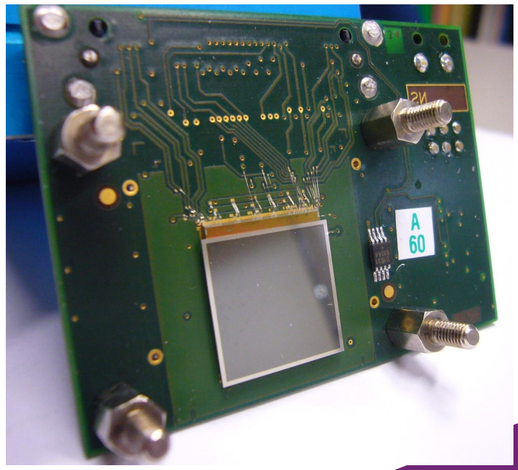


Facility sharing



PANalytical

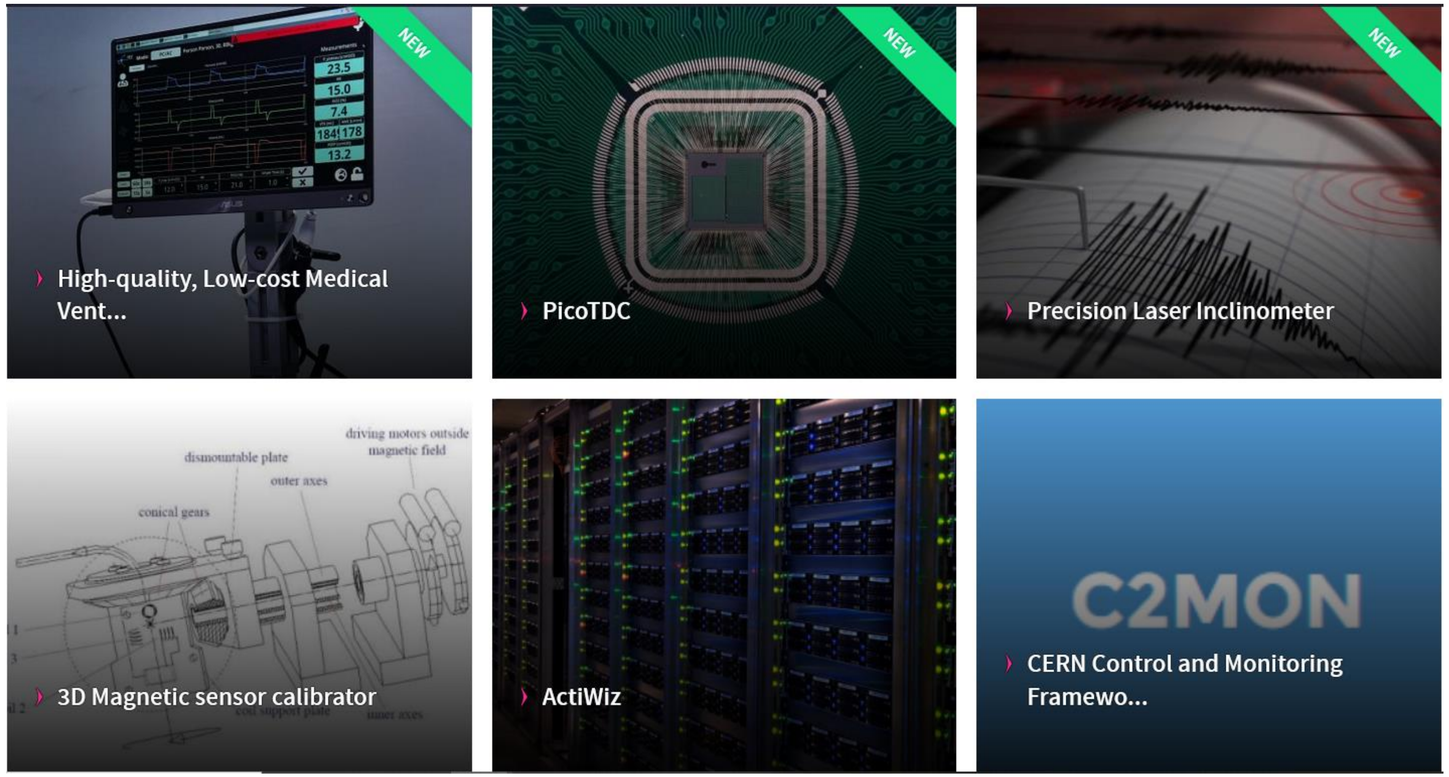
AMSTERDAM SCIENTIFIC INSTRUMENTS



CERN technology portfolio

Details on the CERN website:

- https://kt.cern/who-are-you/industry-how-collaborate-cern
- https://knowledgetransfer.web.cern.ch/technology-portfolio



The ILO-net aims to improve:

- Geo-return
- Co-development
- Knowledge transfer

- The balance is different for each institute and related Big Science organisation
- If you are interested, please reach out to me!