3D Kinematics for Remote Patient Monitoring (RPM3D)

The idea is to explore the use of the *Kinematic Theory of Rapid Human Movements* for analyzing continuous 3D movements captured with smartbands for remote patient monitoring of brain stroke rehabilitation.

Credit image: Pixabay

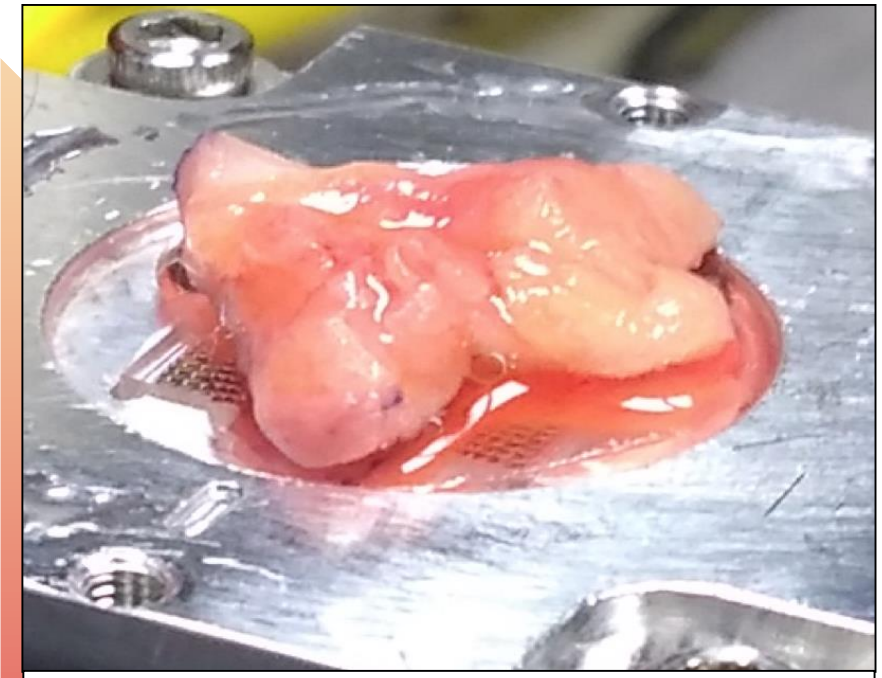
It could have applications in homecare telehealth (continuous remote patient monitoring in neurological diseases rehabilitation), biomedicine, biometrics, robotics, simulations, video games, human-machine interfaces.

Our project is coordinated by the Computer Vision Center **and the partners are** the University of Las Palmas de Gran Canaria, the University of Applied Sciences and Arts Western Switzerland, and the Guttmann Institute (Neurorehabilitation Hospital, Spain).

Contact email afornes@cvc.uab.es

3D-CANCER-SPEC

The Idea is to transfer technology from the MUSE integral field spectrograph at ESO's Very Large Telescope to minimal-invasive optical cancer diagnostics in medicine.



Imaging Raman spectroscopy is capable of distinguishing malign/benign tissue.

Applications have already been demonstrated for skin cancer diagnostics, and further use is being investigated jointly with clinical partners and SMEs for endoscopy (bladder/colon/cervix cancer)

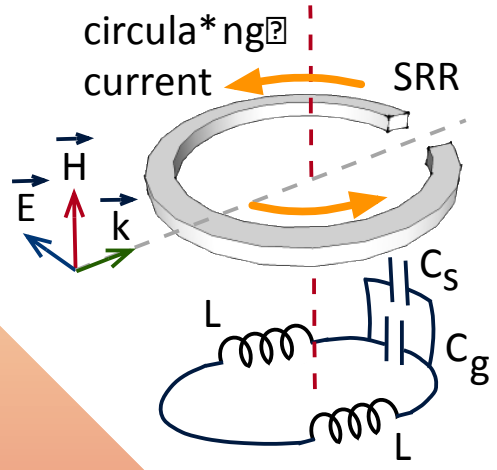
Our project is coordinated by innoFSPEC Potsdam at Leibniz-Institute for Astrophysics Potsdam (AIP) and involves the company Winlight System, Pertuis (France)

We plan to liaise with Research Infrastructure European Southern Observatory (ESO)

Contact email mmroth@aip.de

3D-Printable Metamaterial Integrated Piezopolymer-Based Sensing Platforms

The aim of this project is to develop a wearable sensing platform by integrating two emerging technologies: metamaterial sensors and piezoelectric polymers.



It could have applications in developing platforms for realising versatile, cost-effective and personalised devices.

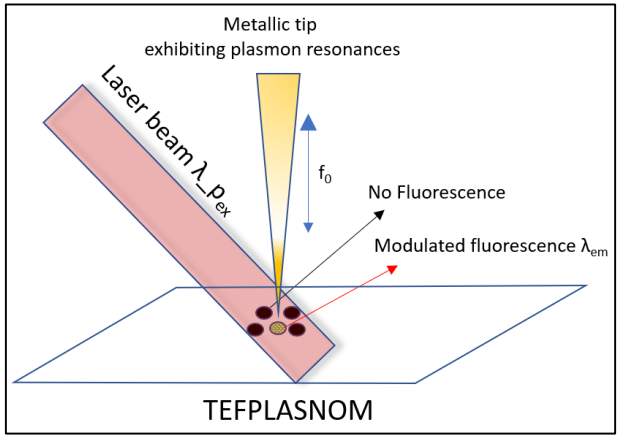
- manipulation and actuation capabilities of piezoelectric layers
- wireless and sensitive detection capabilities of electromagnetic metamaterials
- a single, 3D-printable and flexible platform

Our project is coordinated by Northumbria University and the partner is Magnes AG.

Contact email hamdi.torun@northumbria.ac.uk

A NOVEL APPROACH FOR NEAR-FIELD OPTICAL MICROSCOPY BASED ON TIP-ENHANCED FLUORESCENCE VIA PLASMON RESONANCE ENERGY TRANSFER (TEFPLASNOM)

The Idea is to demonstrate a new technique for tip-enhanced fluorescence (TEF) microscopy that will exploit plasmon resonance energy transfer to activate the fluorescent signals of interest, overcoming the limitations of current TEF approaches, e.g. very low signal to noise ratio and slow imaging speed.



This technique could enable important applications in multiple fields of science that require:

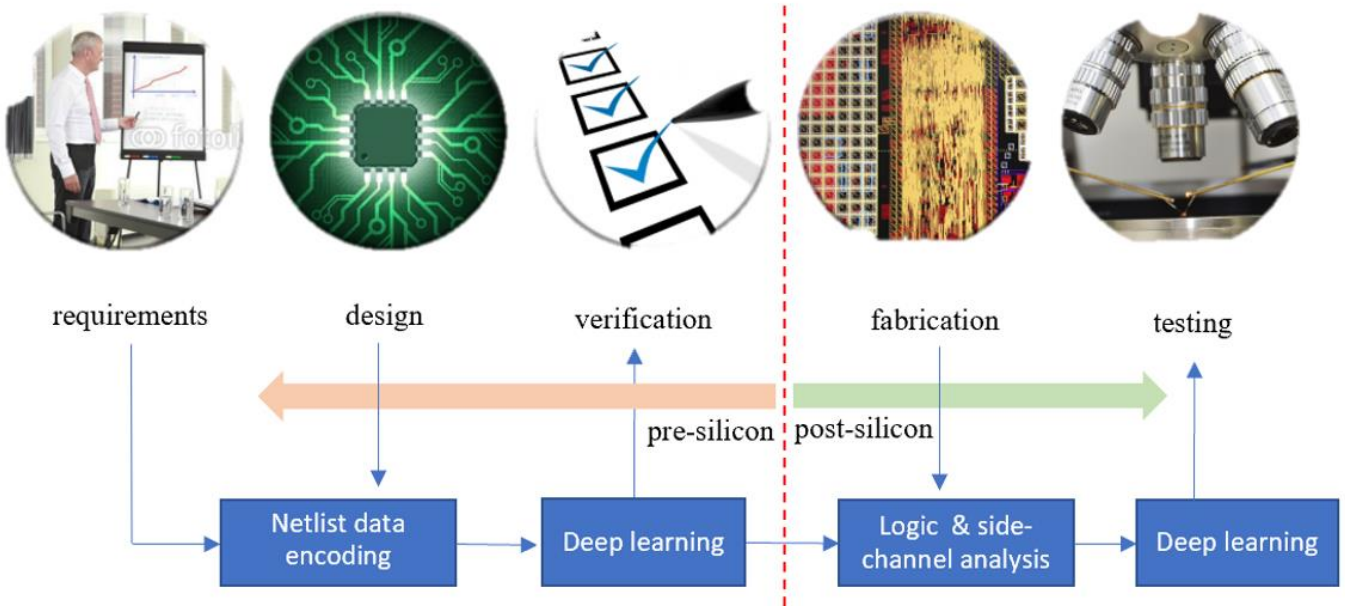
- optical nanoscopy of biological species and advanced materials based on intrinsic autofluorescence
- robust correlative imaging and spectroscopy at nanoscale resolutions (down to 1nm) with TEF and complementary tip-enhanced techniques, e.g. tip-enhanced Raman spectroscopy, scattering-type Scanning Near-Field Optical Microscopy

Our project is coordinated by Dr. Stefan G. Stanciu, Politehnica University of Bucharest (Romania) **and the partner is** Prof. Loredana Latterini, University of Perugia (Italy)

Contact email
stefan.stanciu@cmmip-upb.org

A novel holistic approach for hardware trojan detection powered by deep learning (HERO)

The idea is to **develop an AI empowered approach for hardware trojan detection** combining pre-silicon verification and post-silicon validation sets



IMPACT

- ✓ enable provision of security assurances in numerous IC-related sectors including cell phones, tablets, digital cameras, microelectromechanical systems, photonics, and sensor applications in medical implants or other bioelectronic devices.
- ✓ increase supply chain confidence in IoT, medical systems, government, transportation, and other critical infrastructure organisations

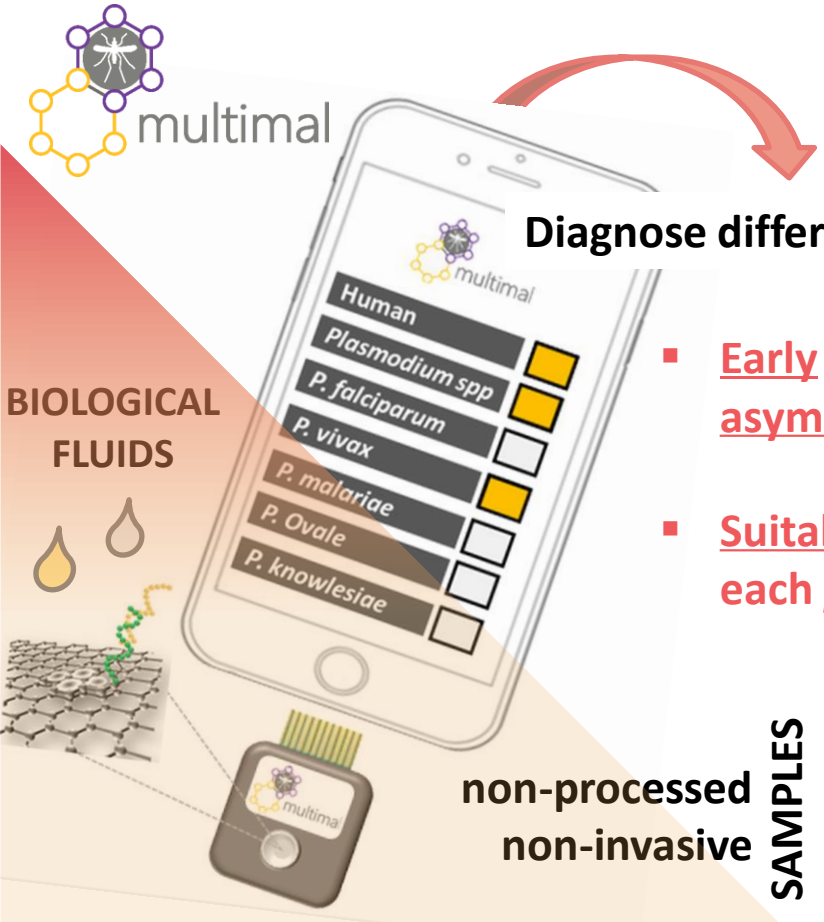
Project partners:

AiDEAS OU (Coordinator), University of Thessaly (partner)

Contact: Dr Serafeim Moustakidis / info@aideas.eu

A point-of-care device for non-invasive multiplexed diagnosis of malaria

The Idea is to develop a **rapid diagnostic test for malaria**, using a graphene/DNA sensor to simultaneously detect all the **five species of Malaria parasites**



- Early detection of asymptomatic patients
- Suitable treatment to each *parasite*

Applied in:

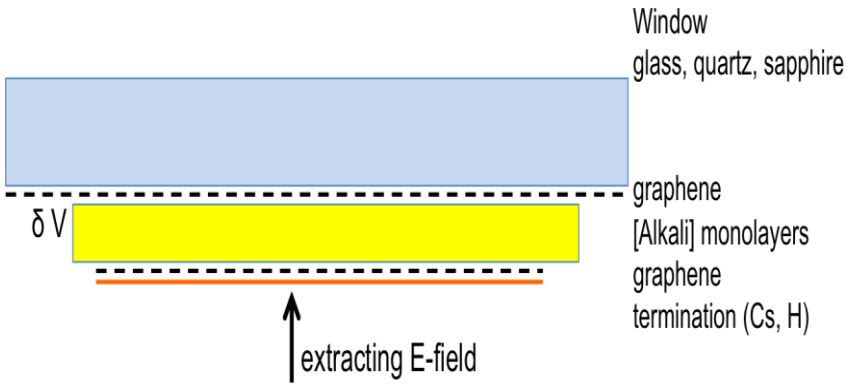
- Diagnosis of Malaria in remote areas and developing countries
- Control of **Malaria disease** worldwide in a context of high mobility and migration of humans
- **Accurate diagnosis to increase treatment success** and aiming **Malaria elimination**

Our project is coordinated by the International Iberian Nanotechnology Laboratory (INL, Portugal) and the partner is University of Minho

Contact email: jerome.borme@inl.int

Active High-QE Photocathode

The Idea is to realise a photocathode with a Quantum Efficiency (QE) for soft photons higher than 90 %.



It could have applications in single soft photon detectors: Photomultipliers, MCPs, Tipsy, and in MIP trackers with 10 ps time resolution

Our project is coordinated by Nikhef **and the partners are** LosAlamos NatLab and Photonis

We plan to liaise with Research Infrastructure Nikhef Detector R&D

Contact email vdgraaf@nikhef.nl

ADAPTIVE LIQUID CRYSTAL LENSES (ALL)

The Idea is to bring ground breaking adaptive liquid crystal lenses recently developed by the UPM to a state of maturity by which the technology can be transferred from the academic to an industrial environment. The intention is to develop prototype lenses and electronic driver that fully illustrate the simplicity and versatility of the lenses, and hence the attractiveness to any industrial partner.

The applications of these lenses are ranging from active contact lenses and glasses to cameras, telescopes and microscopes and all other contexts where adaptive lenses may be used.

Our project is coordinated by Universidad Politécnica de Madrid (UPM) and the **partner is** AD-Telecom (ADT).

We hope to liaise with major industrial stakeholders (*e.g.* Zeiss, Leica, Schott, Rodenstock, Essilor)

Contact email morten.geday@upm.es

ASPECT: Algebraic SPECkle Tomography

The Idea is to apply Phase Contrast tomography on standard and already available clinical X-ray tomographic medical devices

Transfer of technology

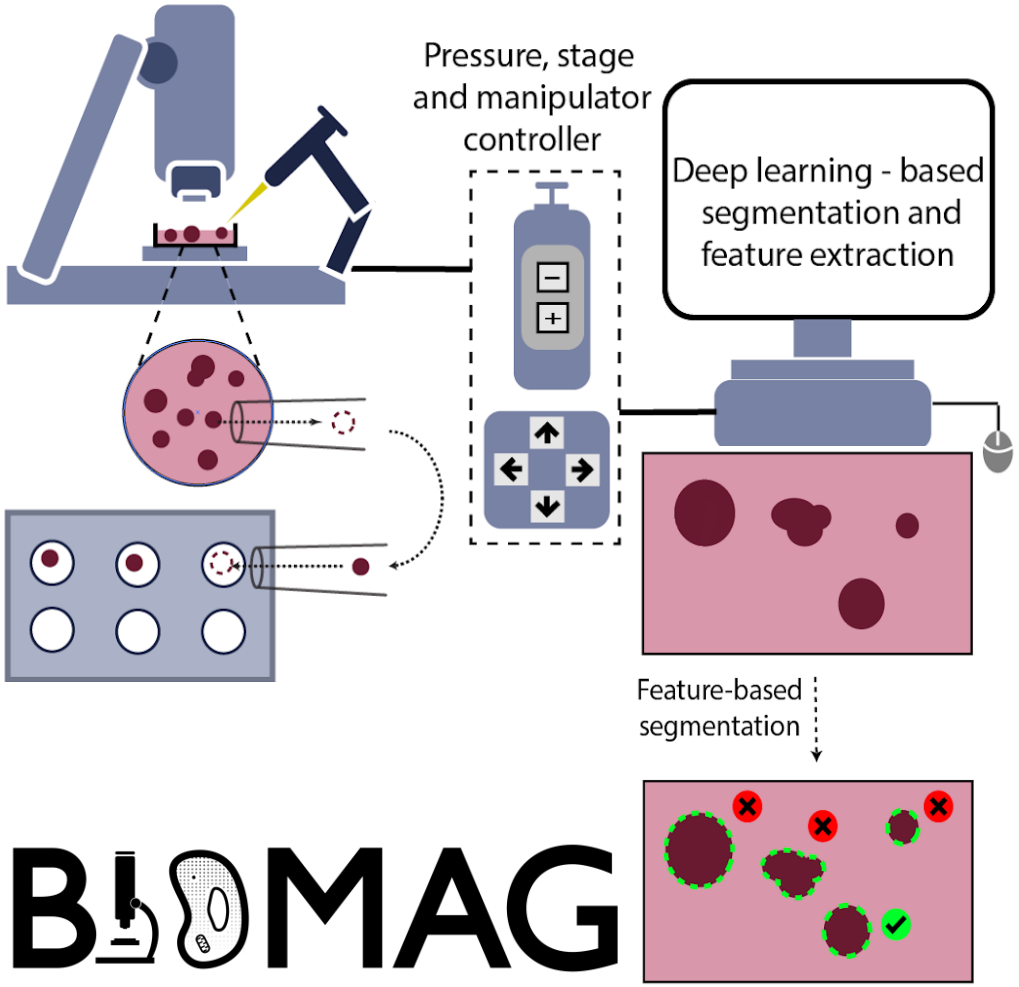
It will have applications for osteoarticular diseases. It will bring new type of information to the radiologists for an early diagnosis of osteoarthritis and rheumatoid arthritis.

Our project is coordinated by the ESRF **and the partners are** INSERM (the French institute for medical research) and Grenoble University Hospital.

Contact email mirone@esrf.fr

Automated 3D organoid manipulator robot

The Idea is to develop a low-cost organoid manipulator system using deep learning.



It could have applications in high throughput drug screening of 3D cancer cell cultures

Our project is coordinated by Dr. Péter Horváth **and the partners are** Dr. Vilja Pietiainen

Contact email horvath.peter@brc.mta.hu

AutoMatic integration of ECG and cardiac MRI to guide caTheter-based substrate ablation for Ventricular Arrhythmias (MERIT-VA Project)

The purpose is to evaluate and integrate into commercial software a machine learning (ML) pipeline for automatically identifying the site of origin (SOO) of Ventricular Tachycardias (VT) using non-invasive information from cardiac magnetic resonance (CMR) and surface 12-lead electrocardiogram (ECG) recordings.

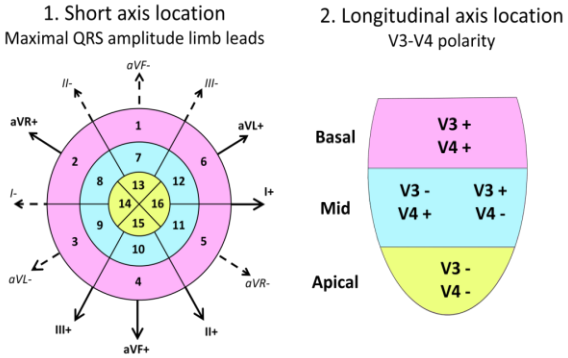


Figure 1. Manual algorithm that helps identifying the VT-SOO (using a 16-segment heart model) from a 12-lead ECG recording

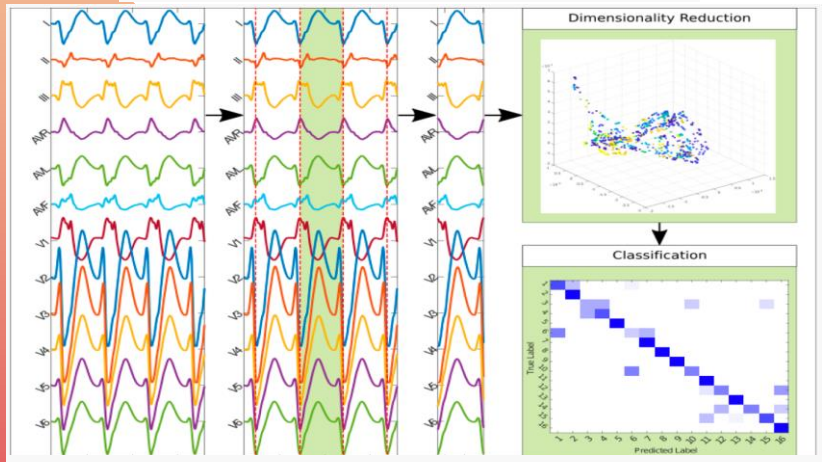


Figure 2. Full SOO identification pipeline based on ML. VT-SOO automatic assignment to one of the 16 heart segments.

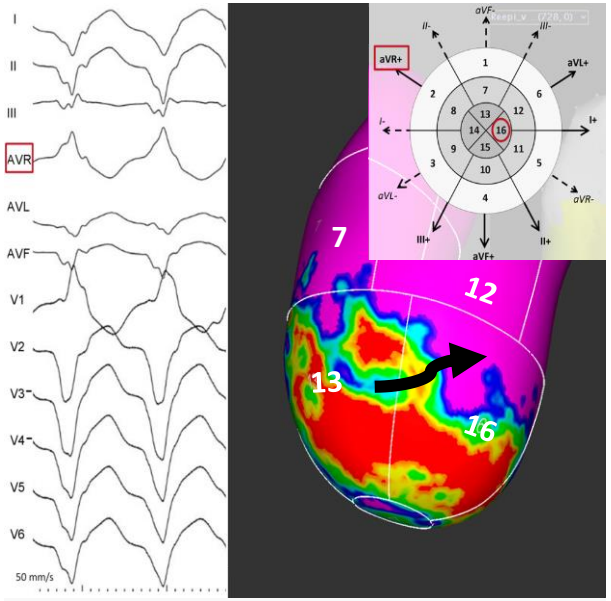


Figure 3. Fusion of ECG-derived information and CMR data. Precise anatomic identification of VT-SOO (*arrow*).

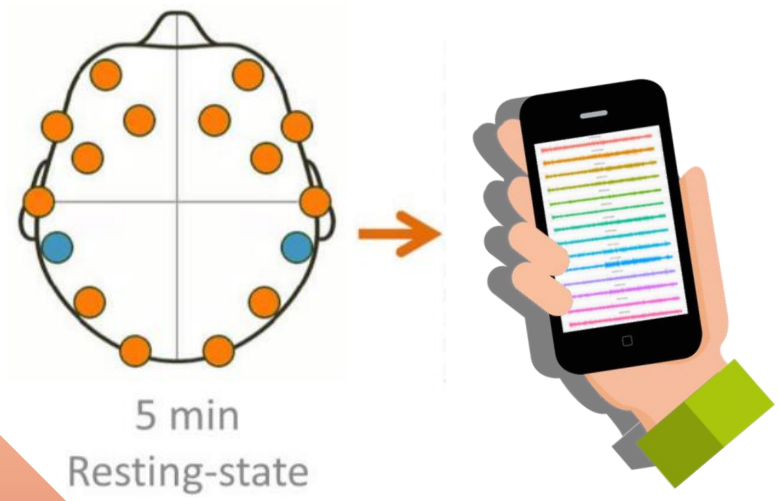
It could have applications in planning, standardizing and improving outcomes after VT ablation (treatment) procedures in patients suffering from life-threating arrhythmias. The project aims to develop a state-of-the-art commercially available software (CE marking).

Our project is coordinated by Antonio Berruezo, MD, PhD, **and the partners are** **Teknon Medical Center**, **Universitat Pompeu Fabra**, and **Gago Medical SL** (Barcelona, Spain).

Contact email
antonio.berruezo@quironsalud.es

Bridging the **epilepsy diagnostic gap**: a fast, reliable and cost-effective **rapid test** (BREEDING)

The Idea is to develop a rapid test prototype suitable for diagnosing epilepsy in a resource poor setting



It could have applications in global health, neurorehabilitation and **community-based** services

Our project is coordinated by UMCU and the partners are CBR Effata, Univ. Twente

Contact email w.m.otte@umcutrecht.nl (Wim)

Carbon quantum dots/graphene hybrids with broad photoresponsivity
-BANDPASS-

The Idea is to develop a flexible carbon-based photodetector with broadband responsivity by combining the conduction properties of graphene-based materials (foam like 3D graphene, reduced graphene oxide) with the large molar extinction coefficient of carbon quantum dots.

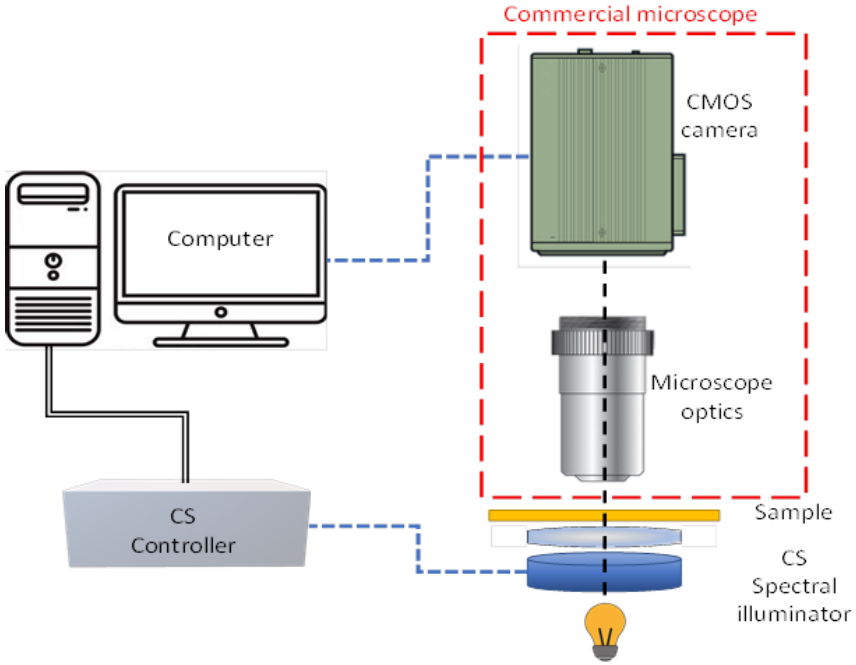
It could have applications in environmental monitoring, communications, medical field.

Our project is coordinated by IMT Bucharest **and the partners are** Babes-Bolyai University, INCDTIM Cluj-Napoca, ICPE-CA Bucharest.

Contact email monica.veca@imt.ro

COSMIC- Compressive Spectral Imaging Microscopy for Cancer Detection

The Idea is to to develop a novel rapid spectral imaging microscopy technique and device in light of its expected unprecedented capability in cancer detection. We plan to adapt a novel compressive spectral imaging technique approach and device that we have developed recently for remote sensing from satellites for the purpose of spectral microscopy.



It could have applications in cancer diagnostics of stained biopsies, biology research, chemical analysis of nano structures

Our project is coordinated by Prof. Adrian Stern (Ben-Gurion University, IL) **and the partners are** Prof. Yuval Garini (Bar-Ilan University, IL) and Prof. Ibrahim Abdulhalim Ben-Gurion University, IL) .

Contact email stern@bgu.ac.il

DEBARE: Deep-learning based Activity Recognition on the Edge

The Idea is to develop an intelligent sensing platform for cost-efficient human activity recognition, utilizing multimodal deep learning, edge computing and smart sensors.

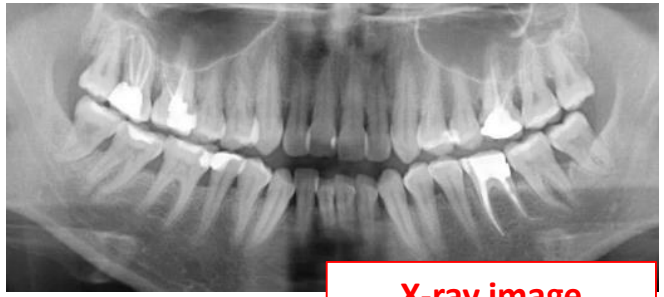
It could have applications in smart manufacturing, healthcare, education and entertainment. Example products include smart gloves for gesture-based interaction with AR/VR applications.

Our project is coordinated by Aalto University (Finland) **and the partner is** HitSeed Oy.

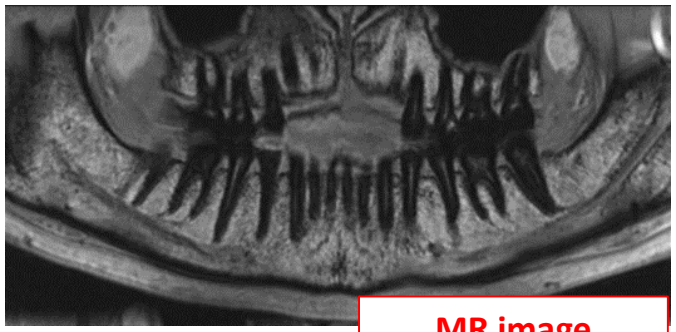
Contact email yu.xiao@aalto.fi

Dental Magnetic Resonance Imaging (DentMRI)

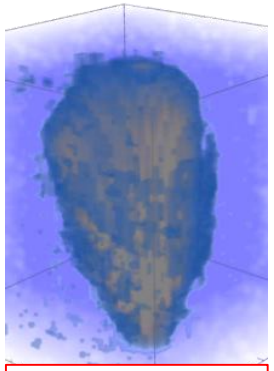
The Idea is to demonstrate a technology capable of simultaneous, high-resolution imaging of **soft and hard** deep biological tissues, and which can be **massively deployed in dental clinics** within the next decade.



X-ray image



MR image



MR image

It could have applications in other health sectors (calcareous deposits in arteries, pulmonary MRI, etc); pre-clinical and veterinary centres; food inspection; defect detection…

Our project is coordinated by the Spanish National Research Council (CSIC) **and the partners are** CSIC (Institute for Molecular Imaging and Instrumentation, i3M) and Tesoro Imaging S.L.

Contact email joseba.alonso@i3m.upv.es

DESIGN AND CONSTRUCTION OF AN X-Y-Z MOTORIZED HEAD TO PERFORM DEEP-UV RAMAN FROM -30 TO -5 ºC (CORaHE)

The Idea is to develop an automated Cold Raman Head sensor for Deep-UV Raman spectroscopy, with X-Y-Z micrometric resolution, to operate in the range -30 to -5 ºC.

It could have applications in analysing Ice-core climate records, Snow and Permafrost, Organic compounds and Hydrated minerals, as well as, in the field of Low-temperature molecular electronics, Frozen Food, Protection from Ice or Future Robotic Missions to Icy Worlds.

Our project is coordinated by the University of the Basque Country (UPV/EHU, Leioa, Spain) and the partners are the Basque Centre for Climate Change (BC3, Leioa, Spain) and the SME company Probtech Innovations S.L. (PTI, Sopela, Spain).

Contact email: juanmanuel.madariaga@ehu.eus

‘DetectION’

The Idea is to create a new kind of water sensor which carries out the detection and sequestration of ionic species in water in the same step.

It could have applications in the recycling of electronics, environmental pollutant remediation and human health.

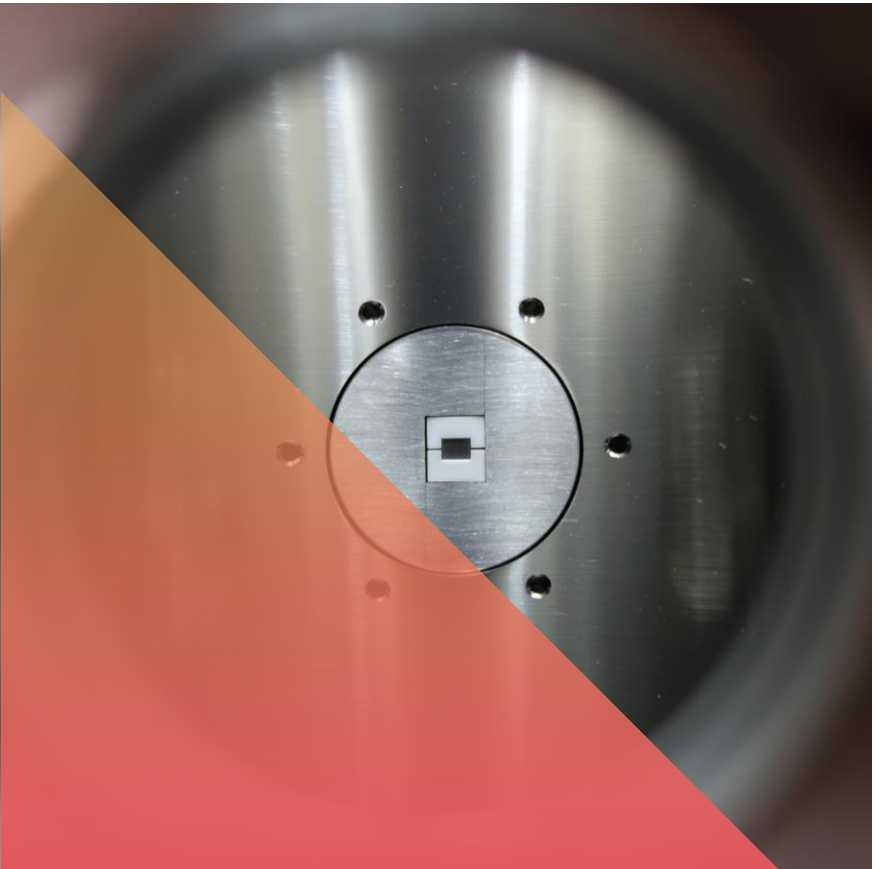
Our project is coordinated by Bio Nano Consulting **and the partners are** AquAffirm.

We plan to liaise with Imperial College London.

Contact email
nicholas.Chadwick@bio-nano-consulting.com

Detection of DC beams using electro-optical crystals

The Idea is to measure the transverse position of DC particle beams by encoding the electromagnetic field of the beam onto a laser shined through an electro-optical crystal.



It could have applications in monitoring high-voltage equipment in harsh environment, monitoring high-power transmission lines, weather forecasting.

Our project is coordinated by CERN (CH) **and the partner is** the University of Huddersfield (UK).

Contact email michal.krupa@cern.ch

Development and Application of Versatile, Highly **UV Reflecting and Absorbing Coatings**

Idea → ‘darkest darkness’ / ‘perfect’ mirror } compatible with

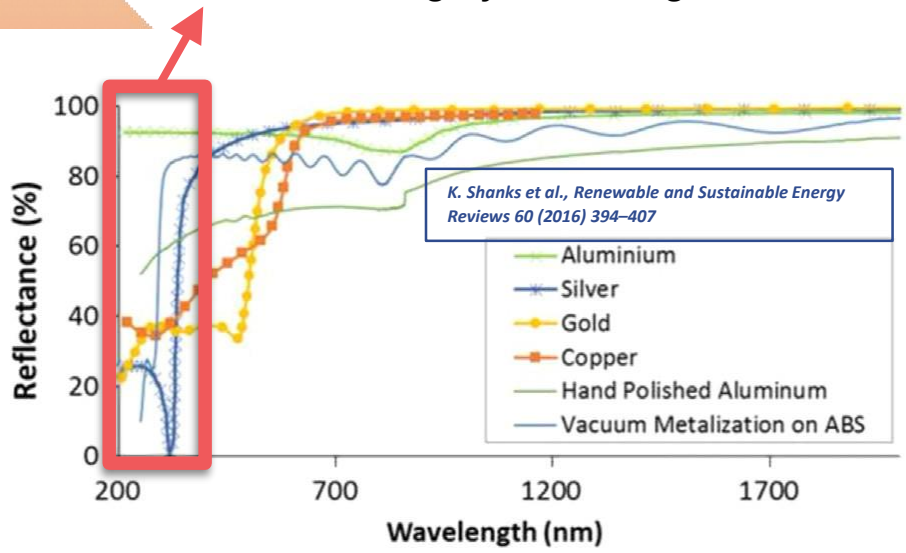
- larger & curved surfaces
- high voltage
- ultra high vacuum
- cryogenic temperatures

in the UV range 200-400 nm

example for

Today’s Challenges:

broadband, highly reflecting UV mirrors?



Potential Applications

- **more efficient UV lamps**, e.g.
  - for drying and curing of inks, varnishes, or coatings,
  - in sterilisation and disinfection of (medical) instruments,
  - for processing in the food-industry, or for air and water purification
- **scientific instruments**
  - optical imaging devices and sensors
  - space science and telescopes
  - fundamental science, laser optics & quantum computing

Our project is coordinated by CERN and the partners are

TECHNISCHE UNIVERSITÄT DARMSTADT

CERN

Contact email stephan.ettenauer@cern.ch

Development of radiation-hard and cost-effective inorganic scintillators for calorimetric detectors based on binary glass compositions doped with cerium - SCINTIGLASS

The Idea is to improve the optical properties of $BaO*2SiO_2$: Ce (DSB: Ce) material and optimise the production technology.

It could have applications in the fields of calorimetry, fast counting systems in radiation hard environment, detector systems for medical, technical, and security applications and neutron detection in a wide energy scale.

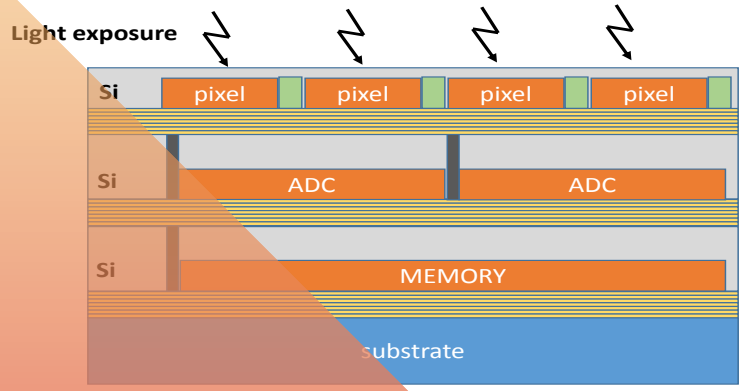
Our project is coordinated by Justus Liebig University Giessen (Germany) and the **partners are** CERN (Switzerland), Università degli Studi di Milano-Bicocca (Italy), Vilnius University (Lithuania)

We plan to liaise with Industry Partner Preciosa (Czech Republic)

Contact email: valery.dormenev@exp2.physik.uni-giessen.de hans-georg.zaunick@exp2.physik.uni-giessen.de

DIBIS (Digital Burst Image Sensor)

The Idea is to design a digital an Ultrafast CMOS image sensor operating at more than 10 Mega frames per second with a stack of 3 CMOS chips



It could have applications in High speed imaging in the visible and Xray Range.
Pixel characteristics : 40×40µm², 12 bits, 10 to 100 Mfps, burst of 500 up to 5000 frames. Array of 600×900 pixels

Our project is coordinated by ICube **and the partners are** Xdigit (ADC) and CEA Leti.

We plan to liaise with Research Infrastructure ESRF or X-FEL

Contact email wilfried.uhring@unistra.fr

DISRUPTING BLOOD GAS ANALYSIS

The Idea is to use high-performance spectrometry, developed for space applications, to measure carbon transpired through human skin, in order to monitor health and save lives.

It could have applications in monitoring prematurely born children, where currently invasive, painful and distressing, as well as less sensitive, responsive and accurate methods are used.

Our project is coordinated by Uppsala University **and its partner is** Fourth State Systems Inc.

We plan to develop machine learning algorithms, and build & benchmark a stand-alone prototype.

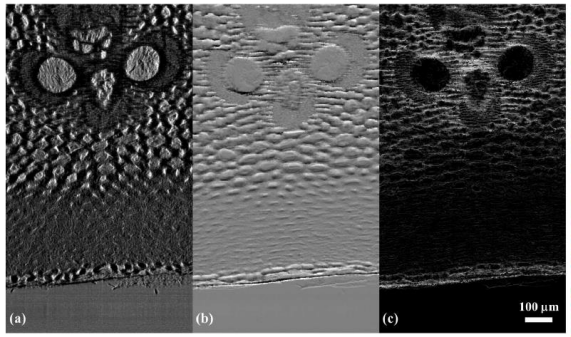
Contact email greger.thornell@angstrom.uu.se

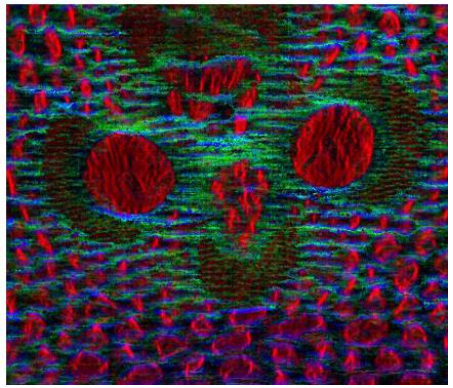
UPPSALA UNIVERSITET

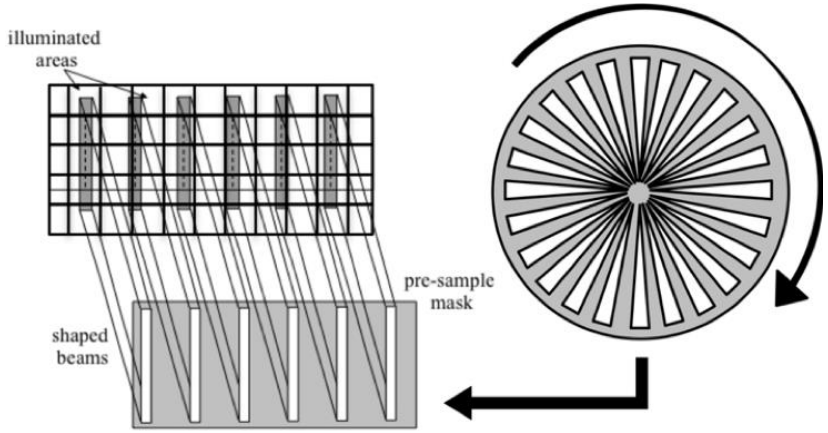
DM-MX: Dynamic multi-modal x-ray imaging

for additive manufacturing and beyond

Intensity modulation enables the simultaneous retrieval of attenuation, phase and USAXS info, with a resolution equal to the aperture pitch; increasing it requires displacing the mask and taking multiple shots. If the mask becomes a rotating wheel, this roadblock is removed.







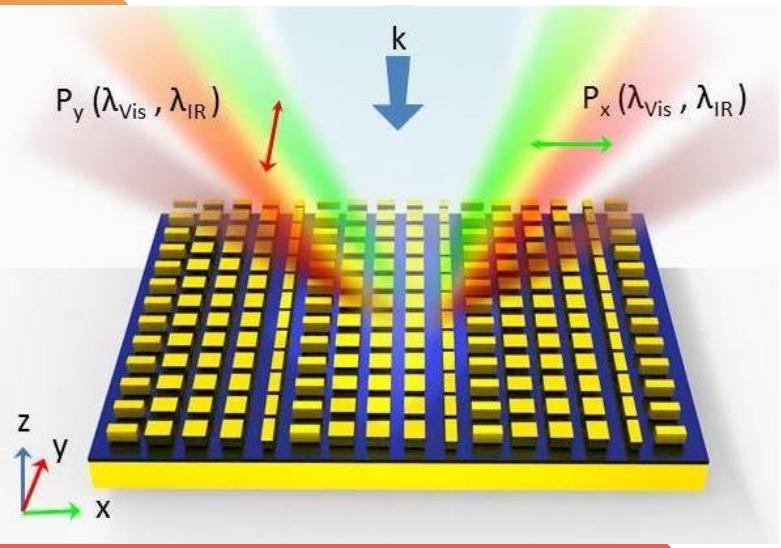
We will demonstrate this on the study of molten pool dynamics in AM; however, once demonstrated, the principle can be applied to many other fields.

Our project is coordinated by University College London with Diamond Light Source and Microworks GmbH as partners

Contact a.olivo@ucl.ac.uk, joachim.schulz@micro-works.de peter.lee@ucl.ac.uk, christoph.rau@diamond.ac.uk,

Dynamic metasurfaces for 3D imaging (3D-META)

The Idea is to utilize piezoelectric MEMS to tune the electromagnetic properties of gap surface plasmon metasurfaces.



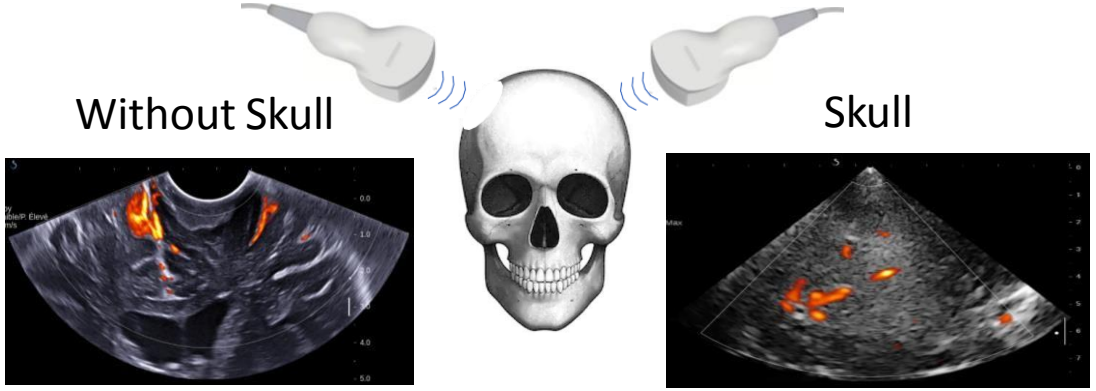
It could have applications in precision lidar 3D imaging by allowing for wide angle beam steering for static MEMS.

Our project is coordinated by SINTEF MiNaLab **and the partners are** University of Southern Denmark.

Contact email christopher.dirdal@sintef.no

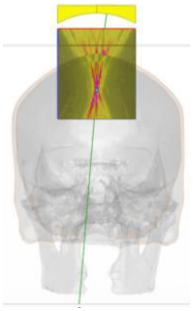
ECHOBRAIN

The Idea is to create a breakthrough in the field of brain imaging by innovating in transcranial ultrasound imaging. EchoBrain will provide a skull aberrations correction based on ultrasound propagation model in complex media.



Fusion device with CT scan

Simulation tool for propagation modeling (CIVA)



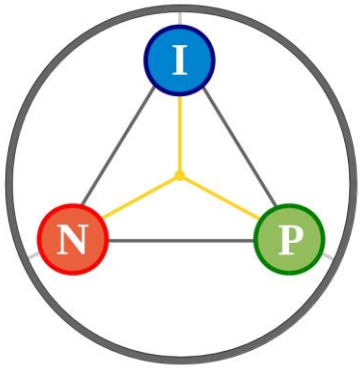
It could have applications in brain trauma, brain pathologies and physician diagnosis since ultrasonic imaging is more flexible, easier to implement and less expensive than other modalities (MRI, …)

Our project is coordinated by Dr. Jean-Luc Gennisson (CNRS, Paris South University) **and the partners are** Dr. Sylvain Chatillon (CEA-LIST).

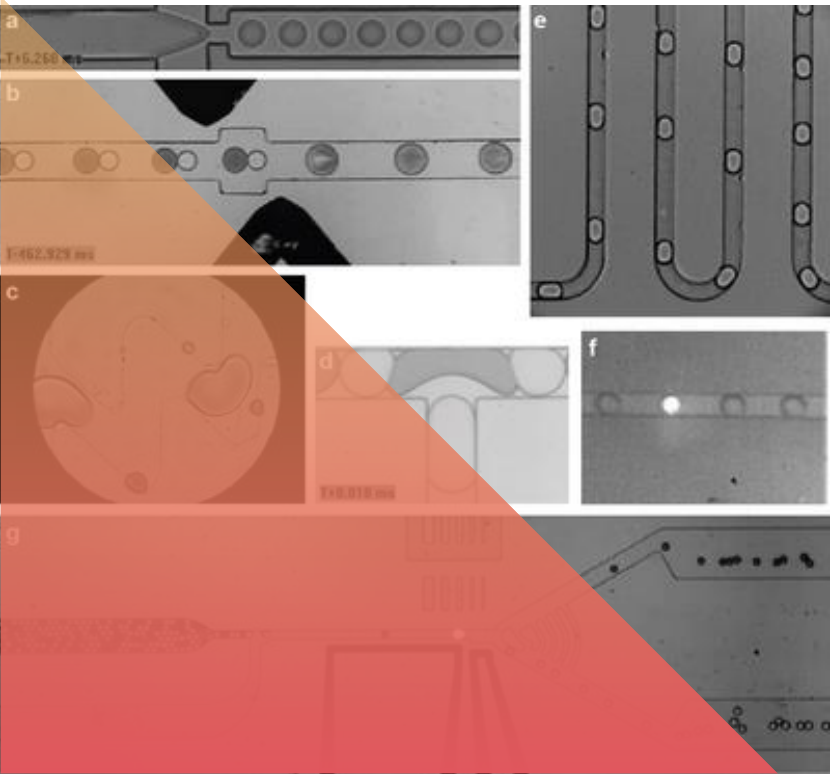
We plan to liaise with Research Infrastructure (Neurospin (CEA) and Supersonic Imagine)

Contact email jean-luc.gennisson@u-psud.fr

EMERGING LIFE



The Idea is to develop automated high-throughput mass-spec and molecular sequencing technology coupled with microfluidics technology to study the emergence and evolution of self-sustaining chemical reaction networks in small compartments.



It could have applications in chemical engineering, synthetic biology, personalized medicine, origin of life research.

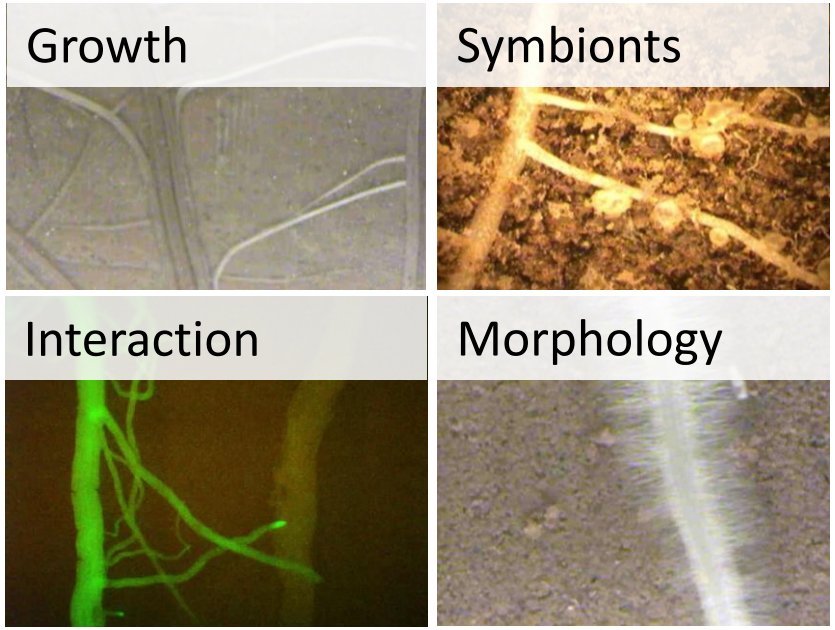
Our project is coordinated by the Parmenides Foundation (Munich, Germany) **and the partners are** ESPCI (Paris, France) and the University of Groningen (Netherlands).

We plan to liaise with Research Infrastructure CERN openlab, University of Modena, University of Vienna, …

Contact email szathmary.eors@gmail.com

Enabling next level research on roots - automatizing MiniRhizotron Image Acquisition and Analysis (**NextMR-IAA**)

The Idea is to develop an **automatized MR image acquisition system** for permanent operation *in situ,* and an **image-processing pipeline** allowing for automatized, high-throughput quantification of root traits and soil water content



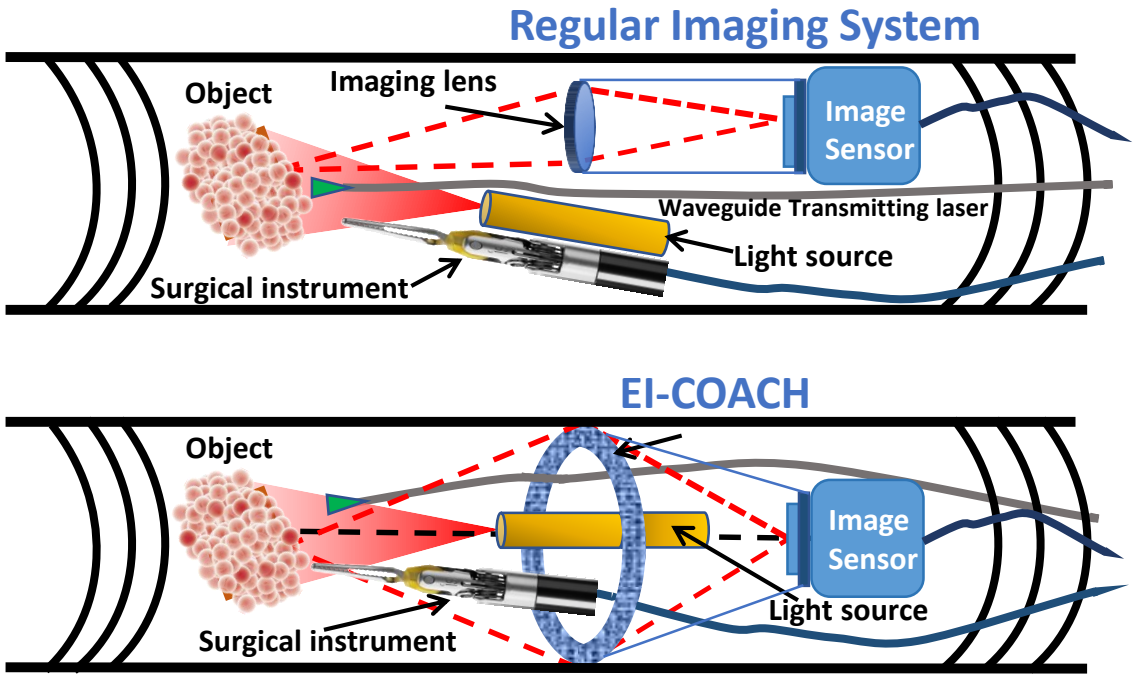
It could have applications in *Precision Farming* (early detection of root pests, optimize fertilization and irrigation, …) & *Environmental Research* (“Ecosystem of Things, EoT”; carbon budgeting, …)

Our project is coordinated by Boris Rewald (BOKU) and the partners are Naftali Lazarovitch & Ofer Hadar (BGU), Gernot Bodner (BOKU), Liaqat Seehra (Vienna Scientific Instruments GmbH)

Contact email **nextMR-IAA@boku.ac.at**

Endoscopy by Interferenceless Coded Aperture Correlation Holography Device with Annular Optical Aperture (EI-COACH)

The Idea is to implement an annular aperture in medical instruments, such as endoscopes, for 3D high resolution imaging.



It could have applications in imaging of internal cavities of the human body (i.e. gastrointestinal tracts, colon, uterus and stomach).

Our project is coordinated by Joseph Rosen, Ben-Gurion University of the Negev and the partner is Israel Gannot, Tel-Aviv University

Contact email rosenj@bgu.ac.il

ENERGY HARVESTING UNDER HARSH CONDITIONS

Towards a safe Oil & Gas industry (Energy4Oil)

The Idea is to deliver a low-cost hybrid nanogenerator able to operate in harsh conditions, with pressures up to 12000 psi and temperatures up to 120ºC, to increase system reliability.

It could have applications in downhole power generation, gas distribution systems, smart water grid or any other fluid flux-based system where the generator would harness wasted environmental energy and convert it to electricity to power electronic devices.

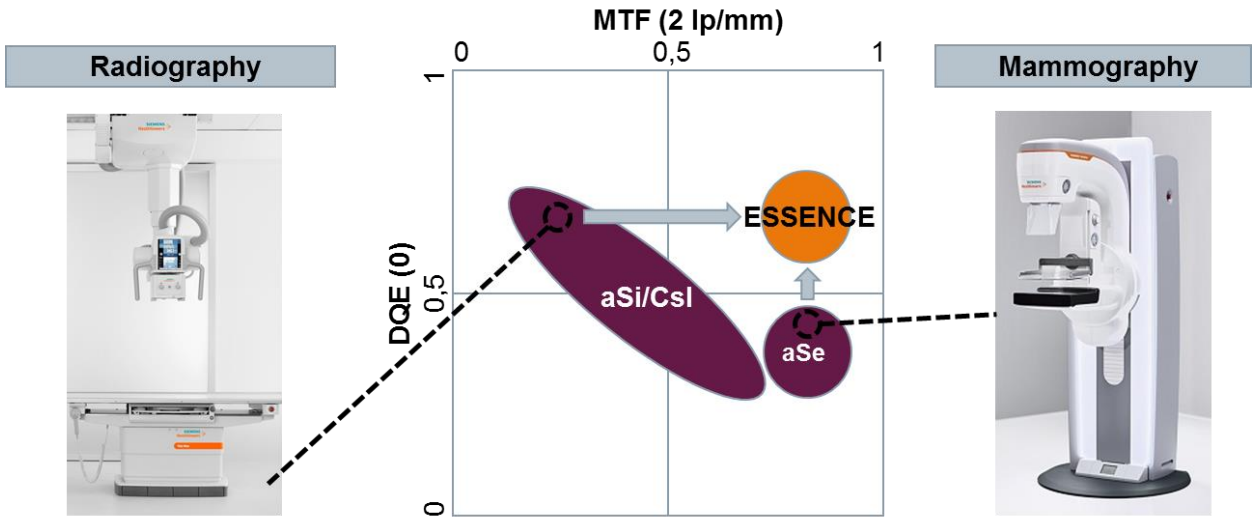
Our project is coordinated by inanoEnergy and the partners are inanoEnergy and XRig.

We plan to liaise with Research Infrastructure available in the Faculty of Science of Porto University.

Contact email: officeporto@inanoe.com

ESSENCE

The Idea is to demonstrate breakthrough advances in sensitivity and resolution of X-ray detectors, enabled by the combination of a high resolution metal oxide TFT backplane and a direct X-ray-to-charge conversion perovskite based frontplane.



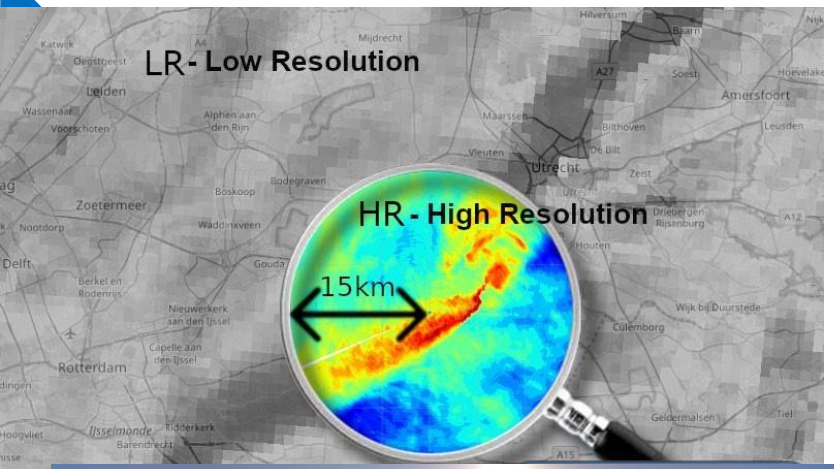
It could have applications in systems that will be the new reference in low-dose mammography, without compromising on image quality.

Our project is coordinated by TNO **and the partner is** Siemens Healthineers

Contact email albert.vanbreemen@tno.nl

EU-RainS⁴ - Enhanced Urban Rain Surveillance Systems for Smart city Solutions

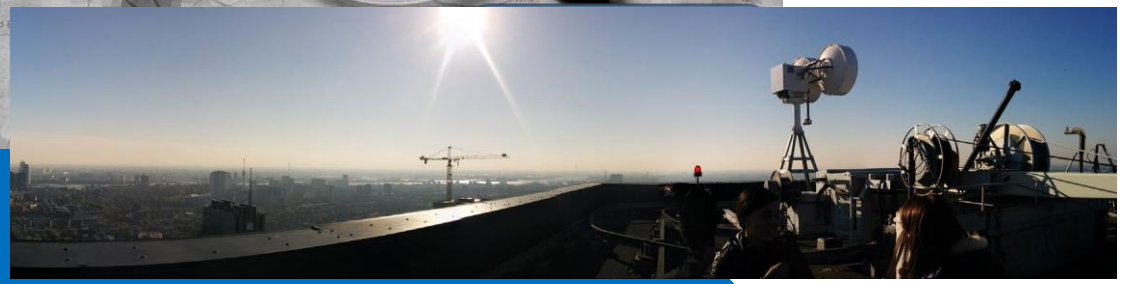
The Idea is to drastically **enhance the quality of the rainfall sensed at street-level** in urban areas, which is paramount to make cities more resilient and adapted to weather extremes caused by the changing climate



It could have applications in water risks management by creating the next generation of smart city solutions for climate adaptation

Our project is coordinated by SkyECHO and the **partners are** the Delft university of technology (**TU Delft**)

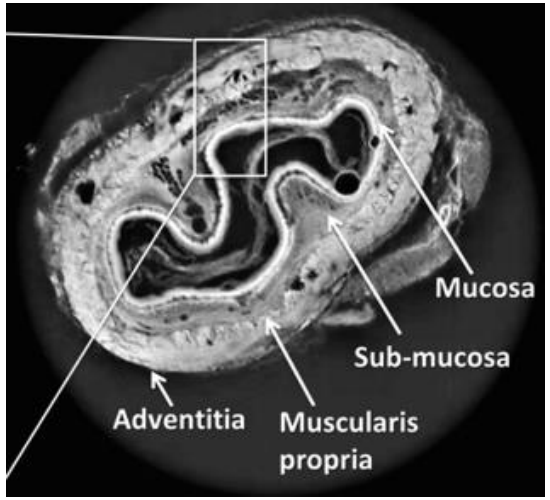
We plan to liaise with the Research Infrastructure the **Ruisdael observatory**, for weather and climate research in the Netherlands

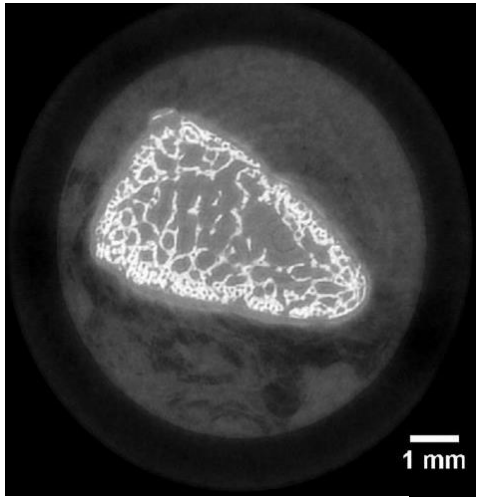


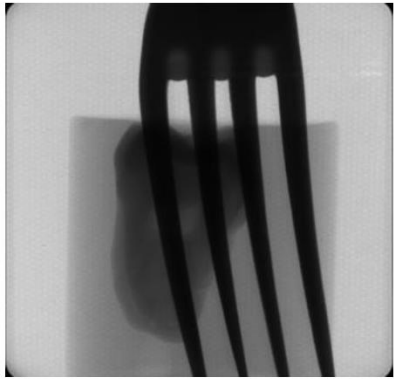
Contact email y.dufournet@sky-echo.eu

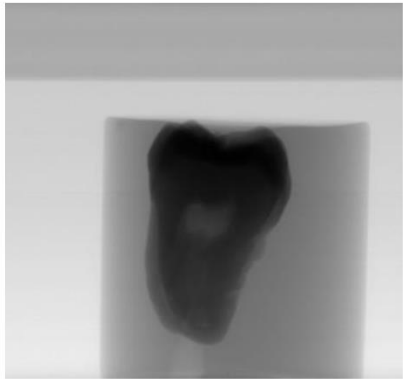
EXPITIS: Edge illumination X-ray phase contrast imaging with equiangular time-delay integration scanning

The Idea is to combine edge illumination X-ray phase contrast imaging with equiangular time-delay integration in order to improve imaging quality and make it tolerant of mask defects.









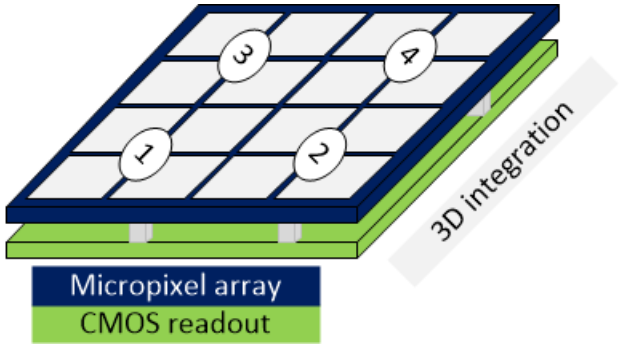
It could have applications in X-ray (including micro-CT) images of biological samples comprising hard and soft tissue and in cultural heritage (imaging scrolls).

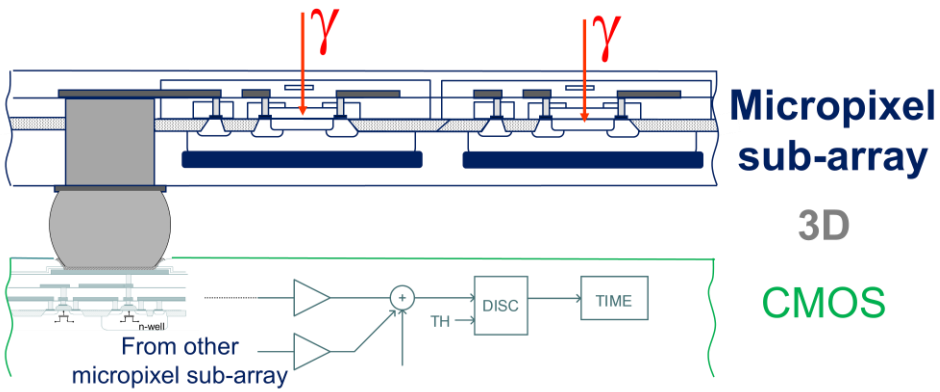
Our project is coordinated by Queen Mary University of London and the partner is University College London.

Contact email G.R.Davis@qmul.ac.uk, a.olivo@ucl.ac.uk

FastICPix: Integrated Signal Processing for a New Generation of Active Hybrid Single Photon Sensors with Picosecond Time Resolution

The Idea is to combine actively the signal of small micropixel sub-arrays based on the fastest single photon sensor technologies with ultrafast readout electronics using 3D integration.





It could have applications in medical imaging by enabling real time PET (Positron Emission Tomography), LIDAR, fluorescence lifetime imaging, homeland security and IOT / vision systems.

Our project is coordinated by the University of Barcelona **in partnership with** CERN.

It is part of wider collaborative effort involving sensor and ASIC design, 3D integration, module and applications with additional collaborators: CEA, EPFL, FBK, IFAE, LAL and University of Geneva.

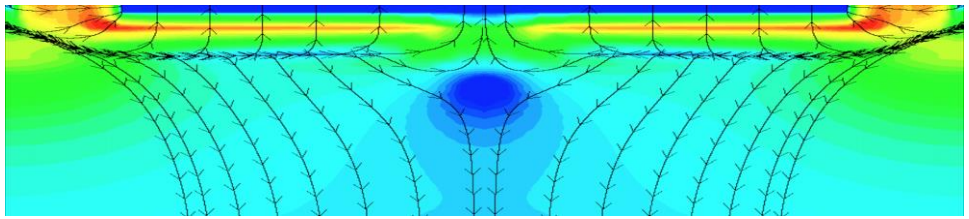
Contact email dgascon@fqa.ub.edu

FASTPIX

Monolithic CMOS sensors potentially provide **an ideal sensor for high energy physics** with an almost noise-free, large amplitude signal, tens of ps timing resolution, extreme radiation tolerance, covering large areas at reasonable cost, and significant in-pixel functionality.

The key to the presently **missing combination of precise timing and extreme radiation tolerance** is a sensor structure eliminating the tradeoff between minimum pixel size and signal timing variation.

We aim to provide such a structure and lay the basis for a **"dream" sensor** revolutionizing not only high energy physics experiments, but also other scientific measurement tools as imaging Time-of-Flight Mass Spectroscopy and Fluorescence Life-Time Imaging Microscopy, and sensors used in daily life like LIDAR in cars.



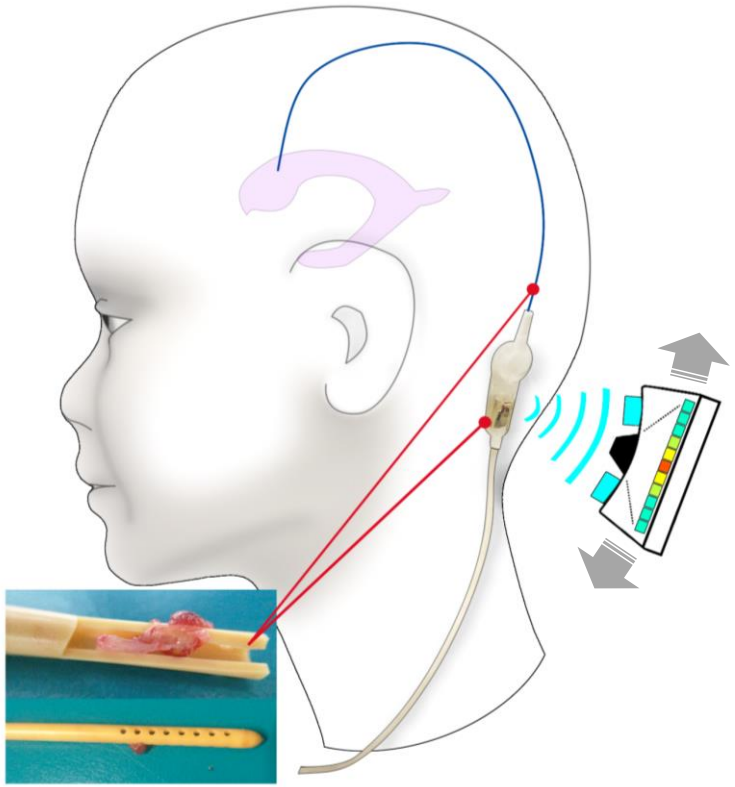
Simulation of the electric field in a CMOS sensor

Our project is coordinated by CERN and the **partners are** INFN and Ritsumeikan University.

Contact email walter.snoeys@cern.ch

FUSCLEAN: Focused ultrasound cleaning of implanted shunts in patients of hydrocephalus

The Idea is to develop a proof-of-concept of preventive, non-invasive, easy-to-implement, cost-effective acoustic cleaning of valves and catheters (implanted in the brain) by image-monitored cavitation.



It could have applications in Neurosurgery, to avoid the (very serious) consequences of cerebrospinal fluid flow obstruction, and in other clinical areas (e.g. Oncology).

Technologies: Combination of focused ultrasound, neurophotonics (multispectral imaging) and artificial intelligence.

Our project is coordinated by Universidad de Sevilla (Spain) **and the partners are** Institute of Biomedicine of Seville (University Hospital “V. Rocio”) and Technological Corporation of Andalusia.

Contact email: Prof.Dr. Emilio Gomez-Gonzalez
egomez@us.es

GASRAMAN - A novel Raman-based sensor for combustible gas analysis

The Idea is to develop a compact, light, low-cost Raman instrument with low power consumption for on-line monitoring of natural gas, methane mixtures, biogas and biomethane composition.

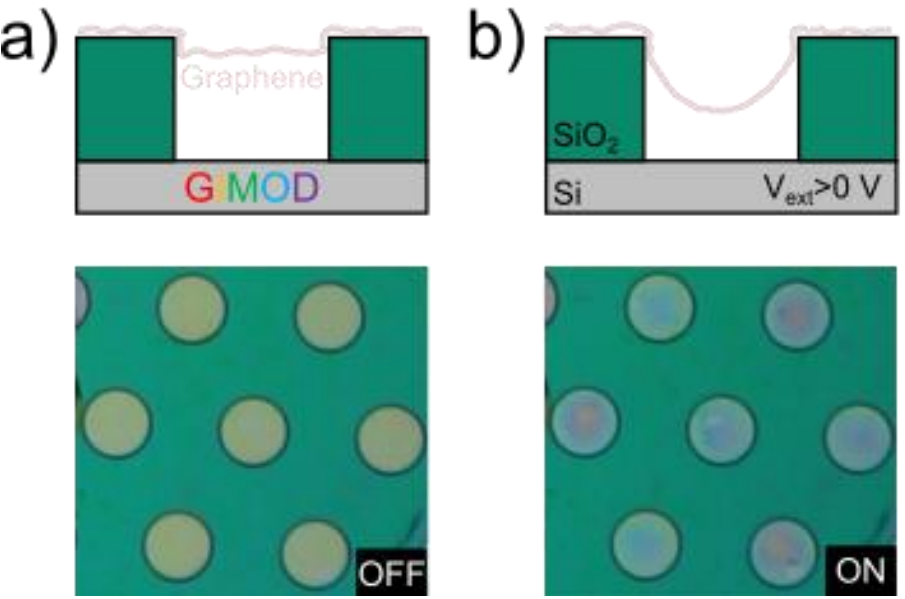
It could have applications in combustible gas diagnostic; determination of the gas composition: main hydrocarbons and gases like N_2, CO_2, O_2, H_2O,... often found as impurities; remote sensing in gas pipelines.

Our project is coordinated by CNR-Institute for Photonics and Nanotechnologies, Padova, Italy **and the partner is** Centre for Energy Economics and Technology of the University of Padova, Italy

Contact email luca.poletto@cnr.it

GIMOD Project

We will design and develop graphene interferometric modulator displays (GIMODs) to push for their commercialization within 2 years. For that goal, we will fabricate, characterize and demonstrate cm^2-size prototypes in an industrially scalable manner.



It has applications in VR displays, e-book displays, microdisplays (video projectors) and optical components requiring >90Hz frame rates and/or >2500 ppi.

Our project is coordinated by SCALE Nanotech OÜ **and the partner is** Graphenea Semiconductor S.L.U.

We plan to liaise with Research Infrastructure COPT Zentrum (Cologne, Germany).

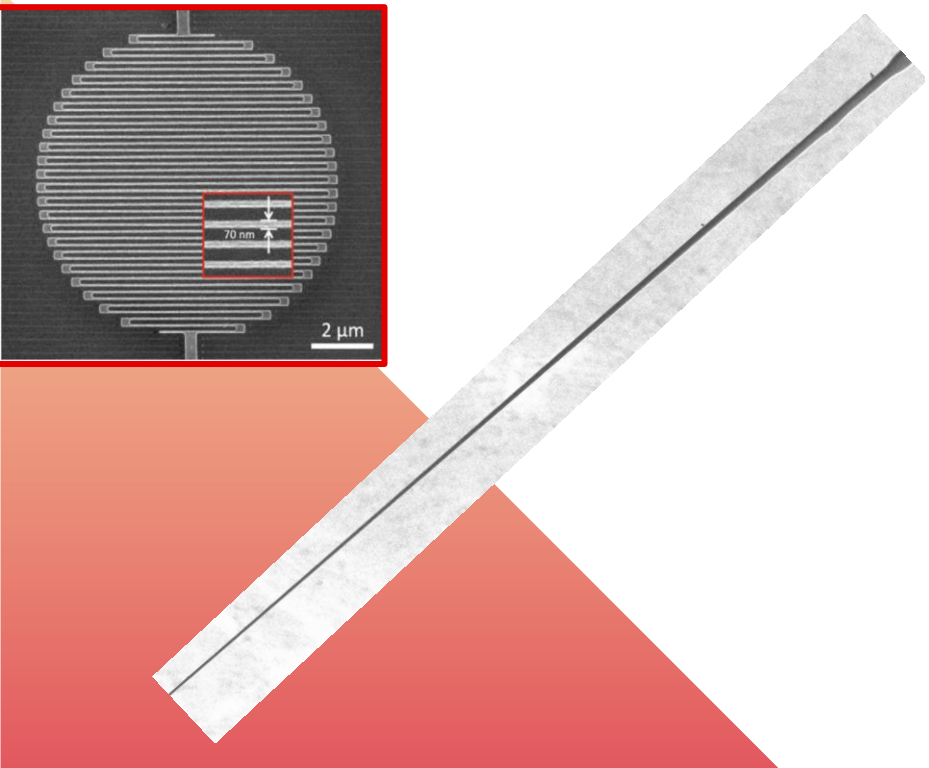
Contact email cartamil@scalenano.tech

GISIPHOD *GHz Single Photon Detector*

The Idea is to build a superconducting single photon detector with a count rate of 1 GHz.

SQ: small

KTH: on tapered fiber



It could have applications in QCrypto, LIDAR, optical communication, diagnostics, spectroscopy

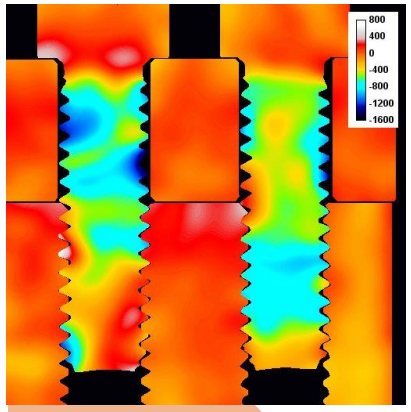
Our project is coordinated by Single Quantum (NL) **and the partners are** KTH (SE).

We plan to liaise with Research Infrastructure
Nanolab @ KTH and Kavli Nanolab @ TUDelft

Contact email andreas@singlequantum.com

GP2M:
A modular detector for the emergent field of energy resolved neutron imaging and 3D reconstruction.

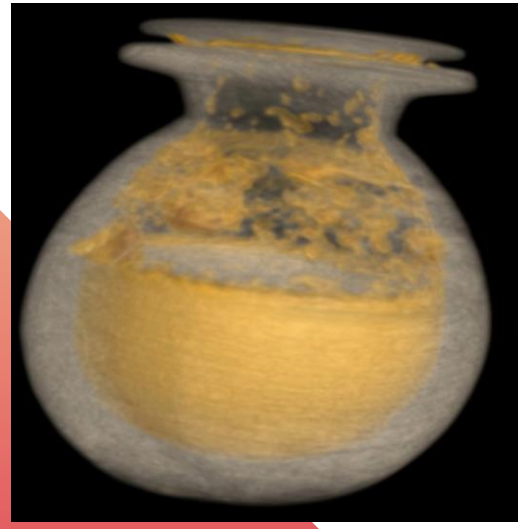
The idea is to realise the full potential of energy resolved neutron imaging via innovations in detection area, efficiency and read-out speed.



Non-destructive Examination of Loads in Regular and Self-locking Spiralock® Threads through Energy-resolved Neutron Imaging A. S. Tremsin et al. *Strain (2016) 52(6) 548*

← These techniques…

… on this scale ↓



Neutron radiography of Egyptian Kha tomb objects, Alabaster date ~1300 B.C.
Giulia Festa (PI), Tino Minniti (IS: IMAT), Valentina Turina, Matilde Borla

It could have application from engineering to archelogy, security to food production, industrial quality control to prototype R&D.

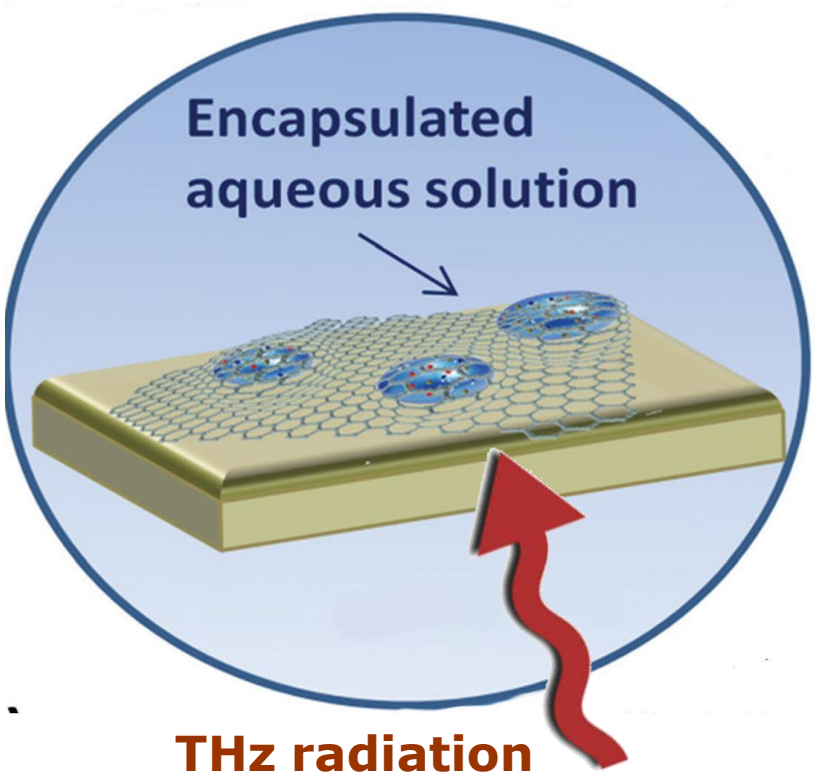
Our project is coordinated by STFC – UKRI **and the partners are** Oxford University.

We plan to liaise with the neutron imaging community via conferences, workshops and beamtime.

Contact email daniel.pooley@stfc.ac.uk

GRaphene Golay micro-cell **A**rrays for a color-se**N**sitive **T**eraHertz imaging sensor (GRANT)

The Idea is: to exploit the outstanding chemical, physical and mechanical properties of graphene to create a a microarray of “color” sensitive Golay cells as light and low cost a THz CCD



Applications: light, portable and autonomous THz cameras to equip drones for a low cost and effective monitoring in many fields:

- Large infrastructure such as bridges, railways, buildings;
- Cultivated field and the maturation of crops;
- Status of goods during shipping…..

Project coordination: CNR-IOM (Trieste-Italy)
Partnership: the Italian Synchrotron light sources, Fermi and Elettra (Trieste-Italy) and CNR-nano (Pisa-Italy)

Research Infrastructure liaison: Elettra and Fermi will provide a THz source with *fsec* resolution and a *continuous* spectrum,

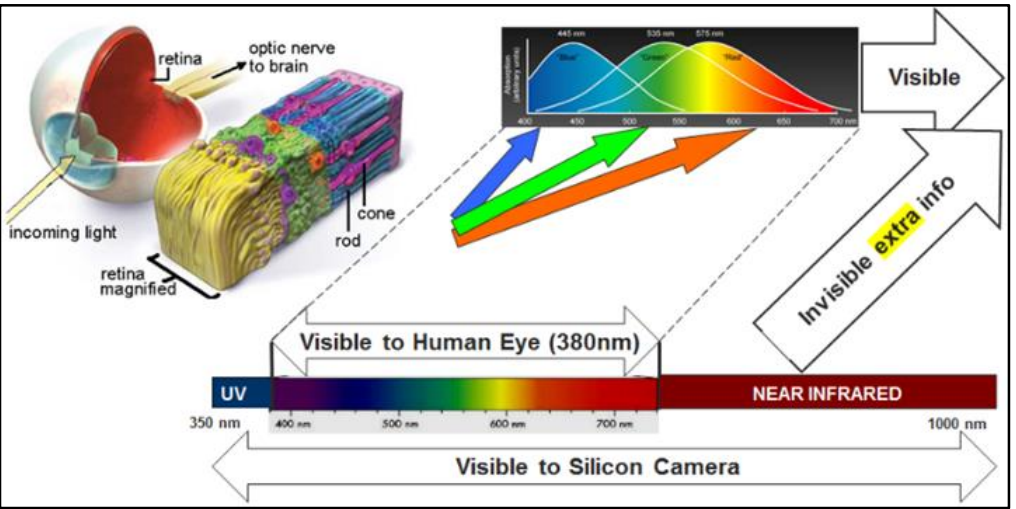
Contact e-mail: lazzarino@iom.cnr.it

H3D-VISIOnAiR

Head-worn **3D**-**V**isualation of the **I**nvisible for **S**urgical **I**ntra-**O**perative **A**ugmented **R**eality

The Idea

Aims to create 3D-microscope head mounted glasses that visualize the invisible for surgeons by combining 3D-multispectral cameras, advanced computer analytics and Near Eye Displays.
Build a real-time 3D AR demonstrator with overlay of images from NIR spectral signature of human pre-defined human critical tissues. Reduce damage to vital anatomical structures e.g. nerves, lymphatic tissue and blood vessels.



It could have applications in

EU-Projects: VOSTAR, EXIST, ASTONISH

industrial, security, surveillance, forensic, agriculture

Coordinated i-Med Technology BV

Partners Maastricht UMC+, Maastricht University, imec

Contact email jaap@i-medtech.nl

Website www.i-medtech.nl

HERALD Hyperspectral retinal imaging for non-invasive detection of amyloid-β in patients with Alzheimer disease

We will test and demonstrate a system for **hyperspectral imaging of the retina** with a compact and fast hyperspectral sensor to detect and quantify **retinal amyloid-β** in patients with **Alzheimer Disease** (AD).

It could be used as low-cost non-invasive technique for **early diagnosis of Alzheimer's Disease** which is essential in (pre)clinical research on **disease-modifying drugs**. Further on it can be used for identifying **patients at risk** and for follow-up of **disease progression**.

Fig.1 : Top : hyperfluorescent Aβ plaque in brain tissue (orange), and reference areas (red dashed); Middle : hyperspectral image at same location; Bottom : spectral analysis showing difference in absorption in the lower wavelengths (450–500nm) between Aβ and reference area

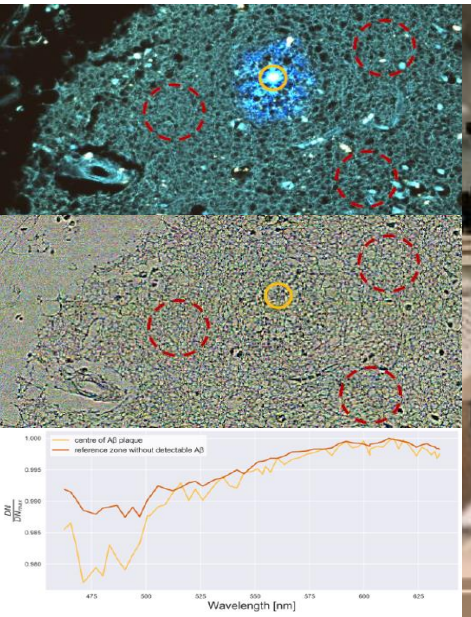


Fig.2 : Left: Snapshot camera mounted on Topcon TRC 50 DX fundus camera

Our project is coordinated by **VITO (Flemish Institute for Technological Research)** and partner is **Leuven University** (departments of **Ophthalmology, Neurology** and **Clinical Pathology** of **University Hospital Leuven**)

Contact email patrick.deboever@vito.be