EIC Regional Info day, Ljubljana, June 8, 2023

EIC Pathfinder Open PetVision Project

Assoc. prof. dr. Rok Pestotnik

Jožef Stefan Institute, Ljubljana

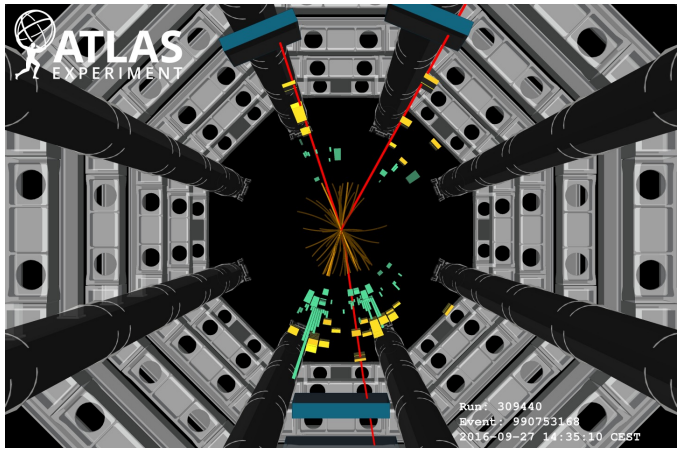
PetVision is an EIC Pathfinder Open project,
financed by EC under Grant no. 101099896

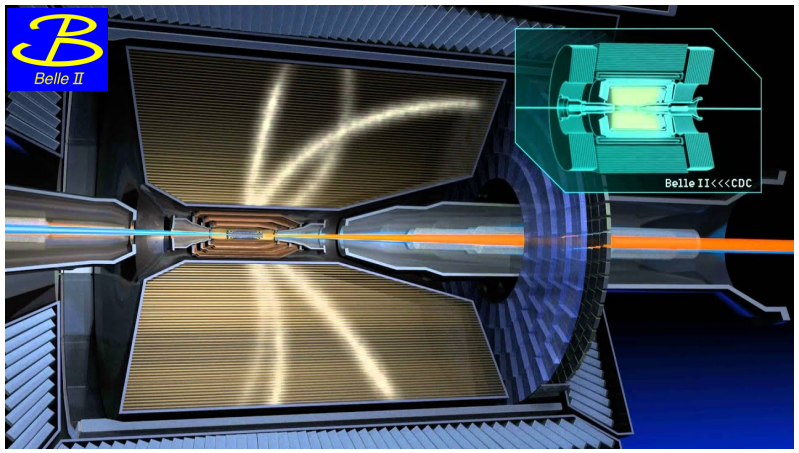
Background – Experimental Particle Physics Department

Institut "Jožef Stefan", Ljubljana, Slovenija

International collaborative research for measuring fundamental particles.

- Study fundamental constituents of nature and their interaction.
- Develop technologically demanding particle detectors
- Complexity and costs of experiments
  - Joining large collaborations in international particle physics centres:
  - Requires efficient collaboration between individuals and management of resources.
- Collaboration on experiments at CERN near Geneva and at KEK in Tsukuba, Japan.





From the development of particle detectors to medical applications

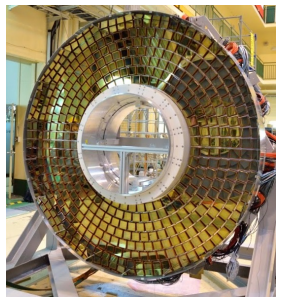
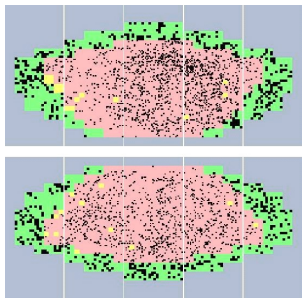
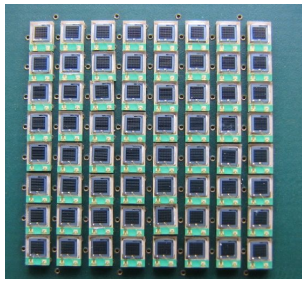
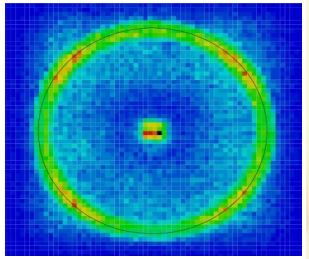
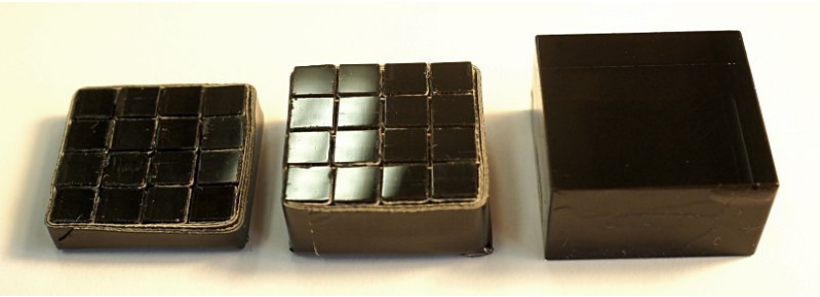
The Department is developing detectors for extreme conditions:

- high radiation load - gamma radiation, charged particles, neutrons;
- high event rates - e.g. collisions every 25 ns at the LHC;
- barely detectable signals – need high efficiency for single photon detection.

Impact

Long term: e.g., Internet, GPS, understanding of the Nature

Short term: Transferring the knowledge and technologies to medical diagnostics.

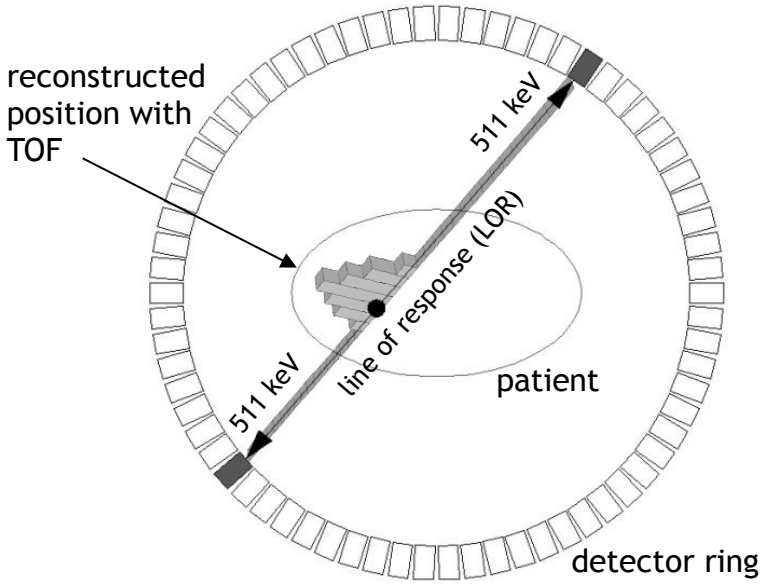







Positron emission tomography - PET

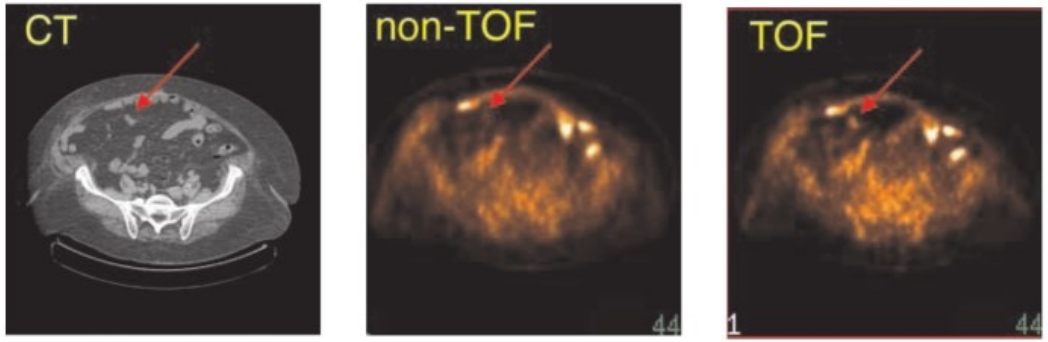
Diagnostic method for in-vivo imaging of biological processes

A radioactive marker is injected into the patient, which decays in the body by beta+ decay.

The **annihilation of the positron** produces gamma rays, which fly out and are detected by gamma-ray detectors.



By reconstructing the events, we get a picture of the distribution of sources in the body - important information for doctors when diagnosing e.g. cancer.



Philips Gemini TF PET/CT, TOF resolution of 600 ps
[PET Center of Excellence Newsletter, Vol.3 Issue 3 (2006)]

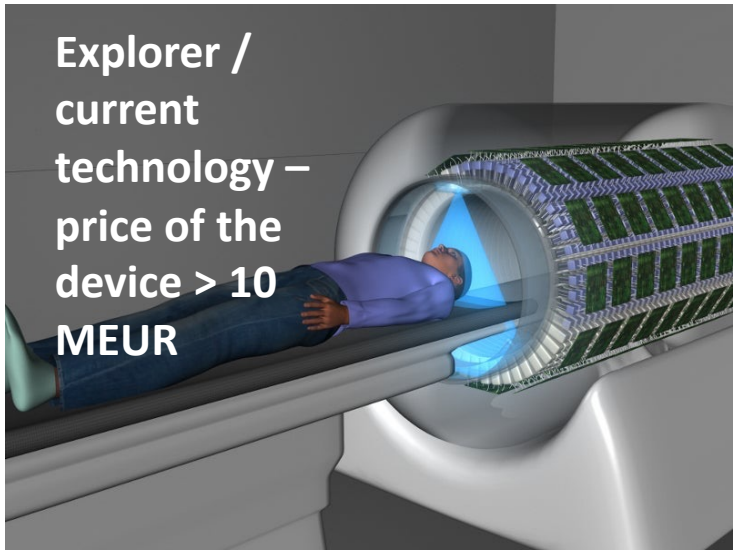
PetVision project

Institut "Jožef Stefan", Ljubljana, Slovenija

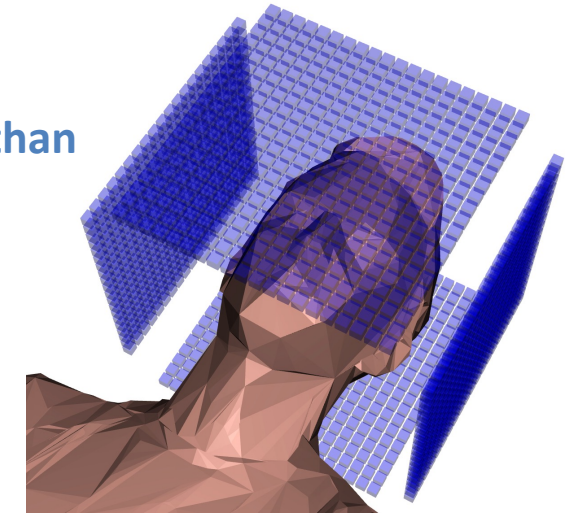
Development of the next generation of ultra fast time-of-flight PET devices

Long term vision - to develop breakthrough technology that will make cancer diagnosis and treatment more efficient and less expensive.

Objective - To prototype and test a limited field-of-view device in a real-world environment - TRL 6



PetVision – Price of the device less than 0.5 MEUR

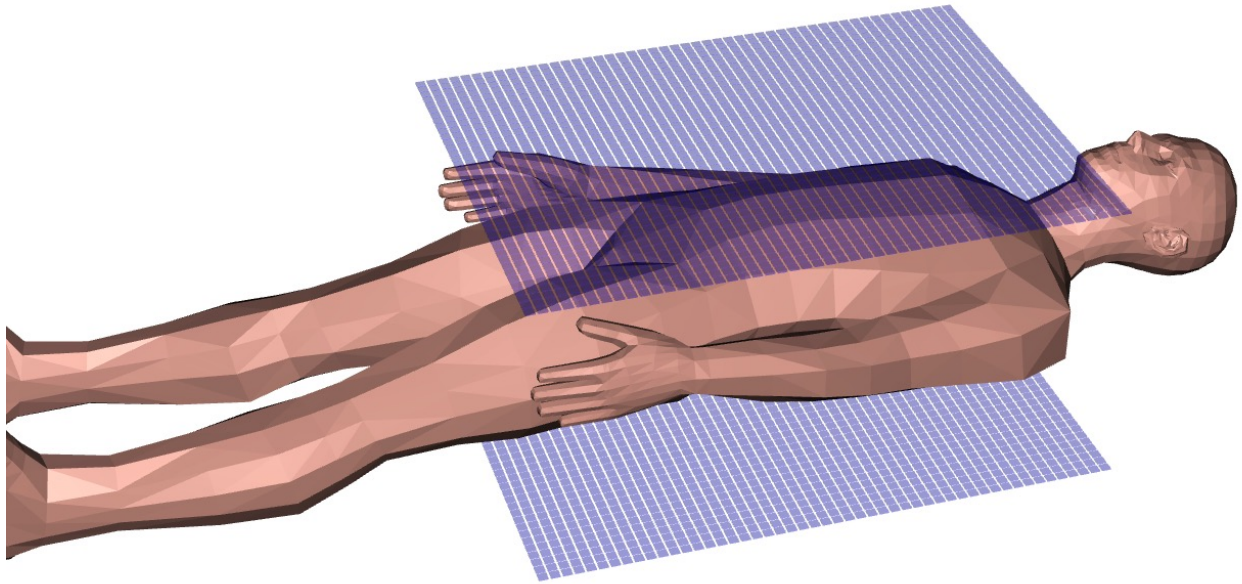


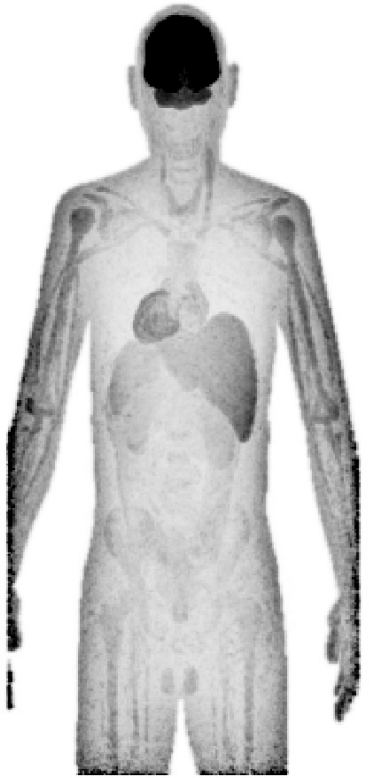
Several innovation steps that all together form a disruptive break-through in medical imaging

Log term goal - Extension to total body imaging

By increasing the sensor panels, the detection efficiency is significantly improved:

- More accurate images
- Reduced radiation burden on the patient





Choice of partners

Institut "Jožef Stefan", Ljubljana, Slovenija

7 partners – coordinating partner JSI

- Technology development: JSI, FBK - Trento, ICCUB - Uni Barcelona, I3M - Valencia
- Company: Oncovision - Valencia
- Technology Validation: 2 hospitals ~ MGH-Harvard Boston , TUM-Med - Munchen

Interdisciplinarity:

- Development of electronics, photon sensor, integration, reconstruction, testing, exploitation

Institut "Jožef Stefan", Ljubljana, Slovenija

ICCUB | Institut de Ciències del Cosmos UNIVERSITAT DE BARCELONA

FONDAZIONE BRUNO KESSLER
FUTURE BUILT ON KNOWLEDGE

MGH 1811

Gordon Center for Medical Imaging

ONCO VISION

i3M

MRI Klinikum rechts der Isar Technische Universität München

Project proposal – EIC Pathfinder Open

Institut "Jožef Stefan", Ljubljana, Slovenija

Administrative

Part A

- Partners
- Researchers
- Achievements
- Equipment
- Ethical issues
  - Iteration of DoA during the Grant agreement preparation

Science

Part B - 17 page limit

Excellence

- Vision
- Goals

Impact

- Long-term impact
- Innovation
- Communication

Implementation

- Consortium
- Work Plan
- Resources

Start of application preparation 1 year before the project.

2021 application: unsuccessful

- after 3 months - evaluators' report - 9 pages
  - Very appreciated
  - A lot of useful and relevant comments
- 1 week response time - 2 page rebuttal
- Funding decision after 5 months

Taking into account comments:
Application 2022: successful (6% success rate – 57 selected out of 858 propoals)

2023 April – Grant agreement has been signed
2023 - 2028 project implementation
Start of the project adjusted to the activities of partners

The project allows applying for EIC Transition and Accelerator, start-up funds for technology commercialisation.
We plan to seek for a VC seed money to accelerate the commercialization.

*More or less standard template with emphasis on the advancing the disruptive technologies towards commercialization

Experience in preparation of application

- If you have the vision to develop a break-through technology,
- If you have an idea that has the potential to have a big impact,

- Find your partners.
- Get help for the parts where you are not strong.
- Define your goals.
- Explore impact.
- Draw up your work plan.

And work together to make an application that succeeds.

Fortune favours the brave