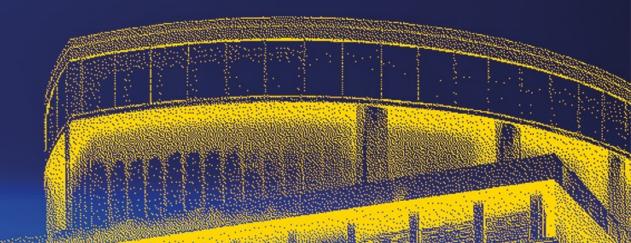


# SVEDISH BIGSCIENCE FORUM



# BIG SCIENCE AS MOTOR

#### Knowledge Transfer



Martina Bauer
Technology Transfer Manager
GSI AND FAIR



Enrico Chesta

Aerospace and
Environmental Applications
Coordinator and a senior
member of the Knowledge
Transfer Group

CERN



Matti Laitinen
Research Manager
ABB



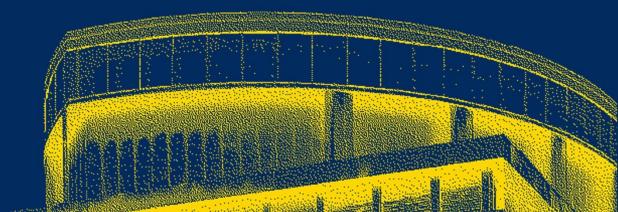
Maja Olvegård
Researcher at the
Department of Physics and
Astronomy and Director

FREIA, UPPSALA UNIVERSITY

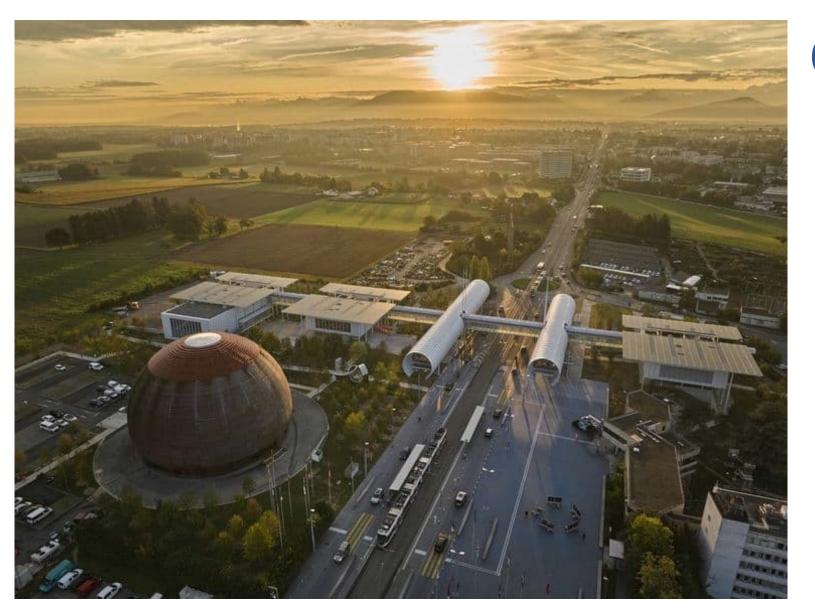


#### Knowledge Transfer Session Big Science as a Motor

CERN



#### Big Science as a Motor: Accelerating Innovation



#### CERN's Knowledge Transfer Model



31 JAN - 1 FEB 2024

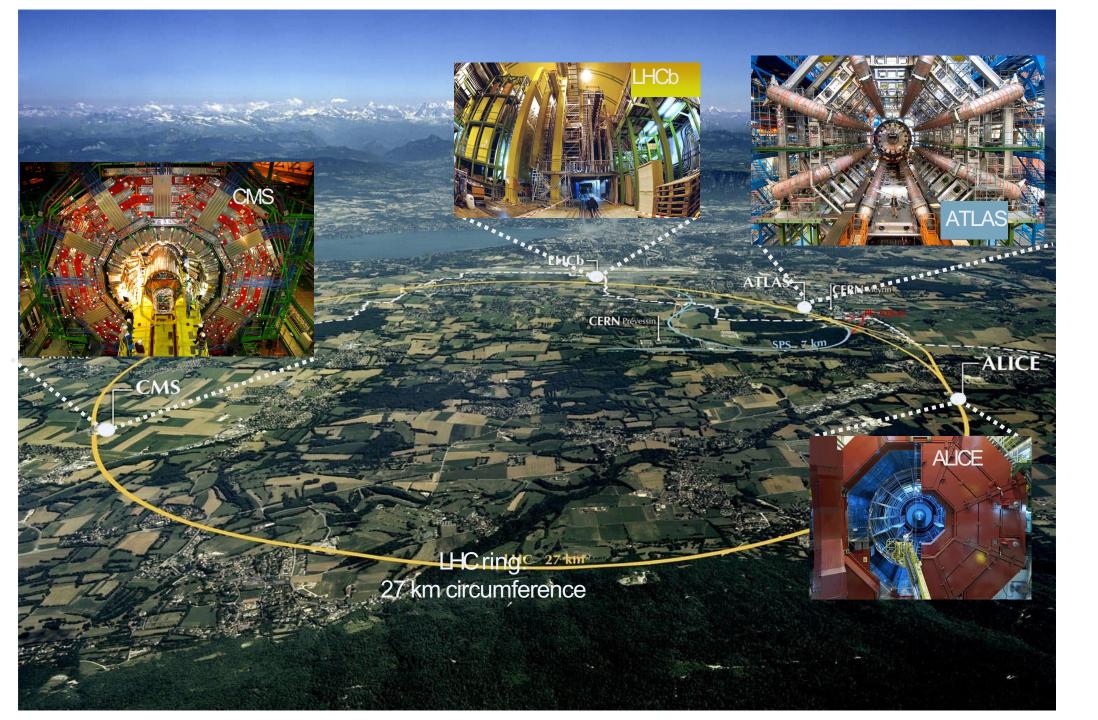
#### **Enrico Chesta**

Environmental and Aerospace Applications Coordinator



Knowledge Transfer *Accelerating Innovation* 

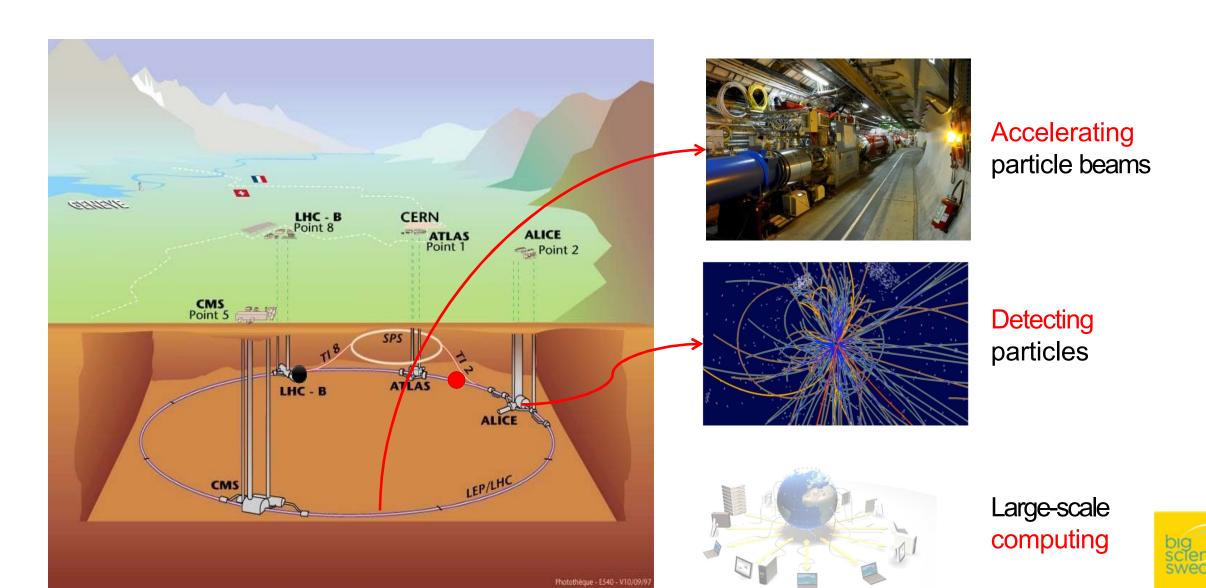




# cern at a glance



#### Key competences in cutting edge technologies



# Very high vacuum





# Extreme temperatures



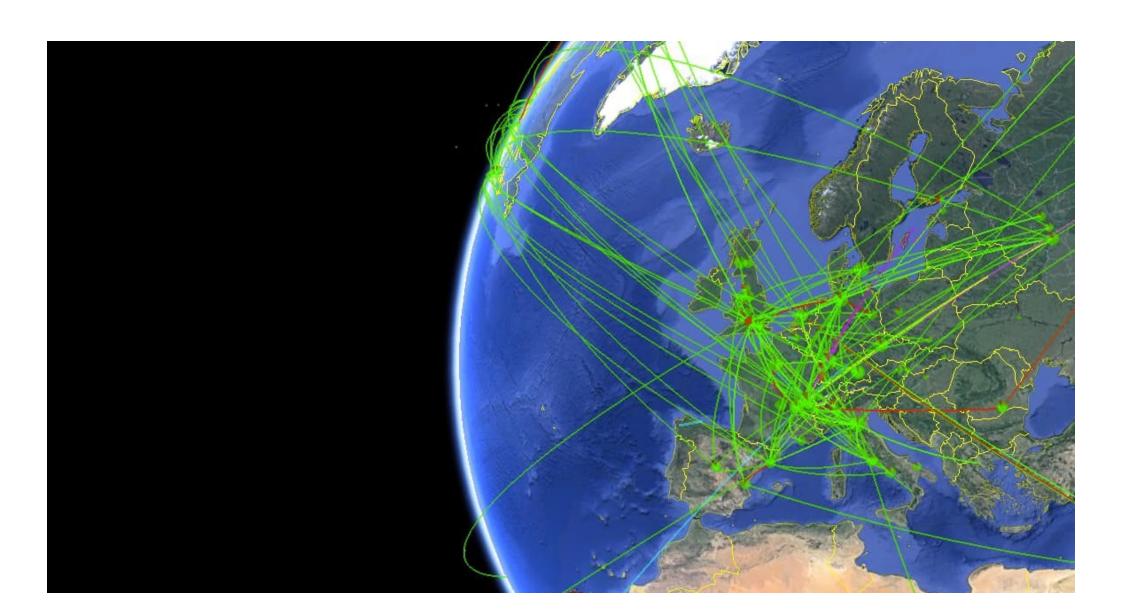


#### Radiations





# **Big data**





#### **CERN's Value Proposition**

**Machine Learning and** 

**Deep Learning** 

**Industrial Controls and Automation** 

High and Ultra High Vacuum Systems

Data Analytics

Metrology

Cryogenics

Optoelectronics and Microelectronics

Superconducting

**Magnets** 

High Volume Data Management & Storage

**Radiation Protection and Monitoring** 

Particle Tracking and

Calorimetry

Sensors

**Collaboration Tools** 

Health, Safety and

**Environment Management** 

Particle Acceleration

and Control

Material Science **Cooling and Ventilation** 

Radio Frequency Technology

**Robotics** 

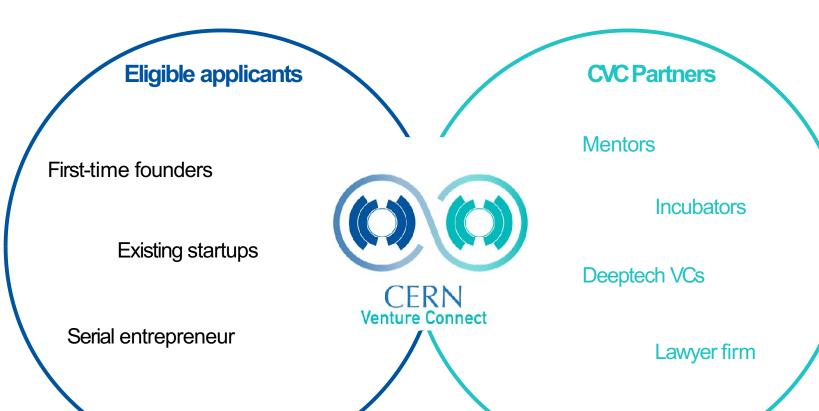
Manufacturing and Mechanical Processes



#### CVC - Support deep tech startups



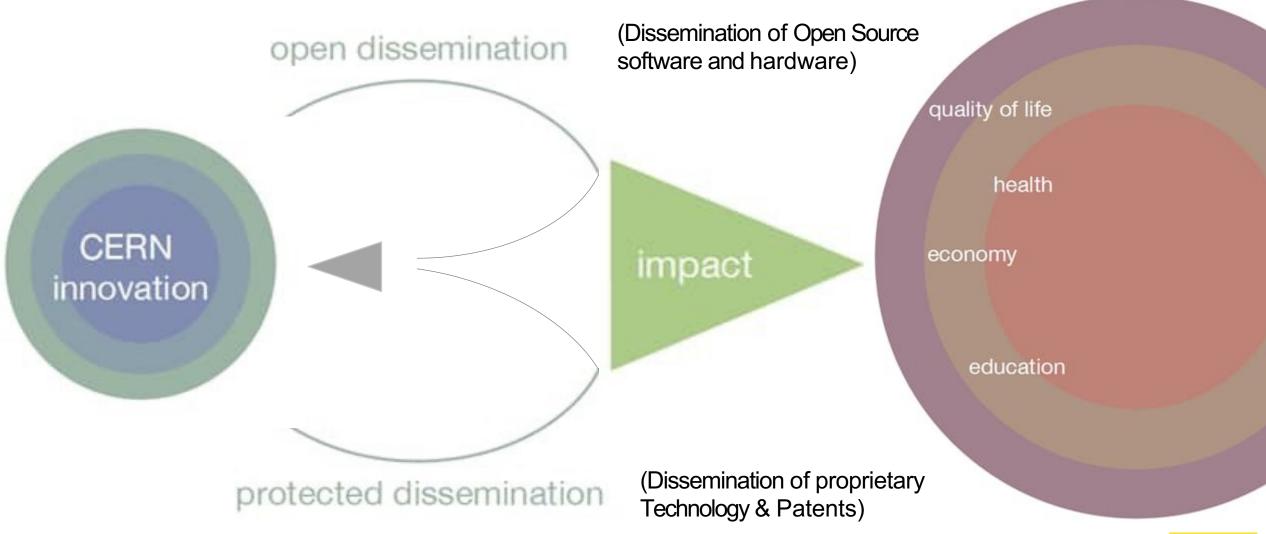
Any deeptech founder / deeptech startup with an idea and the capabilities to absorb CERN tech in a product / service



Any person/ organisation with capabilities to support founders / startups in their journey

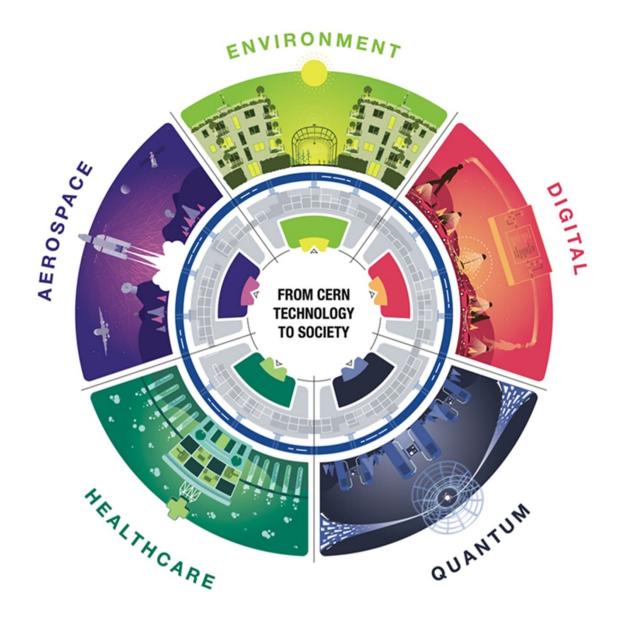


#### **CERN's «impact driven» innovation model**

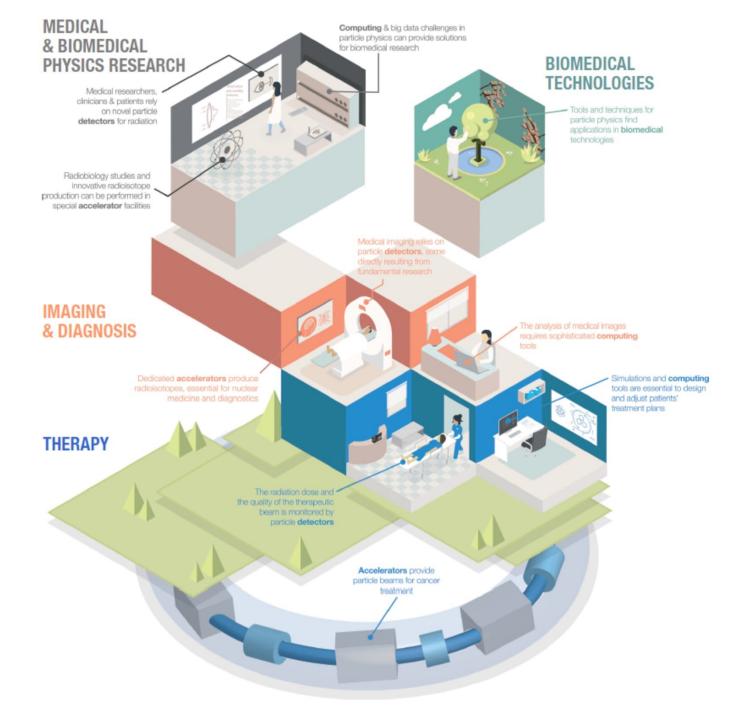




#### **CERN's «application driven» innovation model**

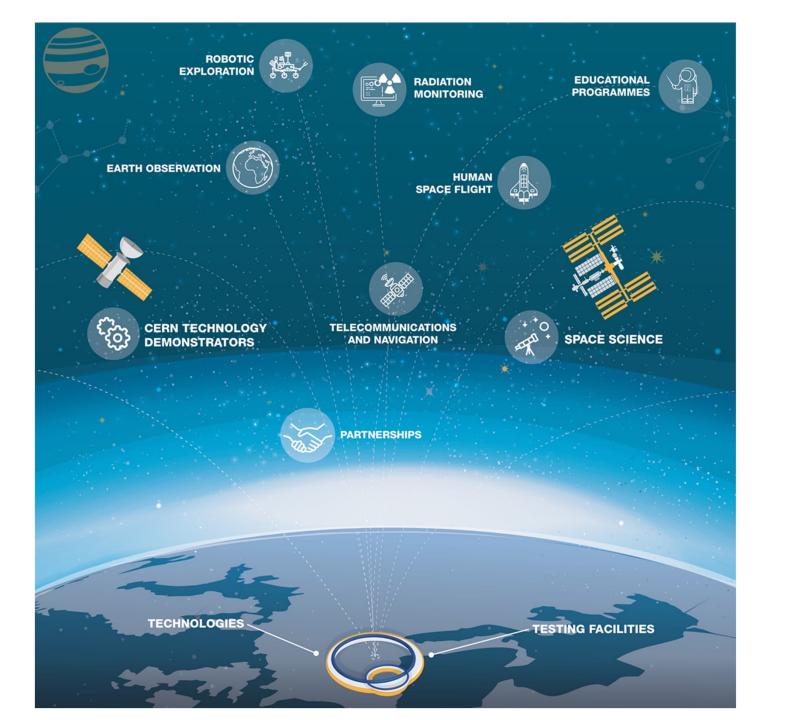






# Medical Applications





# Aeropace Applications



#### **Environmental Applications - CIPEA**

#### RENEWABLE AND LOW-CARBON ENERGY

Production Transformation Distribution Storage



#### CLEAN TRANSPORTATION AND FUTURE MOBILITY

Aviation Shipping Rail Automotive



#### SUSTAINABILITY AND GREEN SCIENCE

Power Management Heat Management Industrial Processes

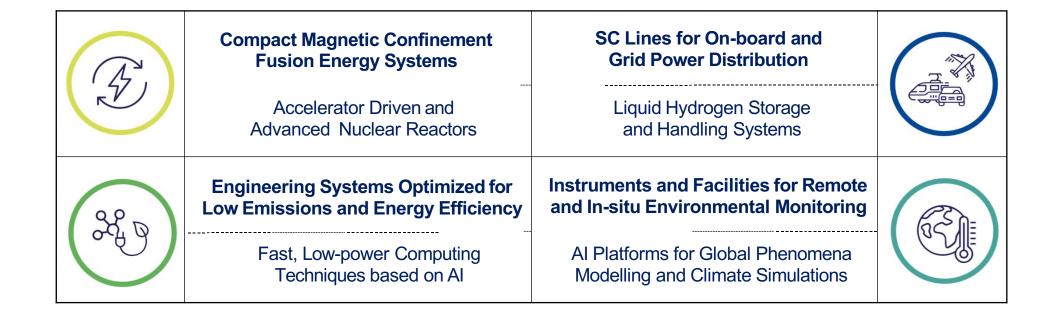
#### CLIMATE CHANGE AND POLLUTION CONTROL

Monitoring Modelling Mitigation



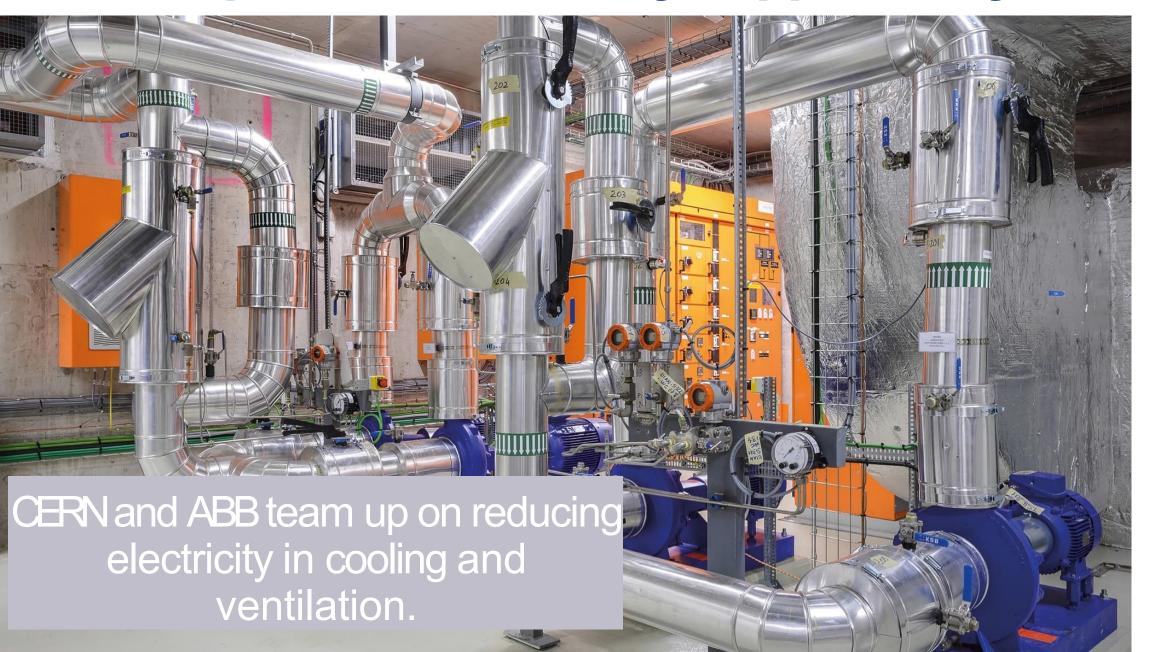
#### CIPEA - Poles of Competence in Environmental Applications





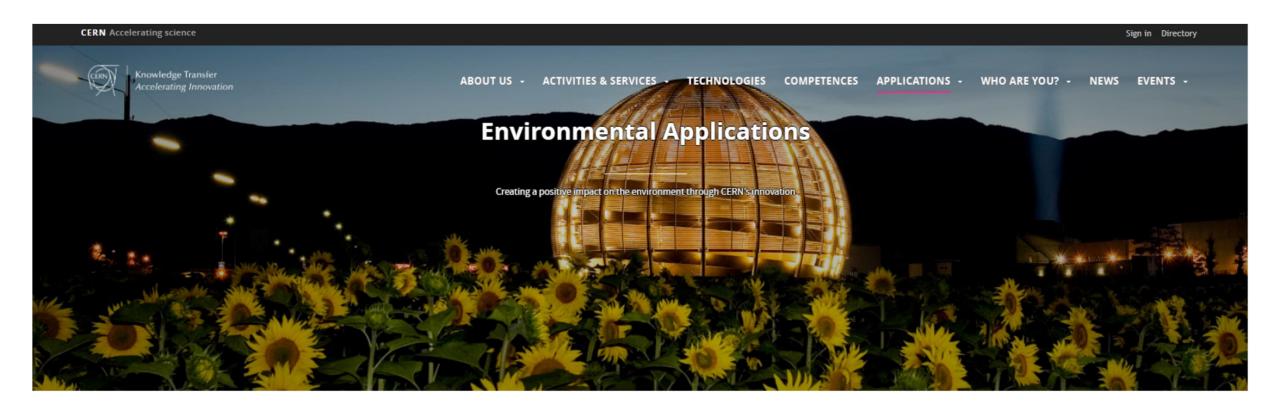


#### Example of success story supported by BSS





#### Thanks for your attention!





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# Big Science as motor – Technology Transfer at GSI and FAIR

**Dr. Martina Bauer** 

GSI Helmholtz Center for Heavy Ion Research GmbH FAIR Facility for Antiproton and Ion Research in Europe GmbH

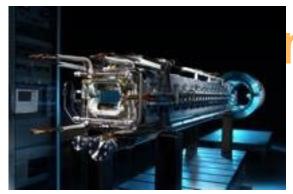
Swedish Big Science Forum 2024, Lund, Sweden, 31th January 2024



#### **High-Tech for FAIR**



Various Technologies, Know-how and







Magnet technology



Vacuum technology



IT-Technology/
Data processing

Electrical/ Energy technology

High-voltage/highpower pulse technology Space Research Nano technology

High-frequency/ communications technology

Detector technology

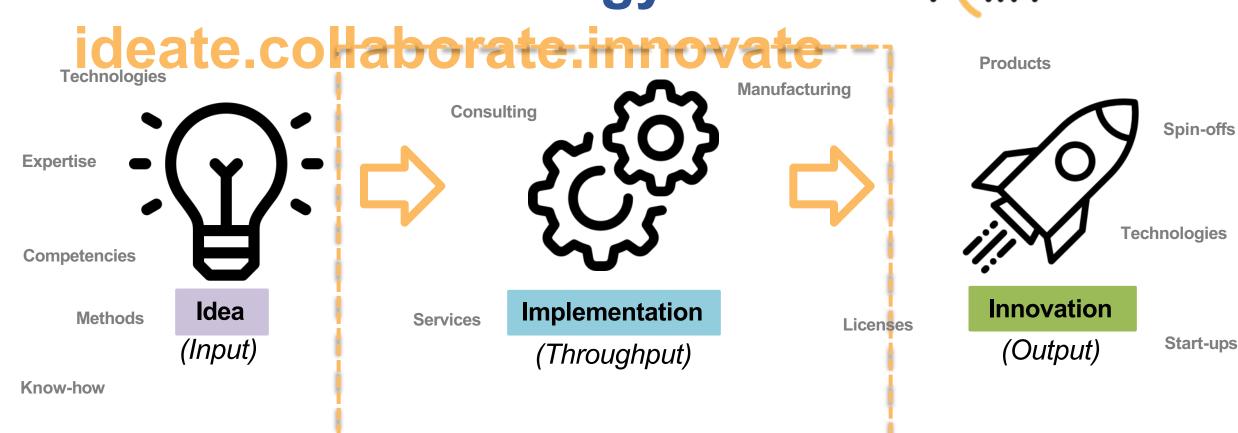
Laser technology

(Micro-) Electronics Control/regulation engineering

Metrology/ Sensors Medical technology

Accelerator technology

# GSI/FAIR Technology Transfer FAIR



**ACADEMIA** 

**COLLABORATION** 

**INDUSTRY** 

**Knowledge Development** 

**Technology Development** 

**Business Development** 

TRL 1-3

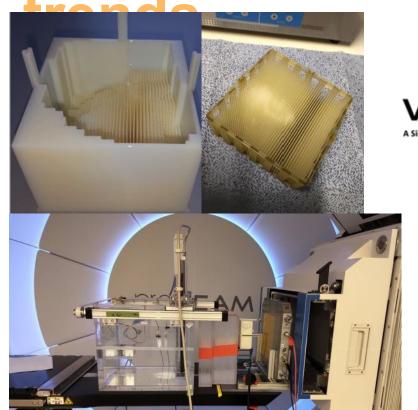
**TRL 4-7** 

**TRL 7-9** 



# Industrial Cooperations with Industry & Start-ups

Cooperation on range modulators for Ogy to programme delix Cooperation pFLASH therapy

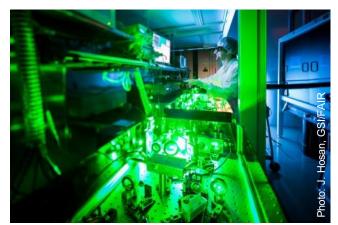
































Source: https://focused-energy.world

### GSI/FAIR Green IT-Cube & ReaF4bb

# "Digital Open Lab" DIGITAL OPEN LAB offers...

Joint R&D provision of infrastructure and IT competencies for joint development projects around about HPC, Big Data and ultra-fast data acquisition, including software development and products.

**COLLABORATIONS** access to HPC systems and projects for external partners via collaboration projects.

PROVISION OF RACK SPACE offer of services in the data centre.













# GSI/FAIR's commitment to enabling

FAIR CSI

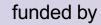
FAIR GSI

#### Financing of...

- Feasibility studies
- Validation projects
- Service projects
- Start-up projects

#### **Enabling...**

the first phase of validation and further development of market-relevant technologies.





#### **GSI** and **FAIR**

#### A motor for innovation



- Unique competencies, know-how and infrastructure is available to map out new technological trends and applications in cooperation with industrial partners.
- Early involvement of and co-creation with industry to reduce time to market.
- Established formats to open our unique infrastructure and expertise to external partners.
- Several cooperation forms, support and funding options are available.





#### Thank you for your attention!

Contact: Dr. Martina Bauer

GSI Technology Transfer

Email: m.bauer@gsi.de









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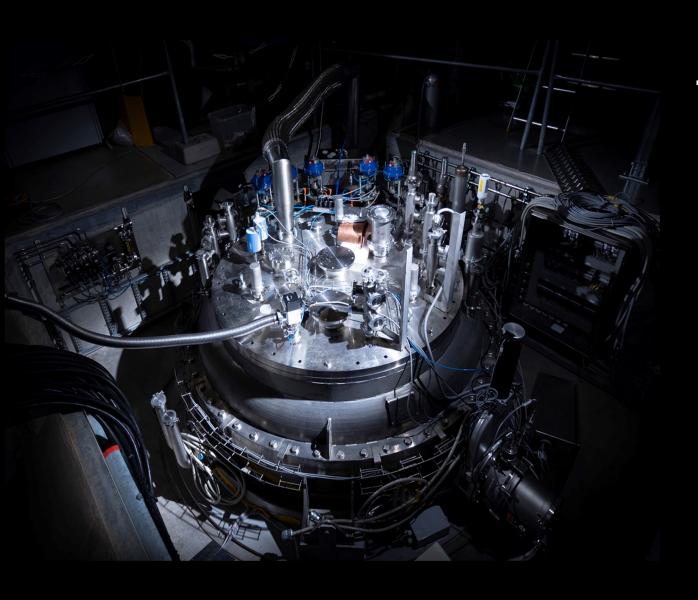
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#### The FREIA laboratory

a link between

Academia,
Big Science Facilities
and Industry

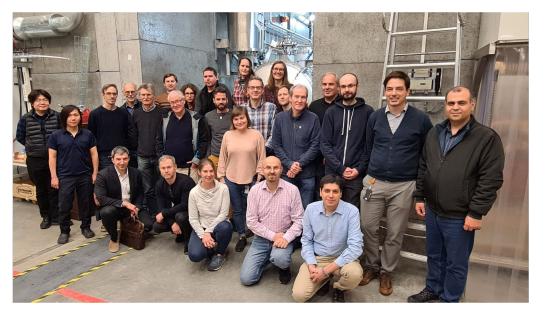
Maja Olvegård

Head of the FREIA division Uppsala University

#### FREIA Facility for Research Instrumentation and Accelerator development







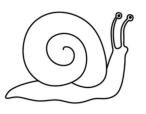












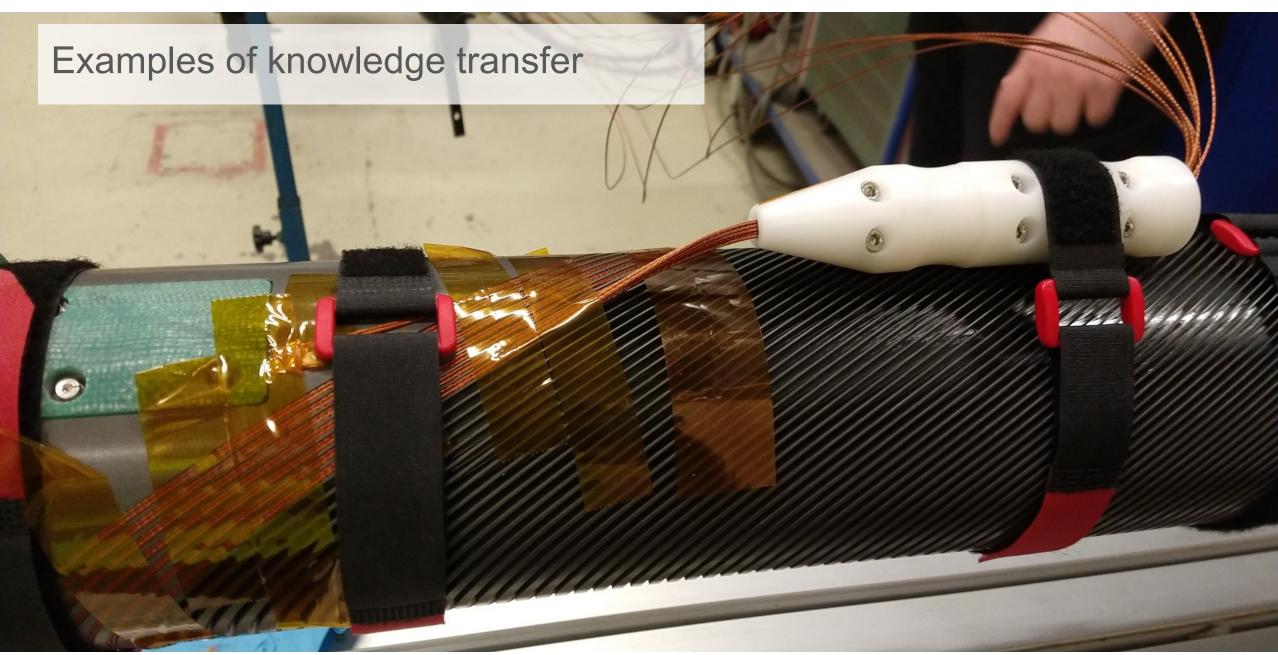


Photo: Anton Ahl, Scanditronix.

#### An example of knowledge transfer

# "Cold Magnets"

Kompetens- och teknikspridning om kalla magneter för tillgång till en breddad internationell marknad















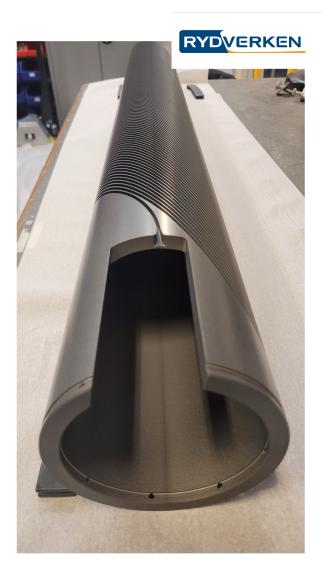
#### "Cold magnets" – superconducting magnets in Sweden

- Competence & technology development
- Produce and evaluate a prototype
- Formulate a "model" for innovation partnerships

#### The collaboration is the core.







#### Cold magnets: What did the companies learn?



NyTeknik No. 1, 27 January 2022

Information film:

https://www.youtube.com/watch?v=WCYZZM7FNdk

- How to collaborative with academia
  - Conditions are different
  - Common language
- Technical knowledge and competence:
  - what their technology can and cannot do
  - prepare for future upgrades
  - be ready for new assignments
- The needs and requirements of the buyer
  - Big science facilities like CERN
- Contact channels, networking
  - Suppliers and buyers
  - collaborators





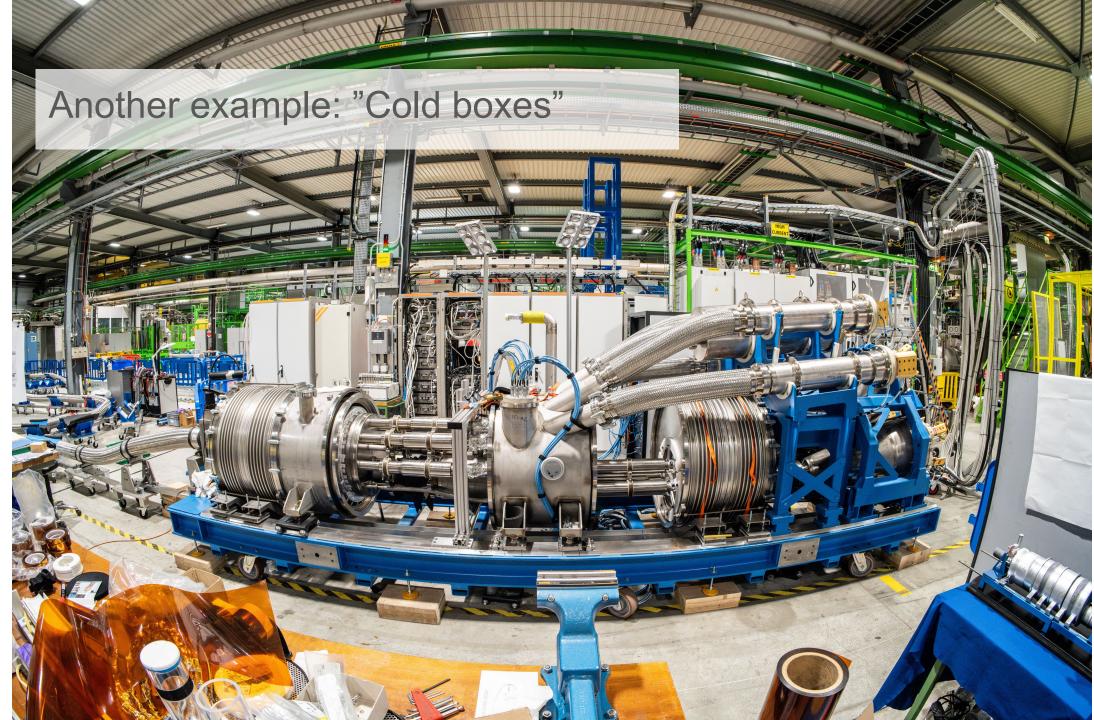












CERN-PHOTO-202311-262-6, Brice, Maximilien: CERN

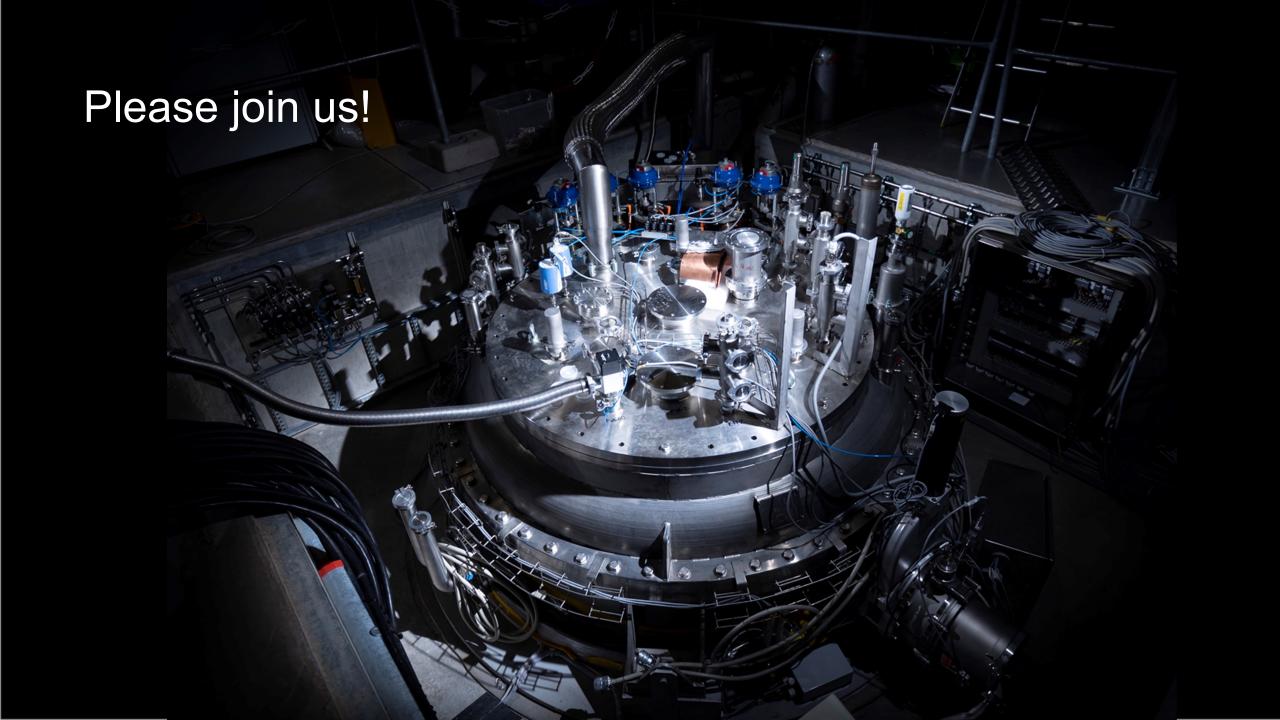
Example 2: "Cold boxes"

Nine cryostats for the LHC upgrade at CERN

- RFR Solutions produces
- Uppsala provides
  - Documentation
  - Quality control
  - Knowledge transfers
- Funded by VR and CERN







## Extra

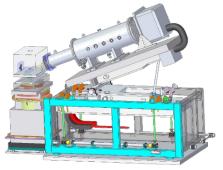
#### 10 years of FREIA

- Superconducting cavity testing for ESS and CERN
- Superconducting accelerating module testing for ESS
- Testing of superconducting magnets for CERN and the Wigner institute for Physics (Hungary)
- R&D on radiofrequency amplifikation, combination and transfer for ESS, CERN, medical industry, and many other applications
- Design and test of a neutron instrument for ESS/STFC (UK)
- Design of X-ray beam line for MAX IV
- R&D on superconducting magnets for CERN and others
- Vacuum breakdown characterizations for accelerator laboratories
- Design of new accelerator facilities like the Ångström laser, a Swedish Free-Eelectron Laser, the Muon Collider project, CLIC and the ESSnuSB.
- ...

### Many projects within accelerator and instrument development



ESS cryomodules



Neutron end stations



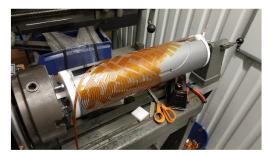
ESS neutrino super-beam



CERN cold powering cryostats



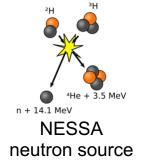
AWAKE plasma acceleration



Kalla Magneter Samverkan

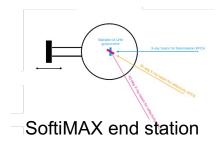


**CERN** magnets





Laser Lab





Vacuum breakdown





Radiofrequency generation

#### FREIA collaborates with industry

## **AMPLEON**













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# BREAK

Swedish fika - refreshments with opportunities for informal networking and 1-to-1 meetings

