Knowledge and technology transfer
Innovate with Big Science

Technology Transfer at GSI and FAIR

Dr. Martina Bauer, GSI Technology Transfer Staff Unit

Big Science Sweden, online, 02. December 2021

Photo: G. Otto/GSI

GSI GmbH – Helmholtz Center for Heavy Ion Research
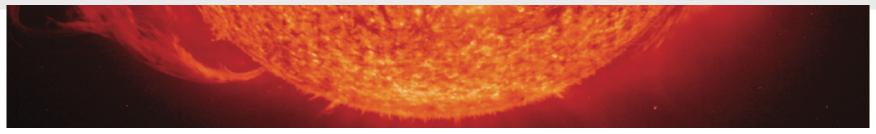# FAIR GmbH – Facility for Antiproton and Ion Research

Existing Facility:

GSI (Foundation: 1969)

Further locations: Mainz and Jena

Future Facility:

FAIR (Foundation: 2010)

- Integrated organisation: FAIR and GSI under one management since 2017
- Employees on campus: approx.1.580

Photo: D. Fehrenz, GSI/FAIR

We explore
the universe…

…in the lab.

The four scientific pillars

NUSTAR
Nuclear Structure, Astrophysics and
Reactions: Stars and nuclei
(850 scientists)

CBM
Compressed Baryonic Matter:
Inside a neutron star
(500 scientists)
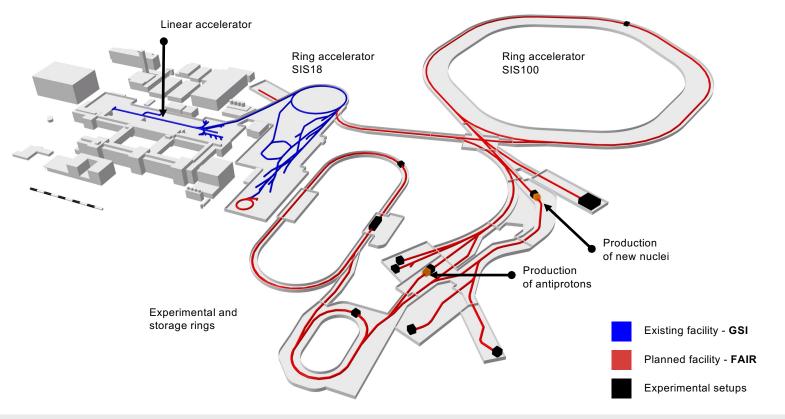
PANDA
Antiproton-Annihilation at Darmstadt:
Antimatter research
(500 scientists)

APPA
Atomic, Plasma Physics and Applications:
From atoms to planets to cancer research
(720 scientists)

Linear accelerator

Ring accelerator
SIS18

Ring accelerator
SIS100

Production
of new nuclei

Production
of antiprotons

Experimental and
storage rings

Existing facility - **GSI**

Planned facility - **FAIR**

Experimental setups

Graph: GSI/FAIR

FAIR – Facility for Antiproton and Ion Research
The Future Facility

Graph: ion42/FAIR

- World-leading accelerator laboratory for decades
- Unique research in physics and applications

- Milestone in the European research roadmap (ESFRI)
- Top priority in the European nuclear physics community

FAIR develops and uses innovative measurement methods and techniques.
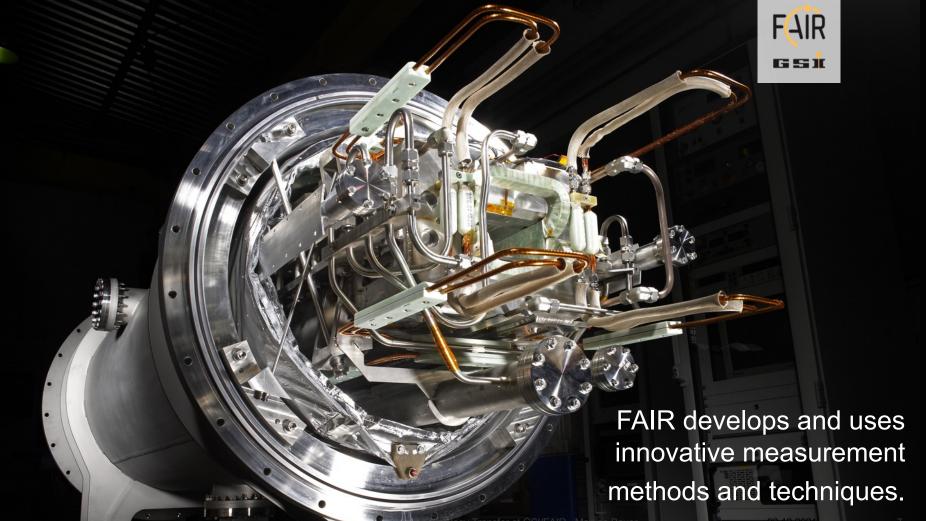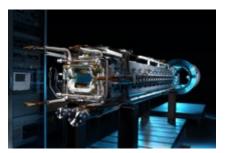
High-Tech for FAIR
Offer of Technologies, Know-How and Competences

Superconductivity/ Cryotechnology

Magnet technology

Vacuum technology

IT-Technology/ Data processing

Electrical/ Energy technology	High-voltage/high-power pulse technology	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 Strategy

**GSI/FAIR Transfer Strategy,
rev. April 2021**

MISSION 1: Culture of innovation.
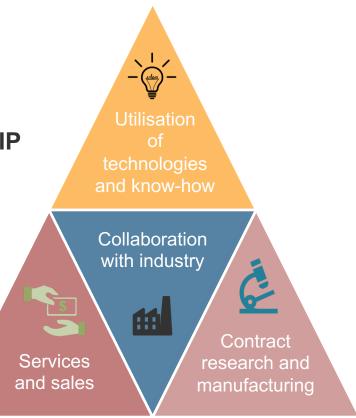
MISSION 2: Effective transfer structure.

✓ Position GSI/FAIR more strongly as a **service provider** and **partner** for SMEs and industry.

✓ Intensify support for **validations** and **prototype development**.

✓ Extending the **offer of infrastructure use** and expertise for **cooperations**.

- **Transfer via cooperation**

- **Transfer of competences**

- **Transfer of property rights and other IP**

- **Transfer via start-ups/spin-offs**

Utilisation of technologies and know-how

Collaboration with industry

Services and sales

Contract research and manufacturing

Finding problems for our solutions - finding applications in industry and society

➢ Talking with industry about their needs.

➢ Financial tools/support to bridge the gap between fundamental research and industrial standards.

Info: gsi.de
Contact: roadshow@gsi.de

TT Funding opportunities
Bridging the gap between Science and Industry

Start Q1/2022

FAIR/GSI Innovation Fund

Target: The product-oriented validation and further development of market-relevant technological potential.

e.g. further development of the product idea, Feasibility studies, own contribution financing for public funding programs

External Funding

Validation
- HELMHOLTZ GEMEINSCHAFT Validation Fond
- iGF
- WIPANO
- VIP+

Collaboration with companies
- KMU-innovativ Vorfahrt für Spitzenforschung im Mittelstand
- ZIM Zentrales Innovationsprogramm Mittelstand
- digitales.hessen DISTR@L
- LOEWE Exzellente Forschung für Hessens Zukunft
- KMU-NetC Mittelstand

Start-up
- HELMHOLTZ SPITZENFORSCHUNG FÜR GROSSE HERAUSFORDERUNGEN ENTERPRISE
- eXIST Existenzgründungen aus der Wissenschaft

ACADEMIA → **COLLABORATION** → **INDUSTRY**

Knowledge Development | **Technology Development** | **Business Development**

TRL 1-3 | Proof of feasibility | TRL 4-7 | Prototype | Pilot plan and scale up | TRL 7-9

Basic technology development | Technology demonstration | Market launch and commercialisation

https://www.gsi.de/en/work/administration/stabsabteilungen_stellen/technology_transfer/support_options

Technologies, Know-How and Competences
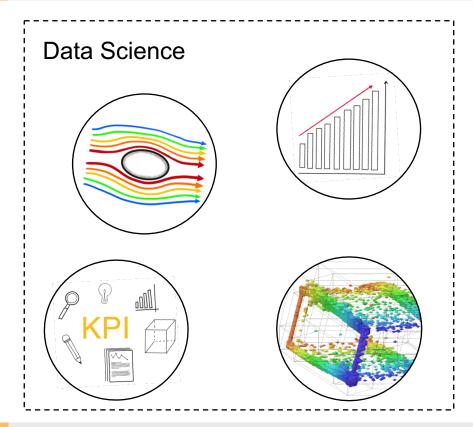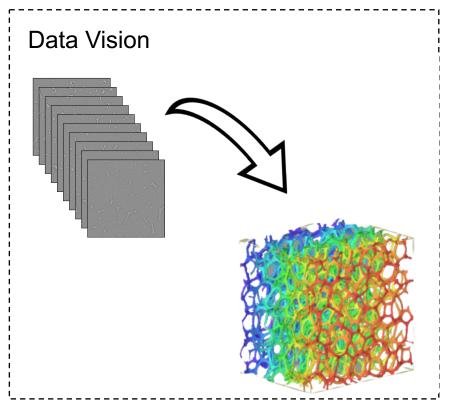## Examples

- Technology Overview**:**
  https://www.gsi.de/en/work/administration/stabsabteilungen_stellen/technology
  _transfer/innovations_products_and_services

  ❗ New online technology platform available in 2022 ❗

- ➢ Examples of current TT and innovation projects.

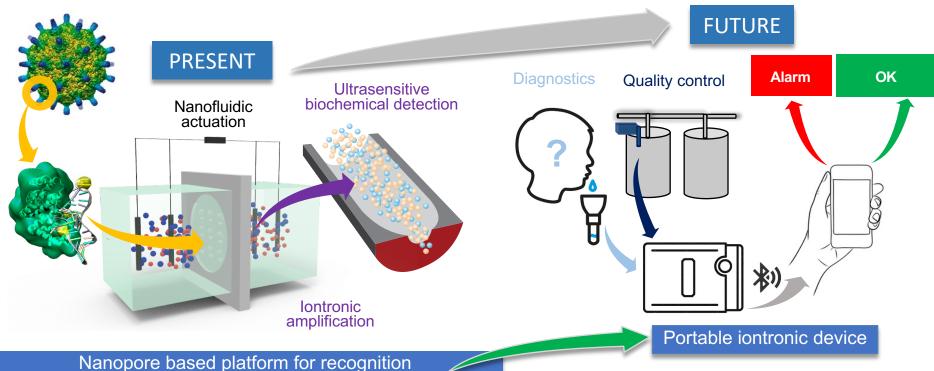# RoSEN- A Method for the Investigation and Visualization of Multidimensional Data Sets

Data Science

Data Vision

Single Nanopore Sensors

Highly sensitive and versatile platform
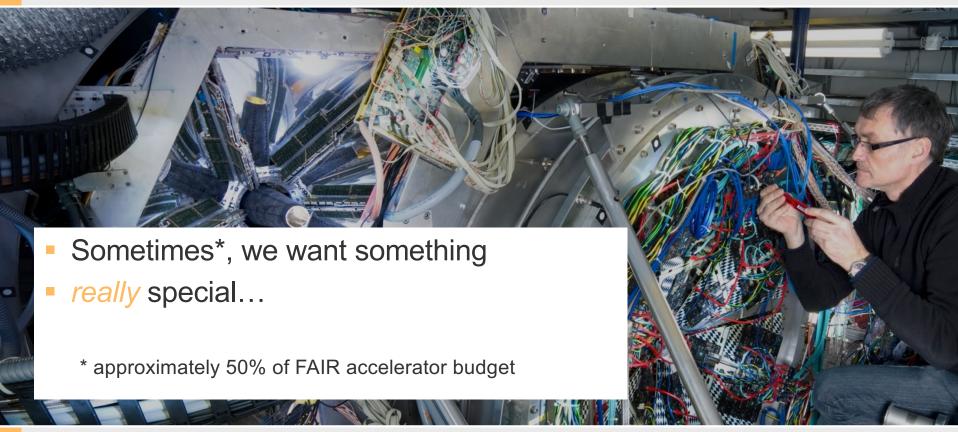
- Sometimes*, we want something
- *really* special…

  * approximately 50% of FAIR accelerator budget

FAIR need technical solution, not available on market

FAIR finds company as R&D partner

FAIR & Company:
Development of new technology

Company:
Delivery of specifications & design

Company:
Industrial manufactur - ing of new product

FAIR orders key product from company

Company:
New ionnvative product for market

Example: **Fast, compact valves**

Photo: Bilfinger Noell GmbH
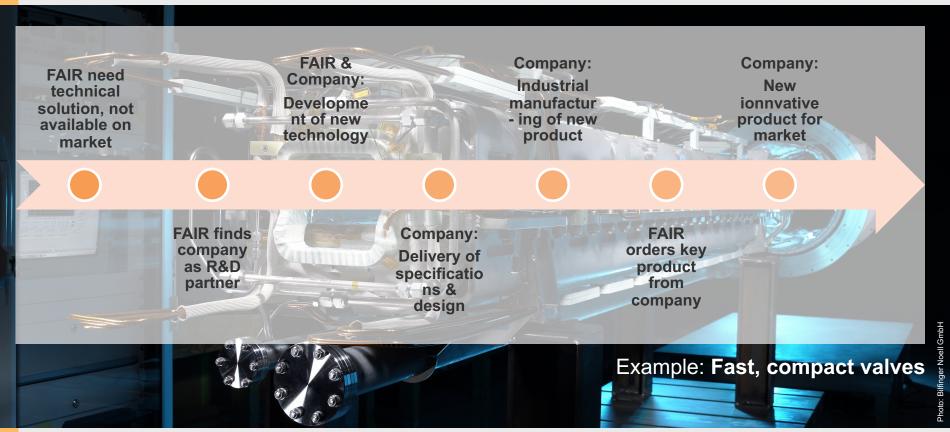
Validation Partnerships
Bringing Technologies from Academia to Market

Be part of the **innovation process** - Strengthening transfer by involving companies as **early** as possible in validation process.

- Example: **ROSE - 4-dimensional emittance measurement system**
  - Successful transfer from the high-energy accelerator sector to industrial application at the medium-sized company NTG GmbH, Germany.

| New algorithm to measure 4D ion-beam emittance | Patent | Validation Partner - NTG GmbH | Funding – 2 national grants | Industrial prototype of elecronic device (1st grant) | User-friendly software for automatisation of measurement and setting (2nd grant) | ROSE Scanner -New innovative product for the market (license) www.ntg.de |

Gefördert durch:

Bundesministerium für Wirtschaft und Energie

LOEWE Exzellente Forschung für Hessens Zukunft

aufgrund eines Beschlusses des Deutschen Bundestages

Invitation to everybody who is curious about technologies, know-how and competences of GSI/FAIR

Contact:
GSI/FAIR Technology Transfer Unit

FAIR/GSI Technology Transfer Team
Your Contact Persons

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Innovation management

Moritz Spreng
Innovation management

https://www.gsi.de/en/work/administration/stabsabteilungen_stellen/technology_transfer/team

Thank you for your attention!

Contact

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Supplement

Efficient transfer of expertise through **contract research** and **manufacturing** with and for external research partners and industry.
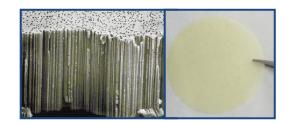
- Examples:

MICRO-ELECTRONICS DEVELOPMENT
Electronic modules, ASICs, Chips,..

NANOTECHNOLOGY
Membranes, foils, nanoelectrodes by ion track technology

GSI/FAIR DIGITAL OPEN LAB
An open Innovation approach to collaborate with industry:
HPC, Big Data, ultra-fast data acquisition incl. software developments and products

Service offers for the use of **GSI/FAIR infrastructure** and **services** for the economy.

- **Electroplating**: High-gloss copper plating for science and industry

- **Bea** ...ical inves...

At the moment only limited ressources available due to technical updates and construction of FAIR plant

Examples of copper plating applications, Technology Laboratory, GSI/FAIR