

AIMday Big Science Technology

1 February 2024 in Lund

Big Science facilities submit their challenges by 17 November.
Registration for participants from industry and academia opens on 17 November.

www.aimday.se/big-science-technology-2024

**Hello Big Science
facilities**
**Hej Swedish
expertise**

AIMday Big Science Technology

1 February 2024

Big Science facilities submit their challenges by 17 November. Registration for participants from industry and academia opens on 17 November.

This is how it works

AIMday Big Science Technology is a workshop where research facilities get the chance to discuss their challenges with scientists at Swedish universities and institutes and with representatives from high-tech companies that deliver to Big Science.

Ahead of the event, the research facilities identify the challenges they are facing in a number of categories, and submit them to Big Science Sweden. Workshop teams with the relevant expertise for each category are then put together to discuss the challenges at AIMday Big Science Technology.

We look forward to your contributions and interesting and stimulating discussions. The day promises to open up opportunities for new collaborations and business.

www.aimday.se/big-science-technology-2024

Hello Big Science facilities

Find solutions for your challenges with the help of Swedish high-tech companies and researchers

1. Identify challenges

At this AIMday, the questions are divided into the following categories:

- Materials – Advanced Materials – Advanced Production Methods – Carbon Fibre Material & Composite material – Magnets & Cryo Technology
- Robotics and Remote Handling
- Big Data, Software Development, AI/ML, Control Systems
- Detector Technology & Instrumentation, Diagnostics

2. Submit challenges

Submit the challenges you have identified to Big Science Sweden no later than 17 November.

[Registration for Big Science facilities](#)

I work at a research facility. What's in it for me?

At AIMday Big Science Technology the spotlight is on your priority challenges. World-leading expertise will discuss your challenges with you, contributing the latest research and methods in your field. This will be the starting point for fruitful collaborations.

Hej Swedish companies
and researchers

**Take an active part in the discussions
and help develop research facilities.
Your expertise is needed!**

1. Choose the category where you have something to contribute

The challenges are divided into the following categories:

- Materials – Advanced Materials – Advanced Production Methods – Carbon Fibre Material & Composite material – Magnets & Cryo Technology
- Robotics and Remote Handling
- Big Data, Software Development, AI/ML, Control Systems
- Detector Technology & Instrumentation, Diagnostics

2. Join the discussions

Registration opens on 17 November.

Registration for company delegates and academic researchers

I represent a company. What's in it for us?

You get involved in high-tech discussions and bring your expertise to the table. This can be a start for collaboration with researchers and Big Science facilities.

I'm a researcher. What's in it for me?

The AIMday Big Science Technology provides an opportunity to discuss future projects and find out where your research can be applied in a Big Science context.

Challenges turn into pre-studies and projects in a four-step process

Together we lay the foundation for collaboration between research facilities and experts from industry and academia. One possible outcome from the discussions is to investigate solutions to the challenges in exciting pre-studies.



Challenges identified by the research facilities

Big Science Sweden is in close contact with the facilities, and compiles the challenges they are facing.



Right expertise around the table

We match expertise from industry and academia and put together qualified discussion groups.



Workshop

Technical experts from the facilities present their challenges. Researchers and representatives from industry present their competencies. Discussion about the challenges, best practice, possible solutions, and collaboration models.



Financing of pre-studies

Big Science Sweden has access to special funding from Swedish universities that can be used for pre-studies. This funding could be the starting point for future cooperation and business.

Looking back

AIMday Big Science Technology

Ahead of previous AIMday events, CERN and ESS submitted their current and upcoming challenges in a number of categories (see below). On the day, researchers and technical experts then discussed these challenges with representatives from the research facilities in workshop teams. The discussions and conclusions led to a number of interesting pre-studies.

Advanced materials and advanced production methods such as additive manufacturing

- Can we produce thicker sheets or bulk material of grain oriented steel, and steer the grain orientation? (CERN)
- How can we produce, cut and polish radiation-hard garnet crystals more efficiently for large detector applications? (CERN)
- How can we construct efficiently large and complex detector absorbers from tungsten alloys, whose composition is driven by the physics application? (CERN)
- Radiation hardness on greases: Is there a roller screw/lubricant (dry) system that can withstand the conditions in a radiation environment, and take up to 10MGy? (CERN)
- Is there a method to heavily bend 316L tubes (6mm or 18mm) with nearly no deformation? (CERN)
- Can we design a cooling solution in a vacuum chamber that does not include welded seams? (CERN)

Drones

- How can we make use of drones more efficient and more compatible in terms of flying time and having them work autonomously? (CERN)
- How can we use drones for monitoring in the accelerator tunnels and other hostile environments? (ESS)
- Robotics/Remote handling
- How can we make industrial robots lighter, while maintaining their precision and dynamics? (CERN)
- How can we increase safety for humans in close human/robot collaborations? (CERN)
- How can we make robots for cryogenic and UHV environments? (CERN)
- How can we make hyper-redundant robots – think for example “snake-like” robots? (CERN)
- How can we make robots to handle continuous decontamination and cleaning of Big Science facilities? (CERN)
- How can we increase the “human touch” for robots working with humans in Big Science? (CERN)
- How can we increase proprioception in maintenance teleoperation in Big Science facilities? (CERN)

AI/Big Data/Data handling/Control systems

- How do we optimize the flow of data in machine learning projects? (ESS)
- How do we develop Intelligent Alarm Handling? (ESS)
- How can we create a Software Development Ecosystem for Machine Learning (Agile Machine Learning)?
- How can we develop Artificial Monkey Tuning? (ESS)
- What do tomorrow's control rooms look like? (ESS)
- How do we together drive the development of future Control Systems for Complex Processes (EPICS / Tango)? (ESS)
- How much we should we care about integrating all the data from all the legacy systems upfront, instead of starting with some data and developing a culture for continuous analysis involving cross-functional teams? (Lund University)

Electronics

- How do we meet the needs for Big Science when it comes to TCA development (Micro TCA – hardware) and how can we push for our needs to be part of standard TCAs? Energy-efficient processors? (ESS)

Magnets and Cryo

- How can Sweden help CERN develop a canted-cos-theta dipole magnet for the LHC?
- How can we develop Superconducting Magnet Energy Storage (SMES) for the LHC at CERN?
- How can we fabricate -53 degrees CO2 cooling systems for the experimental setup at the ATLAS experiment?

Looking back

Big Science Sweden and AIMday Big Science Technology helped bring together key partners for an exciting collaboration project involving industry and academia.

Pre-studies that evolved from previous AIMdays

- Robotic arm in carbon fibre
- SMES – Energy storage
- CO₂-cooling down to -53°C
- Developing a Swedish cluster for super conducting magnets
- Drones in harsh environments



One of the pre-studies advanced into a major project, with funding of SEK 19 million.

A cluster of technology companies in Småland collaborated with Uppsala University and Linnaeus University in an EU research and innovation project on superconducting magnets with uses in, for example, Big Science.

The project aim was to develop environmental-friendly and energy efficient superconducting magnets, combining research and technical development to boost global competitiveness.

Magnets and cryotechnology were one of the areas of technology discussed at the Big Science Sweden Conference/AIMday 2019, under the title, “What can Sweden do to help CERN develop a canted-cos-theta dipole magnet for the LHC?”.

The discussion during the AIMday initiated a feasibility study on the formation of a Småland cluster to work on superconducting ‘cold’ magnets. The feasibility

study concluded with a project application for which funding was awarded. Three high-tech companies and two universities worked together on an exciting research and development project. Collaboration partners were Scanditronix Magnet, Ryd-Verken, Vattenskärningsteknik i Vislanda, Uppsala University and Linnaeus University.

The project, which was completed in April 2023, combined expertise in research, business, technology, and innovation.

The project – Disseminating technology for cold magnets to provide access to a wider international market – was funded by the European Regional Development Fund (ERDF) and Region Kronoberg.

Contact us at Big Science Sweden

Big Science Sweden is Sweden's official Industrial Liaison Office (ILO), serving as the link between Swedish industry, institutes, academia, and Big Science research facilities. We contribute to the build-up of knowledge, skills, and expertise that drive technological development in Swedish companies, and we help the facilities find appropriate high-tech Swedish suppliers. www.bigsciencesweden.se

www.aimday.se/big-science-technology-2024

AIMday questions



Fredrik Engemark

Business Developer and Project Manager

fredrik.engemark@bigsciencesweden.se

+46 72 999 92 68

General questions



Amelie Hallin

External Relations Manager

amelie.hallin@bigsciencesweden.se

+46 701 40 02 44

Big Science Sweden is led and operated by a consortium of leading universities, institutes, and industrial network organisations.



UPPSALA
UNIVERSITET

AIMday by Uppsala University

The workshop will be structured according to the internationally recognised workshop approach called AIMday, developed by Uppsala University. The workshop roots are in the materials science field – bringing expertise from one of Europe's leading centres for materials science out of the labs and into industry.

www.aimday.se



Swedish
Research
Council

VINNOVA
Sweden's Innovation Agency



BIG SCIENCE SWEDEN
THE OFFICIAL SWEDISH ILO