Conference summary and

highlights

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INTERNATIONAL CONFERENCE ON ACCELERATORS FOR RESEARCH AND SUSTAINABLE DEVELOPMENT

From good practices towards socioeconomic impact



- Emerging accelerators or facilities
- CANS and HICANS
- Accelerators for monitoring environmental and Climate Change Related Studies
- Accelerators for health issues
- Accelerators for Neutron Therapy, Cultural Heritage, Innovation and Education
- Remarks

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Large Scale Accelerator Facilities for Nuclear Research and Practical

Applications - Boris Sharkov



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MYRRHA The first European ADS - H. Ait Abderrahim

The construction of phase 1 was approved and started – expected to accomplished in 2024

The objectives of MYRRHA are:

- Demonstrate the ADS concept
- Demonstrate transmutation
- To be also a radiation facility

In the new European context where nuclear energy is "green" and where the construction of several power reactors is expected, MYRRHA is an indispensable facility

In Belgium, for Europe and beyond: For sustainable & innovative nuclear applications

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MYRRHA - H. Ait Abderrahim (Minerva by 2026)

The second phase of the facility –upgrade of the accelerator up to 600MeV & coupling with a reactor to be constructed (phase 3) – expected in 2036



The	MYRRHA	RFQ
was	installed	and
comr	with	
bean		

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Large Scale Accelerator Facilities for Nuclear Research and Practical

Applications

The development of large-scale accelerators provide a substantial boost for the development of advanced accelerator technologies for different socio-economical applications.

In these new facilities a substantial interdisciplinary research program is foreseen from the very beginning.

Into this context IAEA could play an important role by strengthening the links and cooperation with the world of the accelerator community.

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CANS RIKEN Accelerator-driven Compact Neutron Systems and RANS Project

{Plenary session 11} - by Y. Otake



CANS RIKEN Accelerator-driven Compact Neutron Systems and RANS Project {Plenary session 11} - by Y. Otake

RANS	developme	nt	at	RIKEN	has		
started	since	20	11	and	was		
operational since 2013							

The idea is to produce low cost CANS providing 10^{12} n/sec for un ensemble of applications.

Transmission neutron measurement



Future image of transmission method

A transportable CANS for testing the structure of bridges is under development RANS-III

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High power CANS could reach performances comparable to research reactors

(for some applications) Parallel session 12 – F. Ott

Historically, neutron scattering techniques have been served by nuclear research reactors or high energy spallation sources

HiCANS are a potential new solution for fulfilling neutron scattering and other neutron applications. They can be competitive with medium flux research reactors or spallation sources

However, the technical concepts have to be experimentally demonstrated

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The delivery of instrument neutron beam days is dramatically decreasing



The 2020 drop is due to the closure of the Berlin and Saclay reactors.

(we are missing tools for radiography measurements)

The 2020- 2023 drop is due to eventual closure of Budapest, Rez and ILL.

> International Conference on Accelerators for Research and Sustainable Development



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High power CANS for some applications could reach performances comparable to research reactors {Side EVENT 1} - Jerome Schwindling

The bottleneck for these applications is the realization of targets sustaining beam power three orders of magnitude more that the present installations (Riken CANS).

A 50kW Beryllium target has been built and tested (Feb. 2022) at Saclay. A 110 hours, 27,5KW, run over 2 weeks was performed. Target mounting and unmounting has been demonstrated

This highlight of paramount importance opens new perspectives in this domain

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High power CANS for some applications could reach performances comparable

to research reactors {Parallel session 12} – F. Ott

.....And makes this dream feasible.....

The SONATE -Design



Potential for 300 experimental runs/year

Potential for 100-150 publications/year

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Current status of compact Accelerator-based Neutron sources for Boron Neutron Capture Therapy - H. Kumad<u>a</u>



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Current status of compact Accelerator-based Neutron sources for Boron Neutron Capture Therapy in the World- H. Kumada

Many countries, in Europe or elsewhere, don't dispose of any BNCT treatment facility.

In the near future one may expect accelerator based BNCT treatments to become a popular treatment as this is the case in Japan.

Therefore, we can anticipate that several countries will express the wish to equip themselves with such facilities

I really think that IAEA could play an important role into this context.

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Use of accelerators to Preserve Cultural Heritage Objects and Detect Forgeries -

L. Beck



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The traditional ¹⁴C dating apply to old (or very old!) objects but not only - L. Beck – Dating canvas fibers





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Use of accelerators to Preserve Cultural Heritage Objects and Detect Forgeries -

L. Beck

Dating Impressionist and post-impressionist canvas fibers

Radiocarbon dating of seized paintings

Hundreds of paintings were discovered in a restorer's workshop by the French *Central Office for the Fight against Illicit Trafficking in Cultural Property (OCBC)*

From Impressionist period to contemporary art



IAEA could organize and "educate" the community – centralize the demands for expertise?

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Some remarks

- IAEA can play an important role as a facilitator for the supply of accelerator technologies between the different member states enabling the installation and operation of facilities in developing countries.
- Taking in example HiCANS accelerator technologies face a rapid development and may provide in the near future performant and flexible neutrons sources which may replace (for some applications) ageing research reactors.
- IAEA could play an important role by structuring the scientific and technical community that works around CANS, HiCANS, accelerators in general, Associated Detectors and Instrumentation ...by providing advices, the associated equipment's for the exploitation of ion and neutron beamsorganizing schools

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Constructing the IAEA Ion Beam Facility will increase IAEA's attractiveness and will allow to enhance the collaborations with both developed and developing countries



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Thank you

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