The Abdus Salam
International Centre for Theoretical Physics

United Nations
Educational, Scientific
and Cultural Organization

International Atomic
Energy Agency

Workshop on
"Technology and Applications of Accelerator Driven Systems (ADS)"

17 - 28 October 2005

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IAEA Activities in the Area of Fast Neutron Systems

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IAEA Activities in the Area of Fast Neutron Systems

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IAEA Activities

- Implemented in collaboration by IAEA's *Nuclear Power Technology Development* and *Nuclear Fuel Cycle and Materials* Sections
- Framework: *Technical Working Group on Fast Reactors* (TWG-FR) and *Technical Working Group on Nuclear Fuel Cycle Options* (TWG-NFCO)
- Project: *Technologies Advances in Fast Reactors and Accelerator Driven Systems*

Technical Working Group on Fast Reactors (TWG-FR)

- TWG-FR working tool to
  - Promote exchange of information on national and multi-national fast reactor and hybrid systems (e.g., ADS) programs
  - Stimulate and facilitate collaborative research and development (CRPs)
  - Coordinate activities with other Agency projects (e.g., in Safety), and international organizations (EC and NEA)

Membership of the TWG-FR

- Belarus, Brazil, China, France, Germany, India, Italy, Japan, Kazakhstan, Republic of Korea, Russia, Switzerland, United Kingdom, and United States of America, as well as the EU (EC), and OECD/NEA

  Observers: Sweden, Turkey
- Last meeting, hosted by Instituto de Pesquisas Energéticas e Nucleares (IPEN), São Paulo, Brazil, 23 – 27 May 2005

Information Exchange (1/14)

- **IAEA Technical Meeting on "Utilization of MONJU for International Cooperation in Fast Reactor R&D" (Tsuruga, 1-2 December 2004)**
  - **Overall, the meeting concluded that Member States support launching collaborative MONJU related projects under IAEA *aegis*. Some Member States proposed to initiate IAEA CRPs on the following topics**
    - ✓ **Reactor physics tests**
    - ✓ **Natural circulation tests**
    - ✓ **Aged subassembly irradiation test**
    - ✓ **Sharing of reactor operating experience**

Information Exchange (2/14)

- **Consultancy Meeting on the *IAEA Initiative to Establish a Fast Reactor Knowledge Base* (Vienna, 8-10 December 2004) concluded that**
  - **IAEA continue to support and coordinate the Member States' FR data retrieval and knowledge preservation efforts**
  - **IAEA encourage Member States to identify and prioritize preservation of information that is in danger of being lost**
  - **IAEA invite Member States to arrange for, and facilitate the transfer of their FRKP data to the IAEA system**

Information Exchange (3/14)

- IAEA commission the design and construction of a suitable FRKP system
- A Pilot project be carried out to test the compatibility of Member States' information resources and knowledge preservation systems with the proposed IAEA structure
- IAEA work with Member States to ensure that they include within decommissioning projects the requirement to identify and preserve potentially valuable samples together with their history, provenance, and documentation
- CRP is valid mechanism to advance IAEA's FRKP initiative
- IAEA make additional efforts to publicize FRKP initiative (journals, letters to governments/organizations, …)

Information Exchange (4/14)

- Technical Meeting on "Decommissioning of Fast Reactors After Sodium Draining", hosted by CEA Cadarache, 26-30 September 2005
- IAEA Scientific Forum 2005 "Nuclear Science: Physics Helping the World" (Vienna, 27-28 Sept. 2005)
  - On the occasion of the 49th regular session of the IAEA General Conference
  - International Year of Physics (100th anniversary of Einstein's *annus mirabilis*
  - First Session "Meeting Energy Needs"

Information Exchange (5/14)

- TECDOC on theoretical and experimental studies of heavy liquid metal thermal hydraulics
- TECDOC on comparative assessment of the dynamics and safety characteristics of transmutation systems
- TECDOC on the status of accelerator driven systems R&D and technology

Information Exchange (6/14)

- Update *Status Report on Fast Reactors R&D and Technology*
- Update Status *Report on ADS R&D and Technology* (P&B 2006-2007 activity)
- Update *Fast Reactor Database* (TECDOC and WWW version)

Information Exchange (7/14)

- **Status Report on Lead and Lead-Bismuth Eutectic Cooled Fast Reactors**
  - **First draft by end of July 2005**
  - **Peer review in second half of 2005**
  - **Publication 2005/2006**

Information Exchange (8/14)

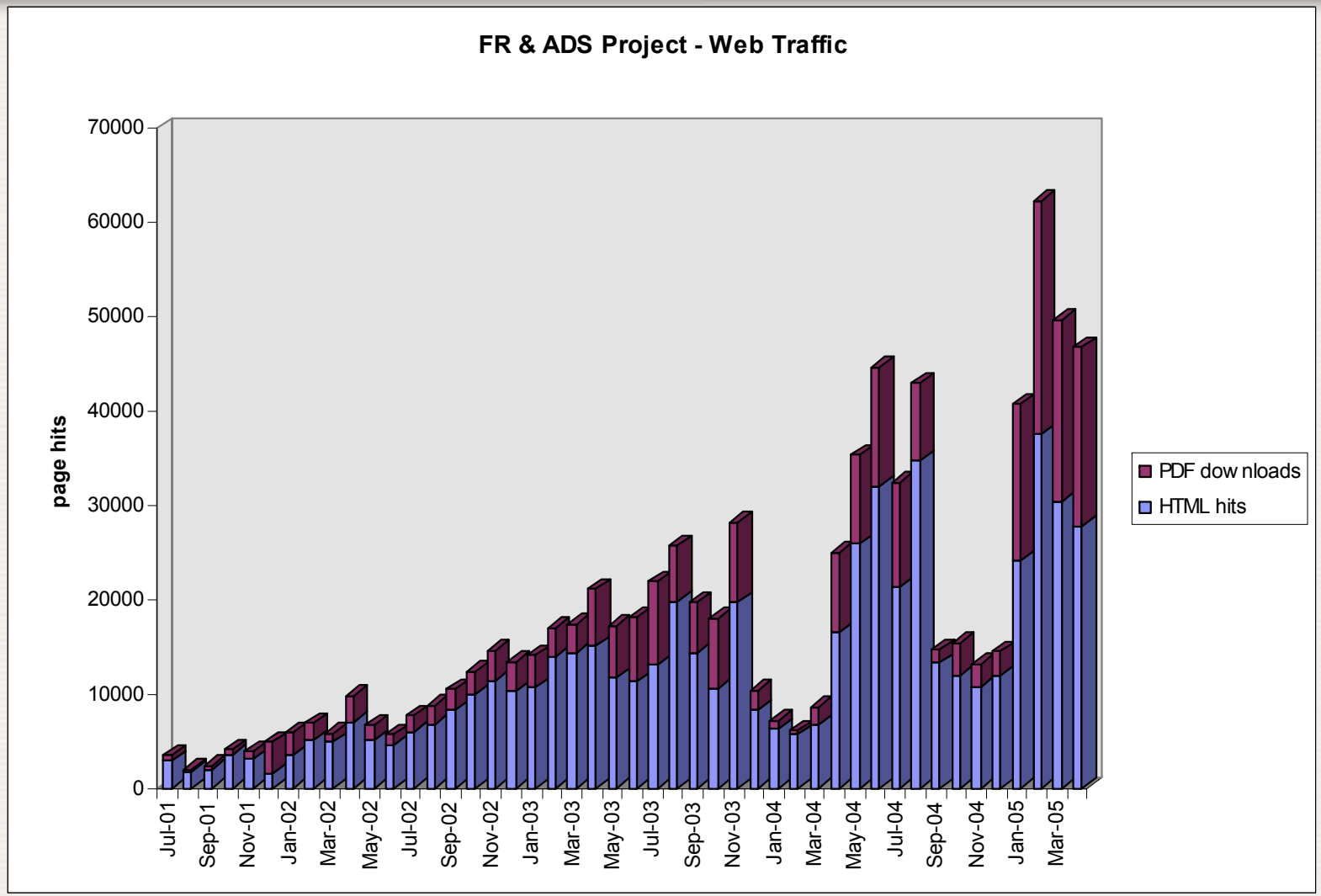
- Compendium on the use of fusion / fission / accelerator based systems for the utilization and transmutation of actinides and long-lived fission products

Information Exchange (9/14)

- **Web Site of the IAEA project *Technology Advances in Fast Reactors and Accelerator Driven Systems***

  ⇨http://www.iaea.org/inis/aws/fnss/

Information Exchange (10/14): Project Web Site Traffic

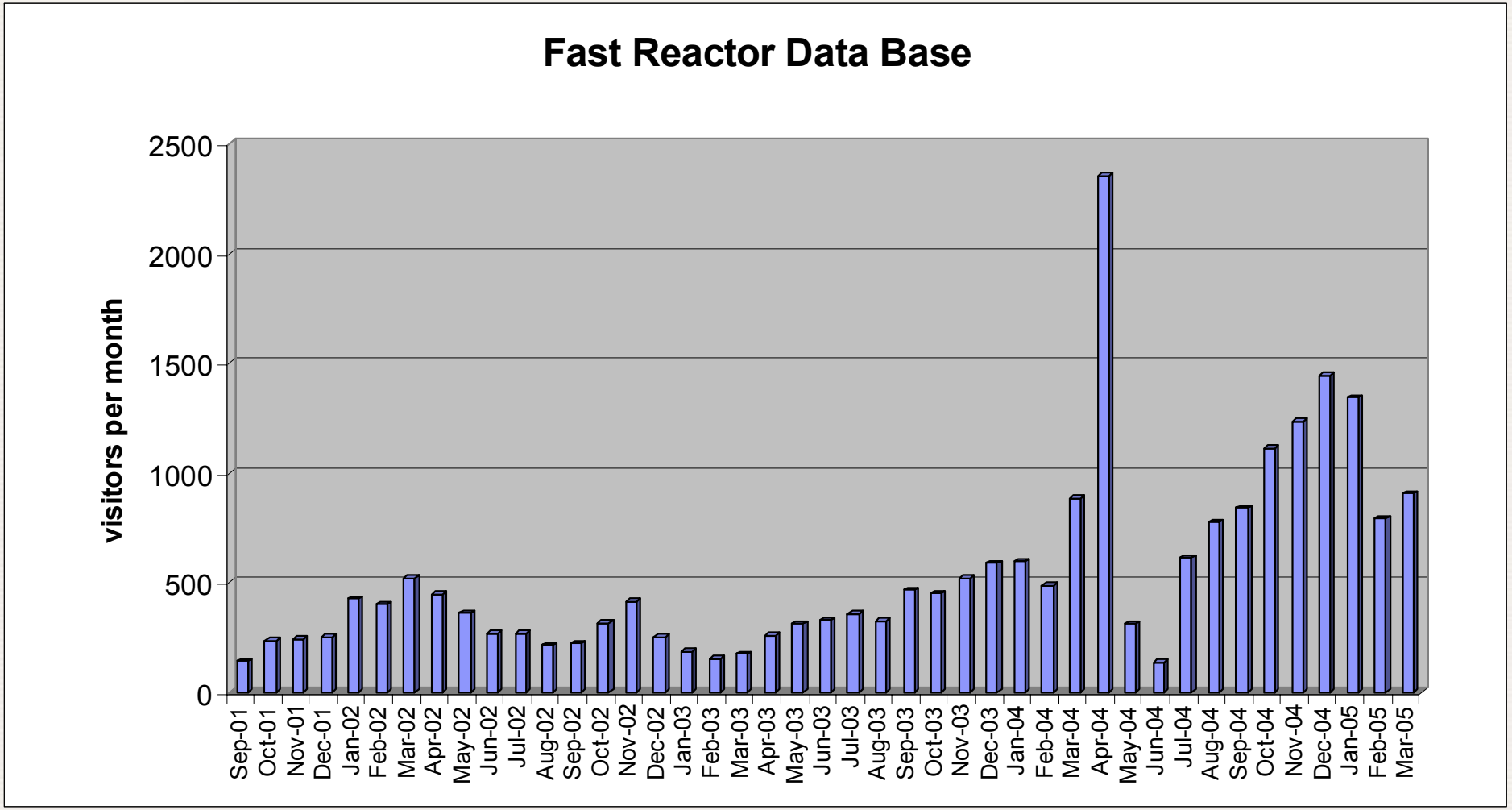


Information Exchange (11/14)

- **Fast Reactor Database**
  - About 400 design parameters of 35 experimental, prototype, and commercial fast reactors
  - Based on IAEA-TECDOC-866
  - Will be updated along with the TECDOC (ongoing)
  - Direct access URL

  ⇨http://www-frdb.iaea.org/index.html

Information Exchange (12/14): Fast Reactor Database Traffic



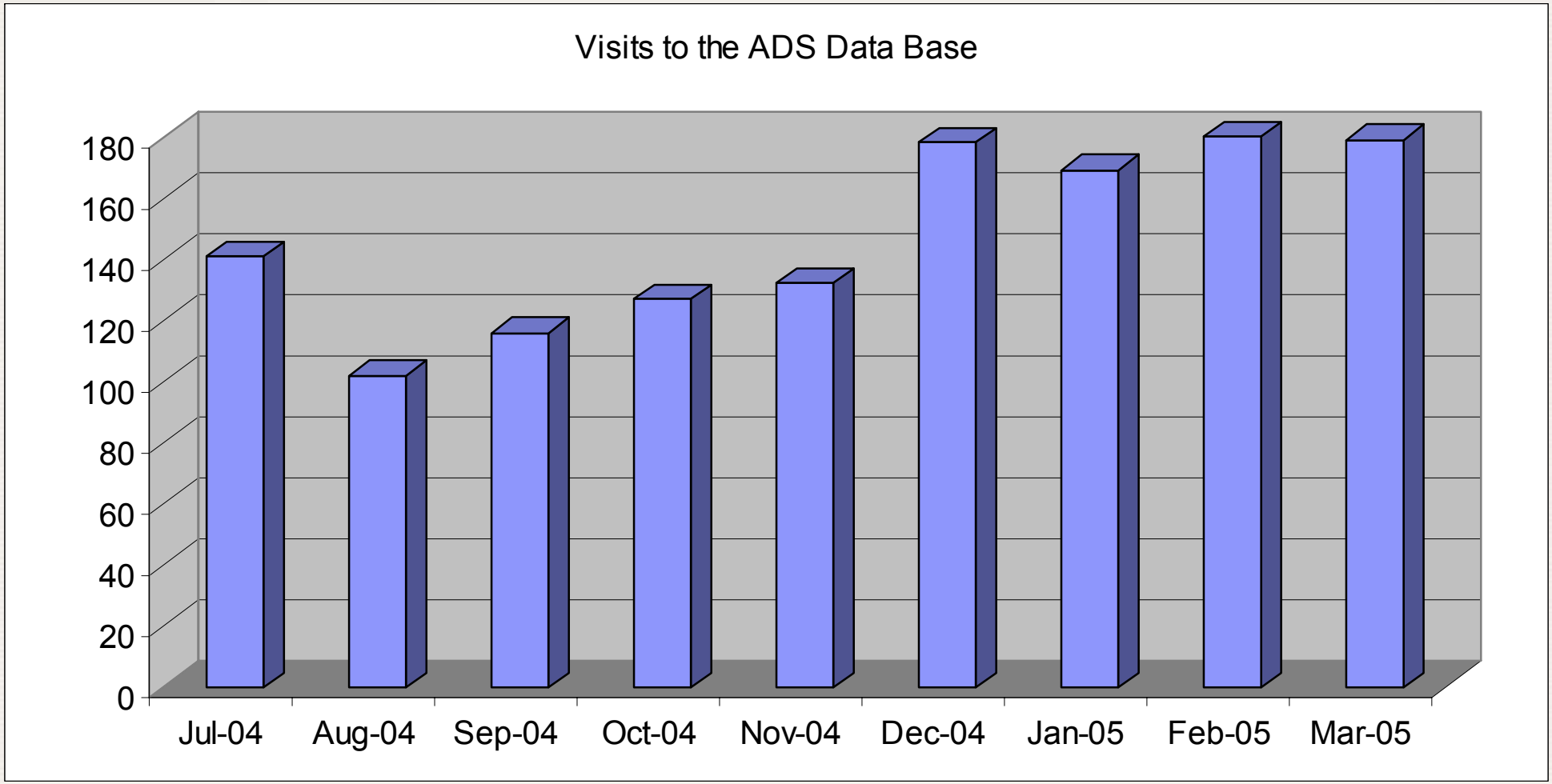
Information Exchange (13/14)

- International database on ADS Related R&D Programs

⇨ http://www-adsdb.iaea.org/index.cfm

- Free access for visitors
- Input urgently solicited
  - Request Login ID and PW from a.stanculescu@iaea.org
  - Data can then be provided on-line

Information Exchange (14/14): ADS R&D Database Traffic



Coordinated Research (1/4)

- **Coordinated Research Project (1999-2005) on *Updated Codes and Methods to Reduce the Calculational Uncertainties of LMFR Reactivity Effects***
  - **Participation from ANL (USA), CEA (France), CIAE (China), FZK (Germany), IGCAR (India), IPPE (Russia), OKBM (Russia), JNC (Japan), KAERI (Rep. of Korea), SERCO Ass. (UK)**
  - **Synthesis Report on Phases 1-3 including Phase 4 to be published as TECDOC in 2005**
  - **Phase 5 Synthesis Report under preparation**

Coordinated Research (2/4)

- **Coordinated Research Project on *Analyses of and Lessons Learned from the Operational Experience with Fast Reactor Equipment and Systems***
  - **Topical areas to be studied in the first stage of the CRP**
    - ✓ **Fuels and materials behavior**
    - ✓ **Steam generators**
  - **Kick-off RCM planned for spring 2006**

Coordinated Research (3/4)

- **Coordinated Research Project (2002-2006) on *Studies of Advanced Reactor Technology Options for Effective Incineration of Radioactive Waste***
  - **Participation from 17 institutions in 13 Member States, and the EC (JRC)**
  - **Comparative assessment of the transient behaviour of advanced transmutation systems**
  - **Both critical and sub-critical systems to be considered**
    - ✓ critical liquid metal, and gas cooled fast reactor
    - ✓ heavy liquid metal, and gas cooled ADS
    - ✓ critical and sub-critical molten salt reactor
    - ✓ fusion-fission hybrid sub-critical reactor

Coordinated Research (4/4)

- **Coordinated Research Project on *Analytical and Experimental Benchmark Analyses of ADS***
  - **CRP approved: 5 years duration (2005-2009)**
  - **Improve understanding of physics of the coupling of external sources with sub-critical cores**
  - **Experimental backing of analytical benchmarks is major objective of the CRP**
  - **Experimental benchmark exercises integrating planned experiments (e.g., YALINA Booster in Belarus, SAD at JINR Dubna, and RACE in the USA)**
  - **Kick-off Research Coordination Meeting 5-9 Dec. 05, Belarus Academy of Sciences, Minsk**

For more information, please visit

http://www.iaea.org/inis/aws/fnss/

Thank You !