ICANS-XV
15^{th} Meeting of the International Collaboration on Advanced Neutron Sources
November 6-9, 2000
Tsukuba, Japan

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Summary report of the working group session: "Code systems, cross sections and kernels"

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(November 28, 2000)

There was first an informal discussion and information exchange of recent workshops and MC conferences on computer codes and models used in the design of spallation sources.

1. "Models and Codes for Spallation Sources" in SARE-5, July 17-18, 2000, Paris, France, about 60 participants, the proceedings of this workshop will be published soon.

   The main outcome of this meeting was:

   New experiments above 1 GeV incident proton energy lead to differences
   mainly: Bertini based codes as compared to new models.
   There was decided to undertake an "International Benchmark" in year 2001. For this purpose a webpage will be available soon!

2. Monte-Carlo 2000, Int. Conference in Lisbon, Portugal, Oct. 23-26, 2000, about 300 participants, proceedings will be published in late spring 2001.

   The conference was organized in three main topics:

   - hadron
   - electron/photon
   - and neutron/photon

   Monte-Carlo systems and their applications. In the hadronic session the mostly used MC-system for designing spallation sources were discussed:

   - HERMES code system - D. Filges, R.-D. Neef, H. Schaal and G. Sterzenbach, "The HERMES Monte Carlo Program Systems a Versatile Tool for Spallation Physics and Detectors"
   - FLUKA code - A. Fasso, A. Ferrari, J. Ranft and P. Sala, "FLUKA: Status and Perspectives for Hadronic Applications"
   - MCNPX code - H.G. Hughes, "Status of the MCNPX Transport Code"
   - MARS code system - N. Mokhov and O. Krivosheev, "MARS Code Status"
   - NMTC/JAERI code - H. Takada, S. Meigo and K. Niita, "Present Status of Nucleon-Meson Transport Code NMTC/JAERI.

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- GEANT4 platform - M. Asai, "Generic Design of Physics Processes in Geant4"
- EA-MC code, coupling high energy physics of FLUKA with new low-energy MC transport routines including burn-up possibilities - Y. Kadi, "The EA-MC Monte Carlo Code Package - A New Approach to the Design of Accelerator-Driven Systems"
- MCNP code, widely used in coupling high energy transport codes with neutron-gamma-electron transport at energies below 20 MeV - E.C. Selcow, G.W. McKinney, MCNP Capabilities at the Dawn of the 21st century: Neutron-gamma Applications.

It was interesting to hear, that hadron MC development was mostly driven by spallation source and ADS projects.

3. There was an interesting discussion with R.Granada about kernels for cold moderators. The development of his expression for scattering functions could stimulate future experiments in this field. There is a further need to investigate good benchmark experiments on cold moderators and moderator data to validate the scattering kernels we have. We need additional data for energies below 10^{-3} eV. There is still some confusion to fix the working print to optimize the para-ortho H_2 concentration.

4. A real highlight in model development is the GEM code (S. Furihata) based on the generalized evaporation model and the RAL fission model—reproducing successfully the cross sections for fission fragment production as well as ^{7}Be and ^{9}Li productions.