SPECIAL SESSION: STATUS OF FUKUSHIMA-DAIICHI REACTORS
Wednesday, 29 June 2011
Ballroom C
8:15 am – Noon

WAM-C

Abstracts unavailable

ACCELERATOR SECTION SPECIAL SESSION: NEUTRONS FROM ACCELERATORS
Wednesday, 29 June 2011
2A
8:30 am – Noon

WAM-D.1

CHADWICK'S NEUTRON AND THE ROLE OF NEW PARTICLES IN ACCELERATOR HEALTH PHYSICS. J. Cossairt (Fermi National Accelerator Laboratory, Batavia, Illinois 60510)

When Sir James Chadwick discovered the neutron in 1932 near the beginning of the era of particle accelerators, he probably did not realize that he had found only the first of many new particles that have challenged radiation protection at accelerators ever since. The myriad properties of neutrons include several that continue to drive many of the radiological problems that must be addressed in the design and operation of accelerators both small and large. Indeed, new surprises due to neutrons are still being addressed. The neutron, moreover, was not the end of the story. In nearly every epoch of accelerator development one or more new particles revealed by the accelerators themselves have become important challenges to accelerator design and operation. These challenges have had to be identified and then successfully addressed before further progress could be made. Accomplishing this has generally required knowledge of the particle physics involved as well as the need for close collaboration between particle physicists, accelerator physicists, and health physicists. Particle discoveries marching in this parade include those of the charged and neutral pions, kaons, muons, neutrinos, and antiprotons. In this talk, the role of the neutron in accelerator health physics will be described and compared and contrasted with those of other esoteric particles unveiled by the advancements in accelerator technology and particle physics.

WAM-D.2

RESULTS FROM A HIGH-ENERGY NEUTRON DOSIMETER INTER-COMPARISON EXERCISE. L. Walker and T. McLean (Los Alamos National Laboratory, Los Alamos, NM 87545)

During November 2010, a high-energy neutron dosimeter inter-comparison exercise was held at LANL (Los Alamos National Laboratory). Participants included several National Labs as well a few non-U.S. research accelerator facilities. The study was conducted at LANSCE (Los Alamos Neutron Science Center) using the WNR (Weapons Neutron Research) facility where spallation neutrons are produced by irradiating a 7.5 cm x 2.5 cm tungsten target with 800 MeV protons. The study was conducted on the 90 m flight path by moderating the neutron spectrum with an in-line filter of copper and polyethylene to harden the beam by preferentially removing neutrons below 20 MeV. The resulting neutron spectrum, as determined using a fission chamber and time-of-flight information, extended to 800 MeV with an average energy of 320 MeV. Dosimeters were mounted on a Lucite phantom and centered in the 17 cm diameter beam. Linearity studies were done by varying exposure times to give integrated doses ranging from 500 μSv up to 100 mSv depending on the dosimeter. In addition, a few angular dependence measurements at 40° and 60° were made as well. In this presentation, the characterization of the neutron field and the experiment protocol is described. This is followed by a presentation of the exercise results and a discussion on the implications for the current state of high-energy neutron dosimetry.

WAM-D.3

CALCULATED NEUTRON SKYSHINE SPECTRA AND DOSIMETRIC IMPLICATIONS AS A FUNCTION OF DISTANCE AND SOURCE SHIELDING. S. Schwahn (Oak Ridge National Laboratory, Oak Ridge, TN 37831-6469)

Monte Carlo analyses were initially performed for a thick target at Oak Ridge National Laboratory's Spallation Neutron Source, a 1-Gev proton accelerator, to estimate the neutron dose at the nearest routinely-occupied building, 0.8 km from the accelerator. The purpose of the calculation was to determine skyshine spectra to establish expected neutron dosimeter response. The calculations identify an average physical neutron energy ranging from 20 MeV to 60 MeV over distances from 0.5 km to 3 km for the well-shielded accelerator. Using ICRP-74 dose conversion coefficients (extended by data from Pelliccioni to higher energies), these