Abstracts for the Twelfth International Conference on the Application of Accelerators in Research & Industry

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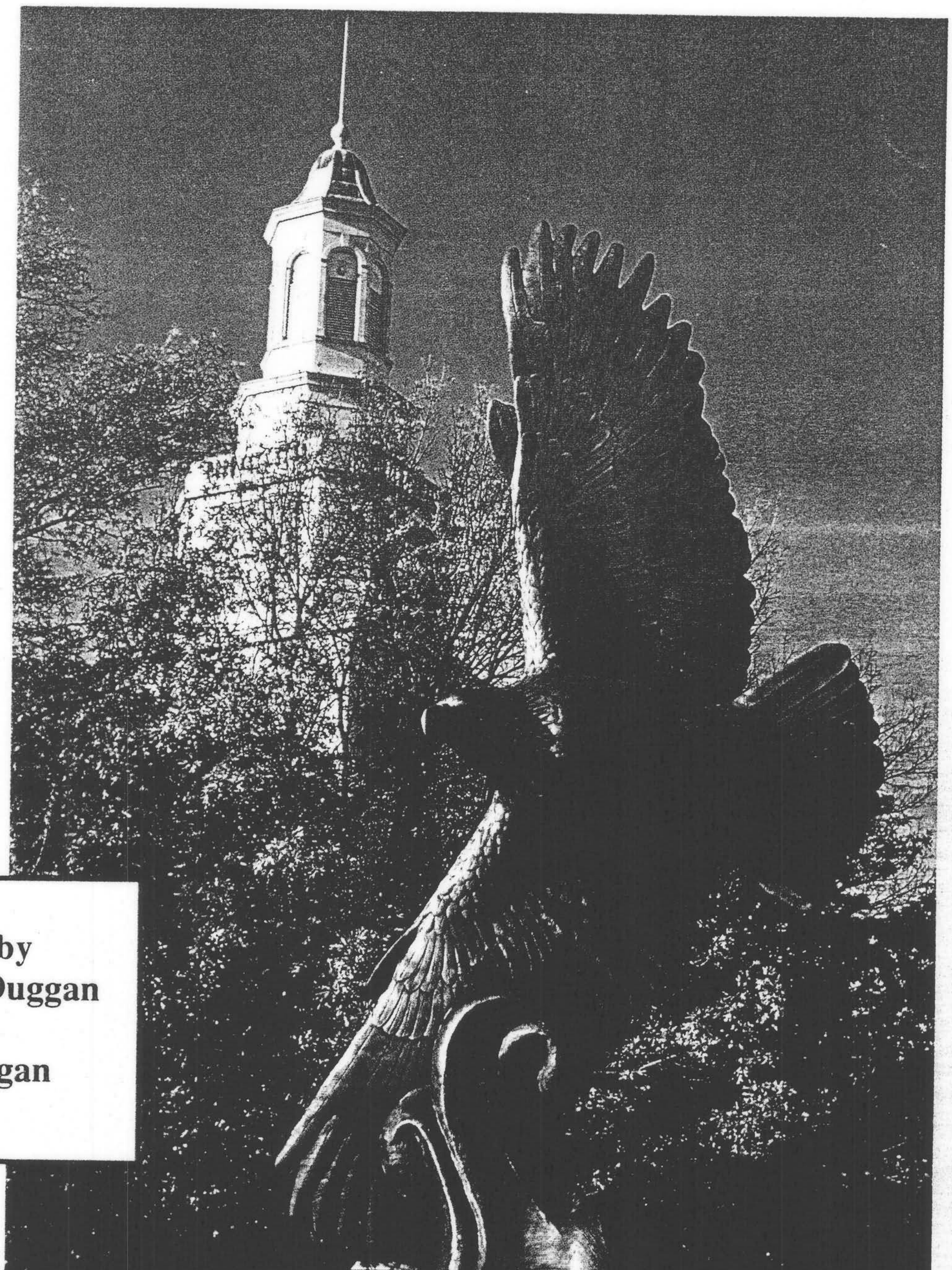

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PC59a Line-of-Sight Injection into a Tandem Accelerator.* K.J. BERTSCHE, LLNL—A beamline has been designed to accomodate an AMS ion source at the 0° position, injecting in a straight line into the LLNL CAMS tandem accelerator[1]. An AMS source at this position will allow simultaneous injection of isotopes, providing a testbed for injection techniques which may be used in a low cost RFQ accelerator for tritium AMS measurements. The use of a Wien filter in the beamline will also allow selection of individual isotopes, with the capability of rapid sequantial injection of isotopes. The stable isotope current may be collected in a Faraday cup while the radioisotope is injected into the tandem, allowing continuous monitoring of ion source output for calibration purposes. This Wien filter and injection beamline should be adequate for biomedical measurements of ^{14}C as well as for tritium.

*Work performed under the auspices of the U.S. Department of Energy at the Lawrence Livermore National Laboratory under contract W-7405-Eng-48.
[1]M.L. Roberts, J.R. Southon, J.C. Davis, I.D. Proctor and D.E. Nelson, Nucl. Instr. and Meth. B56/57 (1991) 882.

PC60 A Study of Cosmogenic Radionuclides in Precipitation D. KNIES, D. ELMORE, G. PETTY, S. VOGT, M. WANG, E. AGEE, PRIME LAB, Purdue University.---Two thirds of the production of ^{7}Be, ^{10}Be, and ^{36}Cl takes place in the stratosphere. The limited mixing between the stratosphere and troposphere combined with the regular cleansing of the troposphere further enhances these radionuclides in the stratosphere relative to the troposphere. These isotopes should therefore shed light on processes that involve mixing of the troposphere and stratosphere. We are measuring these radionuclides in samples collected from every significant precipitation event in West Lafayette, Indiana. We will use this information to look for correlations between the concentrations of cosmogenic radionuclides and the storm type, the past history of the air masses involved, and the season of the year. The study will include measurements of the major cations and anions and ^{137}Cs and ^{210}Pb to aid in identifying the resuspended soil contribution to the ^{10}Be concentrations in precipitation. The latest data will be presented.

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PC60a Lanthanide Negative Ion Detection Using Accelerator Mass Spectrometry (AMS). M.A. GARWAN, X-L. ZHAO, M-J. NADEAU, A.E. LITHERLAND, AND L.R. KILIUS, *IsoTrace Laboratory, University of Toronto, Toronto, Canada*—Accelerator mass spectrometric methods have been used in the detection of the negative ions of the lanthanides. All of the lanthanide negative ions ($La^- \rightarrow Lu^-$) have been observed except Pm^-, Dy^-, Ho^-, and Er^-. The heavy element analysis line at the IsoTrace Laboratory was used to count the positive ions resulting from the atomic negative ions injected into the Tandem accelerator. Because of its suspected very low electron affinity, Yb^- is difficult to observe, and its detection required the reduction of the electric field gradients used to accelerate the ions. The relative negative ion yields among the lanthanides will be discussed. Both Yb^- and Lu^- have recently been theoretically predicted to exist with negative parity ground states.[1, 2]

[1]S.H. Vosko, J.A. Chevary, and I.L. Mayer, J. Phys. B, **24**, 225 (1991)
[2]S.H. Vosko and J.A. Chevary, Bull. of the American Phys. Soc. Series II, **37**, 1089 (1992), and private communication.

PC61 **Cosmogenic Nuclide Depth Profiles in the Iron Meteorite, Canyon Diablo** E. MICHLOVICH, M. LIPSCHUTZ, S. VOGT, D. ELMORE, Purdue University, West Lafayette, IN --- The large preatmospheric size (25-86 m) of the Canyon Diablo meteorite makes it especially suitable for systematic studies of cosmogenic nuclide production rates and provides a unique opportunity to study production rates in a 2π geometry. We have measured the ^{10}Be, ^{36}Cl and ^{26}Al activities in a number of Canyon Diablo samples by accelerator mass spectrometry using the newly established AMS facility at Purdue. With the preatmospheric depths of the fragments estimated by Heymann *et al.* [1], we were able to construct cosmogenic nuclide depth profiles. For ^{10}Be and ^{36}Cl, the production rate half-thickness was approximately 10.7 cm (85 g/cm^2) and 11.5 cm (90 g/cm^2), respectively. Cosmic ray exposure age estimates derived from noble gas content [1] and the $^{10}Be/^{21}Ne$ ratio both suggest a possible multi-episodic exposure for the meteoroid in interplanetary space.

Work supported by NASA grant NAG 9-580 and NSF grant EAR 89-16667.
[1] *J. Geophys. Res.* 71, 1966.

PC62 The Use of the Neutron-Activation Techniques for Studying Elemental Distributions: Applications in Geosciences and Technology. **ELENA S. FLITSIYAN**, Institute of Nuclear Physics, Uzbek Academy of Sciences, Ulugbek, Tashkent 702132, Republic of Uzbekistan, CIS.

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D-Be, D-D Fast Neutron Irradiation Fields and Their Multipurpose Applications. ZHOU YONG, XIA XINGYUAN, LI JINGDE, CAO YANGSHU, ZHONG GUANSHOU and LIU MANTIAN --Institute of Nuclear Science and Technology, Sichuan University, Chengdu, 610064, P. R. China — The development status of fast neutron radiation sources and their applications in china and other countries is given in broad outline. The main standings of establishing fast neutron irradiation fields through the $^{9}Be(d,n)^{10}B$ and $^{2}D(d,n)^{3}He$ reactions produced by 13. 4 MeV deuteron beams from the 1. 2M Cyclotron at our Institute are described. The early work of ours includes; measurement of the relative spectra of D-Be neutrons by a liquid scintillation neutron spectrometer; measurement of the absolute neutron spectra and neutron fluence by activation method, and determination of the neutron flux density and its distribution by a ^{238}U fission chamber. Besides, comprehensive applications of the D-Be neutron irradiation field are radiation damage studies of mixed fission-fusion reactor materials performed on the target surface; irradialion of superconductive materials and semiconductor devices performed at a distance of 10 to 50 cm from the target in the direction of 0° to ±30°; fast neutron radiation breading of antibiotics and crops in the range from 100 to 300 cm in the direction of 0° to ±45°, and stimulation of organisms' growth by low dose fast neutrons in the range from 400 to 600 cm in the direction ±45° to ±150°.
Our recent work is reported. These investigations are successful development of a mixed target chamber with deuterium gas and beryllium; calibration of the efficiency of the liquid scintillation neutron detector with a ^{252}Cf standard neutron source; accurate measurement of the D-Be, D-D and D-D +Be neutron spectra by means of the neutron time-of-flight spectrometer; advances in using the D-D neutron irradiation facility for studying radiation damage of fission-fusion reactor materials, and advances in using the D-Be standard neutron source for studing neutron integral data.

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KFUPM Fast Neutron Activation Facility
A.AKSOY, A. A. NAQVI, F.Z. KHIARI, R.E. ABDEL-AAL , M. RAASHID, A. COBAN and H.A. AL-JUWAIR*, Energy Research Laboratory, KFUPM,Saudi Arabia.---A fast neutron activation and analysis facility is built at KFUPM 350 keV accelerator. The facility consists of an irradiation station, a fast transfer system and a counting station. For 14.5 MeV neutrons, a maximum flux of 10^{10} neutrons/cm^2/sec is available at the target. The neutron flux is monitored by a NE213 detector and is recorded every 0.2 seconds . The sample transfer system has 3 seconds transfer time. The counting station has a large volume, high resolution HPGe detector and a pair of higher efficiency 5 in.x 5 in. NaI(Tl) detectors. The detectors are connected to a PC based multichannel analyzer which has special software for data acquisition and analysis.

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