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University of North Texas
Department of Physics
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Edited by Jerome L. Duggan and I.L. Morgan
PC59a Line-of-Sight Injection into a Tandem Accelerator * K.J.
BERTSCHRE, LLNL—A beamline has been designed to accommodate an
AMS ion source at the 0° position, injecting in a straight line into the
LLNL CAMS tandem accelerator. 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 RFO 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 sequential 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 14C 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.

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 produc-
tion of 3Be, 9Be, and 36Cl takes place in the stratosphere. The limited
mixing between the stratosphere and troposphere combined with the
limited cleansing of the troposphere further enhances these radionuclides
in the stratosphere relative to the troposphere. These radionuclides 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 in-
volved, and the season of the year. The study will include measure-
ments of the major cations and anions and 36Cl and 36Ar to aid in
identifying the resuspended soil contribution to the 36Cl concentra-
tions in precipitation. The latest data will be presented.

Work supported by NSF grant EAR 89-16667

PC60a Lanthanide Negative Ion Detection Using Acceler-
ator Mass Spectrometry (AMS), M.A. GABWAN, X-L. ZHAO,
M-J. NADEAU, A.E. LITHERLAND, AND L.R. KIILUS, IsoTrace Lab-
oratory, University of Toronto, Toronto, Canada—Accelerator mass spec-
trometric methods have been used in the detection of the negative ions of
the lanthanides. All of the lanthanide negative ions (La− → Lu−)
have been observed except Pr−, Dy−, Ho−, and Er−. The heavy ele-
ment 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 nega-
tive ion yields among the lanthanides will be discussed. Both Yb− and
Lu− have recently been theoretically predicted to exist with negative pariy
ground states.1,2

II, 37, 1089 (1992), and private communication.

PC61 Cosmogenic Nuclide Depth Profiles in the Iron
Meteorite, Canyon Diablo E. MICHLICH, M. LIFSCHUTZ,
S. VOGT, D. ELMORE, Purdue University, West Lafayette, IN—
The large preshredded 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 40Be, 36Cl and 24Al activities in a number of Canyon
Diablo samples by accelerator mass spectrometry using the newly
established AMS facility at Purdue. With the preemergous
depths of the fragments estimated by Heymann et al. [1], we were
able to construct cosmogenic nuclide depth profiles. For 40Be and
36Cl, the production rate half-thickness was approximately 10.7 cm
(65 g/cm2) and 11.5 cm (90 g/cm2), respectively. Cosmic ray
exposure age estimates derived from noble gas content [1] and the
40Be/26Ne 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.

PC62 The Use of the Neutron-Activation
Techniques for Studying Elemental
Distributions: Applications in Geosciences
and Technology, ELENA S. PLITSIYAN, Institute
of Nuclear Physics, Uzbek Academy of Sciences.
Ulubek, Tashkent 702123, Republic of
Uzbekistan, CIS.

PC63 D-Neutron Irradiation Fields and Their Multifunctional
Applications, ZHOU YONG, XIA XINGYUN, LI JINGGE, CAO
YANGSHU, ZHONG GUANSHOU and LEI MANTIAN—Institute of
Nuclear Science and Technology, Tsinghua University, Changsha, 410044.
J.R. CHEN—The development status of fast neutron irradiation sources and their applications in China and other countries is given in broad outline. The main advantages of selecting fast neutron irradiation fields through the 237Np(d, n)238U and 239Pu(d, n)240Pu reactions produced by 14.4 MeV deuterons beams from the 1.2 Mw Cyclotron at our Institute are described. The early work of ours includes: measurement of the relative spectra of D-Neu-
trons by a liquid scintillation neutron-spectrometer; measurement of the absolute neutron-energies and neutron fluence by activation method; and deter-
mination of the neutron flux density and its distribution by a PPO fission
chamber. Besides, comprehensive applications of the D-Neutron irradia-
tion field are radiation damage studies of mixed fission-fusion reactor materi-
als performed on the target surface; irradiation of superconducting magneto-
 coils and semiconductor devices performed at a distance of 15 to 50 cm from
the target in the direction of 6° to 20° fast neutron radiation breeding of
seabedic and coral in the range from 100 to 300 cm in the direction of 8°
to 45°, and stimulation of organisms' growth by low dose fast neutrons in
the range from 600 to 6000 cm in the direction 25° to 110°.
Our recent work is reported. These investigations are experimental develop-
ment of a mixed target chamber with deuterum gas and beryllium; calibra-
tion of the efficiency of the liquid scintillation neutron detector with a 241Cm
standard neutron source; accuracy measurement of the D-Neutron, D-D and D-D
neutron spectra by means of the neutron time-of-flight spectrometer;
advances in using the D-Neutron irradiation facility for studying radiation
damage of fission-fusion reactor materials, and advances in using the D-Neutron
standard neutron source for studying neutron integral data.

PC64 KFUPM Fast Neutron Activation Facility
A.AKSOY, A. A. NAGVI, F.Z. KHARI, R.E. ABDEL-AAL, M.
RAASHID, A. COBAN and H.A. AL-JUWAIRI, 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 1010
neutrons/cm²/sec is available at the target. The neutron flux is
monitored by a NE213 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
detection and analysis.

Monday and Tuesday Evenings

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