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C_B = 14 cm and C_0 = 8.3 cm. Results for backscattering from Au on Si will be presented.

Work was performed under the auspices of the US Department of Energy.

AE9 Improvement of Ge(Li) Detector Energy Resolution and Peak-to-Compton by Use of a Pulse Shape Discriminator.* N. MATSUSHITA, Wm. C. MCHARRIS, and R.B. FIRESTONE Mich. State Univ.—It has been shown that the resolution can be improved and the peak-to-Compton ratio drastically increased for a Ge(Li) detector by the optimal choice of rise times coincident with energy pulses.

*National Science Foundation Grant No. Phy-7822696.

AE10 Unique Determination of Doublet and Triplet Peak Parameters of Ge(Li) and Si(Li) Detector Spectra via the Sinc Transform and Analysis of the Moments of the Peak Distribution.* G. HUTCHINS and B. HICHWA, Hope College, Holland, MI. -- With the sinc transform method of analysis 1), peak regions and parameters from Ge(Li) and Si(Li) detector spectra can be determined easily and quickly. From the peak parameters of each region it can be determined whether the peak is a singlet or a multiplet. If a peak is a multiplet, the original spectral data are analyzed to calculate the zeroeth through fifth moments. Assuming Gaussian peak shapes and using a FWHM determined from detector response to single peaks, theoretical integral representations of the moments can be formed. After integration the results are combined with the experimental moment values to define a set of equations which can be solved simultaneously with a Newton-Raphson method. The parameters determined by this approach are found to be in excellent agreement with those determined by conventional non-linear least squares methods.

1)B.Hichwa and H.Frissel, Bull.Am.Phys.Soc.23(1978),927

*Supported in part by the National Science Foundation

AE11 Mean Excitation Energies of H, He, N, O, Ne, r, and Xe Extracted from Alpha Particle Stopping Power Measurements. L. E. PORTER, University of Montana.—Recent measurements of the stopping powers of several gases, purportedly of great accuracy[1], have been analyzed both with and without inclusion of the low velocity projectile-z^3 correction to Bethe-Bloch theory. In the cases of H and He the extracted mean excitation energies lay very close to generally accepted values when an adequate quality of fit to the data was achieved. However, the fits obtained for the remaining gases under any reasonable constraints imposed on ranges of mean excitation energy and shell correction values were far from satisfactory. Hence further study of the latter measurements is in progress.

1C. Hanke and J. Laursen, Nucl. Instrum. Methods 151, 253 (1978).

AE12 Elemental Analysis of Coal Samples by RBS and PIXE.* H. W. KRANER and K. W. JONES, Brookhaven National Laboratory--Rutherford backscattering (RBS) and proton-induced x-ray emission (PIXE) are complementary techniques for the elemental analysis of coal and fly ash samples. As is well known, PIXE can be used for highly sensitive elemental determination for $Z \gtrsim 14$. However, matrix corrections can be complex and interferences between x rays from various elements can be troublesome. RBS, on the other hand, can easily give the light element composition and at the same time determine the concentration of heavier elements with 10^{-5} g/g sensitivity, although with less elemental resolution than PIXE. Concurrent use of the two methods therefore gives very detailed information on the total elemental composition of coal and fly ash. Results of determinations made with 3 MeV protons and alpha particles on samples of North Dakota lignite, New Mexico coal, fly ash, and other samples will be presented to demonstrate the usefulness of the methods for elemental analysis of coal and related materials.

*Work supported by the U. S. Department of Energy, Division of Basic Energy Sciences, Contract No. EY-76-C-02-0016.

AE13 Determination of Lithium in Biological Samples with the $^6Li(n,\alpha)^3H$ Reaction.* D.C. GREGORY AND K.W. JONES, Brookhaven National Laboratory, S.COCHAVI, Mount Sinai Medical Center, and P.G. BERNAD, Massachusetts General Hospital--The determination of lithium in biological samples by conventional chemical methods is difficult when the concentration is of the order of parts per million. Sensitive and accurate measurements have been made using the $^6Li(n,\alpha)^3H$ reaction and plastic track detectors.[1] Here we investigate the feasibility of using conventional surface barrier detectors which, while not giving position information, have superior dynamic range, energy discrimination, and greater ease of data analysis. Measurements were made with a thermal neutron flux of 1.4×10^6 n/cm^2/sec using 50 and 100 mm^2 silicon surface barrier detectors located 2.4 cm from the thick biological material. Concentrations of lithium greater than 20(parts per billion could be measured in a 4-hour measurement. Lithium concentrations in selected organs of mice fed varying amounts of Li_2CO_3 will be presented.

*Work supported by the U.S. Department of Energy, Divisio of Basic Energy Sciences, Contract No. EY-76-C-02-0016.

[1]M. Thellier, T. Stelz, and J. C. Wissocq. Biochem. and Biophys. Acta 437, 604 (1976).

AE14 Detection of Linear Polarization of X-Rays and Gamma-Rays Using Pulse Rise Time.* R.A. LOVEMAN and J.G. CRAMER, Univ. of Wash.—We have used a Monte-Carlo program to determine the rise time of pulses produced by photo-electrons in liquid inert gas ionization chambers. The time it takes for the first forty percent of the ionization electrons to pass through a Frisch-grid should indicate the linear polarization of the incoming photon. We predict that by looking at the pulses with the fastest rise times, we can get a modulation factor of 0.50 at 80 keV. This modulation factor improves for higher energies, and deteriorates for lower energies. We believe that detectors of this kind could be useful in astrophysical experiments because of the ability to simultaneously obtain good energy resolution and polarity resolution.

*Supported in part by U.S. Dept. of Energy.

AE15 A Comparison of Magnetic Field Calculations by the Programs GFUN3D and SATDSK. GREGORY S. McNEILLY and JOHN D. BELL, Computer Sciences Division at Oak Ridge National Laboratory†.--Magnetic field calculations (including iron poletips) for cyclotron design studies have been performed using the general code GFUN3D[1] and using SATDSK[2], a program which assumes uniform magnetization in the high field limit. A comparison of results will be presented.

†Operated by Union Carbide Corporation, Nuclear Divisic for the Department of Energy under contract W-7405-eng-26.

1 Armstrong, A. G., et al., GFUN3D User Guide, RL-76-029/A (1976).

2 ORNL/CSD/TM-98

SESSION BA: MEDIUM-ENERGY PHYSICS

Thursday afternoon, 18 October 1979; Auditorium at 2:00 P.M.; D. Bowman, presiding

BA 1 Pion Single Charge Exchange.* HELMUT W. BAER, *Los Alamos Scientific Laboratory.* (30 min.)

A survey of pion single charge-exchange reactions on nuclear targets ranging in mass from ^{3}He and ^{208}Pb has been performed[1] at LAMPF using the newly built π° spectrometer. The instrument operates by detecting the symmetric $\pi^\circ \to 2\gamma$ decay with two large volume position-and-energy-