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bulletin

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INCLUDING THE PROGRAM OF THE
DIVISION OF NUCLEAR PHYSICS IN TUCSON, ARIZONA
4–6 NOVEMBER 1971

neutron energies of 1.5, 2.5, 3.5, and 8.5 MeV. Most of the cross sections are well fit with the aid of complex potentials whose parameters vary monotonically with neutron energy and neutron excess. The dependencies of the parameters will be illustrated by presenting data and analyses for an extensive set of measurements at 3.5 MeV incident energy.

* Work supported by the National Science Foundation

ED 12. Elastic Scattering of Gamma Rays by ^{88}Sr Below Photoneutron Threshold.* S. DATTA, J. S. ALLEN, University of Illinois.--Monochromatic gamma rays from the University of Illinois bremsstrahlung monochromator were used to measure the elastic scattering cross section of ^{88}Sr for gamma rays below photoneutron threshold in the energy region 9 MeV to 12 MeV. The incident gamma ray energy could be defined to within 25 keV; however these were selected only in energy bins of about 100 keV. Resonances were observed at 9.38, 9.92, 10.55, 10.95, 11.33 MeV. These compare with theoretically predicted lines at 9.6, 10.4, 10.93, 11.48 MeV by Goulard et al.[1] A sharp drop in scattering cross section was observed at 11.50 MeV which corresponds to the effective photoneutron threshold of 11.528 MeV obtained from Nuclear Data Sheets.

*Submitted by A. O. HANSON

[1]B. Goulard, T. A. Hughes and S. Fallieros, Phys. Rev. 176, 1345 (1968).

ED 13. Resonance Scattering of Se Neutron Capture γ Rays from Zr.* JOHN C. HILL, Texas A&M University.--Selenium neutron capture γ rays produced in the thermal neutron flux of the TAMU "Triga" reactor were allowed to impinge on a natural Zr target. Resonant scattering of the 8.496-MeV γ ray was observed using a Ge(Li) detector. It was determined that the resonantly excited level belonged to ^{90}Zr since decay to the first excited 0^+ level at 1.75 MeV and the 2^+ level at 2.18 MeV was observed. The angular distribution of the resonantly scattered γ ray was consistent with a spin of 1 for the 8.496-MeV level as observed in earlier work.[1] The parity of the above level was measured and a search for higher excited states in ^{90}Zr was made.

*Work supported by the Robert A. Welch Foundation.

[1]S. Ramchandran and J. A. McIntyre, Phys. Rev. 179, 1153 (1969).

ED 14 Resonance Fluorescence from the 7.08 MeV State in ^{208}Pb.* W. SCHOLZ and H. BAKHRU, SUNY-Albany, R. COLLE and ANGELA LI-SCHOLZ*, RPI, Troy.--Nuclear resonance fluorescence has been observed from the $J^\pi = 1^-$ state at 7.08 MeV in ^{208}Pb[1]. The primary photon beam was produced with the ^{19}F(p,αγ)^{16}O reaction using a 2.1 MeV proton beam from the Dynamitron Accelerator at SUNYA. The target was a pressed pellet of CaF_2. From a study of the growth of the intensity of scattered radiation with increasing scatterer thickness as observed in a Ge(Li) detector, the following level parameters were extracted: level energy 7.083 ± 0.002 MeV, integrated scattering cross section $\int\sigma_s dE$ = 1.70 ± 0.20 MeV-mb, maximum absorption cross section $80 \leq \sigma_A^{max} \leq 146 = 6\pi\lambda^2$ barn, and ratio of Doppler width to level width $0 \leq \delta/\Gamma \leq 2.8$. Since a careful search did not reveal any branches to excited states in ^{208}Pb, the value of σ_A^{max} should be close to the upper limit. The level width extracted assuming σ_A^{max} = 146 barn is Γ = 7.4 ± 0.9 eV.

*Work supported in part by the U.S. Atomic Energy Comm.

[1]N.B. Lewis, Nuclear Data B5 - 243 (1971).

SATURDAY AFTERNOON, 6 NOVEMBER 1971 (R.L. BECKER presiding) SENIOR BALLROOM AT 1:30 P.M.

Many Body Theory

FA 1. Theory of the Shell Model Potential. B. BRANDOW, *Battelle-Seattle Research Center.* (30 min)

FA 2. Semiphenomenological Many-Body Theory of Nuclei. S.H. KOHLER, *University of Arizona.* (30 min)

FA 3. Statistical Theory of Nuclei.*
H.W. MELDNER, *University of California at San Diego, La Jolla.* (30 min)

The statistical theory of nuclei due to Brueckner and collaborators reproduces "shell-structure-averaged" nuclear binding energies, sizes and shapes. This energy-density functional approach incorporates the present knowledge about nuclear matter--including recent neutron matter results. It has been applied to heavy-ion scattering and provides a reliable extrapolation to gross properties of superheavy elements and neutron stars.

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FA 4. The Effective Two-Body Interaction in Finite Nuclei and Its Calculations.*
B.R. BARRETT, *University of Arizona, Tucson.* (30 min)

Effective operators are needed in nuclear physics because of the overwhelming number of degrees of freedom involved in a many-particle nuclear-structure calculation. In order to make such calculations tractable one must truncate to a limited and manageable number of degrees of freedom. The theory for carrying out this truncation and for constructing the effective operators in the truncated space is now well-established and many calculations have been performed using this theory. In particular, this paper will review the time-independent many-body perturbation theory for the

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Abstract Submitted

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Bulletin Subject Heading in which Paper should be placed
Nuclear Scattering of Photons
$A \geq 90$

^{208}Pb. W. SCHOLZ and H. BAKHRU, SUNY-Albany, R. COLLE and ANGELA LI-SCHOLZ*, RPI, Troy.—Nuclear resonance fluorescence has been observed from the $J^{\Pi} = 1^-$ state at 7.08 MeV in ^{208}Pb[1]. The primary photon beam was produced with the $^{19}F(p,\alpha\gamma)^{16}O$ reaction using a 2.1 MeV proton beam from the Dynamitron Accelerator at SUNYA. The target was a pressed pellet of CaF_2. From a study of the growth of the intensity of scattered radiation with increasing scatterer thickness as observed in a Ge(Li) detector, the following level parameters were extracted: level energy 7.083 ± 0.002 MeV, integrated scattering cross section $\int\sigma_s dE = 1.70 \pm 0.20$ MeV-mb, maximum absorption cross section $80 < \sigma_A^{max} < 146 = 6\Pi\lambda^2$ barn, and ratio of Doppler width to level width $0 \leq \delta/\Gamma \leq 2.8$. Since a careful search did not reveal any branches to excited states in ^{208}Pb, the value of σ_A^{max} should be close to the upper limit. The level width extracted assuming $\sigma_A^{max} = 146$ barn is $\Gamma = 7.4 \pm 0.9$ eV.

*Work supported in part by the U.S. Atomic Energy Comm.

[1]N.B. Lewis, Nuclear Data B5 - 243 (1971).

Submitted by

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Signature of APS Member

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