Measurement of Nuclear Magnetic Dipole Moment of Li-8 by Implantation in Metal Foils

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constructing high energy scattering amplitudes. The effect of long-range correlations has been estimated by using a macroscopic collective model to describe the low-lying 2\(^+(4.44 \text{ MeV})\), 3\(^-(3.96 \text{ MeV})\), and 3\(^+(3.99 \text{ MeV})\) states. These states make a correction to the optical potential through the second-order correlation function which usually includes only Pauli and center-of-mass correlations. These corrections considerably improve the agreement between theory and experiment. In addition, the differential cross-section for scattering and excitation of the low-lying states has been calculated using the same model and is in substantial agreement with experiment.

**F**. 2 Partial-Wave Contribution in \(\gamma\)-Nucleus Scattering Near the 3-3 Resonance. S. Seki, San Fernando Valley State College. Within the frame work of the multiple scattering formalism which we proposed previously, we have examined how much each (\(\gamma\)-nucleus) partial wave contributes to the \(\gamma\)-nucleus total cross sections near the 3-3 resonance. It is found that the appreciable contribution comes from partial waves up to a little larger than \(k R\), where \(k\) is the pion wave number and \(R\) is the geometric radius of the nucleus seen by the pion, and also found that the largest contribution comes from partial waves \(\pi < kr < 4\). The result of our study shows remarkably well a feature of the simple black-body scatterings caused by formation of the 3-3 resonance in the nucleus. The result of our calculation seems to be in agreement with a partial wave analysis of the \(\gamma\)-scatterings by use of an impact parameter method.

**F**. 3 Deuteron Wave Function at Large \(r\). H. Uchino, O. Kuma, and J. M. Leinber, Rensselaer Polytechnic Institute. --We substitute analytical expressions for the deuteron wave function \(r > 4\) into the Schrödinger equation to find the central and tensor potentials. We compare our results with those of Odagaki and Weid. We consider: 1) E. J. Teller's wave function which gives a poor fit; 2) modified Teller; varying \(r\) of his parameters (so \(B = 0.350, a = 1.335 \pi^{-1}, 2.05 \pi^{-1}, \gamma = 0.640 \pi^{-1}\)) to obtain a good fit to field's potentials; 3) Hulthen-Boguslaw wave function which gives a poor fit.

**F**. 4 Photodisintegration of \(^{12}\text{C}\). Leading to Excited States of \(^{12}\text{C}\) and \(^{12}\text{B}\). R. J. Winwood, Rensselaer Polytechnic Institute and Argonne National Laboratory. A Geiger-Müller detector was made of gamma ray spectra from the \(\gamma\) transitions of \(^{12}\text{C}\). These reactions were initiated by bremsstrahlung from the Harwell e-ray accelerator, and the excitation functions for the production of particular gamma lines were obtained as a function of bremsstrahlung-end point energy over the range 3.5 to 40 MeV. The 15-1 MeV state of \(^{12}\text{C}\) was both strongly populated, as Murray has observed. However, the cross section for \(^{12}\text{C}\) leading to the 15.1 MeV level is peaked at 25 MeV, while the cross section leading to the 15.4 MeV level peaks below 15 MeV. The 0.95 MeV state in \(^{12}\text{B}\) is weakly excited. These results appear generally consistent with \(^3\) giant resonance calculations which predict a substantial isoscalar splitting of the resonance.

**F**. 5 Observation of Quadrupole Splitting of \(^{12}\text{B}\) in a Single Crystal. R. L. Williams, J. L. Pfeiffer, J. C. Wells, Jr, and L. Madansky, The Johns Hopkins University. --The quadrupole coupling of \(^{12}\text{B}\) implanted in \(^{12}\text{Be}\) has been observed using a single crystal of \(^{12}\text{Be}\). One sees a narrow resonance line, the location of which depends in the normal way on the orientation of the crystalline c-axis with respect to the external magnetic field direction. The coupling constant is given by \(eQ/2h = 54.9(5) \text{ MHz}\). This is consistent with previous measurements using a Be foil. Using the field gradient at \(^{12}\text{Be}\) lattice sites, calculated by Pomerantz and Das, we find \(Q/2\hbar = 35.7 \text{ MHz}\).

**F**. 6 Comparison of the Calculations of Angular Correlations Produced by Magnetic Dipole and Axially Symmetric Quadrupole Interactions. -- O. Klepp, R. C. Haskell, and L. Madansky, The Johns Hopkins University. --The quadrupole interaction of \(^{12}\text{B}\) implanted in \(^{12}\text{Be}\) has been observed using a single crystal of \(^{12}\text{Be}\). One sees a narrow resonance line, the location of which depends in the normal way on the orientation of the crystalline c-axis with respect to the external magnetic field direction. The coupling constant is given by \(eQ/2h = 54.9(5) \text{ MHz}\). This is consistent with previous measurements using a Be foil. Using the field gradient at \(^{12}\text{Be}\) lattice sites, calculated by Pomerantz and Das, we find \(Q/2\hbar = 35.7 \text{ MHz}\).

**F**. 7 Measurement of the Nuclear Magnetic Dipole Moment of \(^{14}\text{N}\) by Implantation in Metal Foils. -- R. C. Haskell, R. L. Williams, Jr., and L. Madansky, The Johns Hopkins University. --Polarized \(^{14}\text{N}\) nuclei have been produced through the \(\gamma\)-ray reaction using the 3.5 MeV Van de Graaff accelerator at Brookhaven National Laboratory. The observed polarization was a slowly-varying function of deuteron energy over the range 1.3-2.9 MeV, reaching a maximum of about \(+1.6\%\). The recoiling nuclei were stopped in Au, Pt and Pd foils and the effective dipole moments were measured by a resonant dephasing method. The results were \(1.65322(25)\) \(\mu\text{N}\), \(1.65288(20)\) \(\mu\text{N}\), and \(1.65270(30)\) \(\mu\text{N}\), respectively. These are consistent with the work of Connor, who found \(\mu(1) = 1.6538(7)\) \(\mu\text{N}\) and \(\mu(2) = 1.521\) \(\mu\text{N}\) for \(^{14}\text{N}\) in \(^{14}\text{N}\) crystal. An upper limit for the \(\mu(2)\) quadrupole moment will also be discussed.

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