MEASUREMENTS OF THE IN-PLANE POLARIZATION TRANSFER COEFFICIENTS, D_λ AND D_σ, FOR THE ISOSCALAR TRANSITIONS IN $^{10}B(\vec{p},\vec{p}')^{10}B$, AT 200 MeV

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As part of E368, we have measured the in-plane polarization transfer for selected low-lying, T=0 states in ^{10}B. These states include the 1^+ at 0.72 MeV, the 1^+ at 2.15 MeV, the 2^+ at 3.59 MeV, the 3^+ at 4.77 MeV, and the 4^+ at 6.03 MeV. The excitation energy spectrum from $\theta_{\rm lab} = 20°$ is shown in Fig. 1, where both states in ^{10}B and the contaminants are labeled.

In Fig. 1, a tagging scintillator was used to mark a region near the elastic peak where the data-acquisition rate was scaled down by a factor of 40. This removed most elastic events and made possible better statistical precision elsewhere in the spectrum. Operation of the K600 focal plane polarimeter at the medium dispersion port made possible the observation of two combinations of the in-plane polarization-transfer coefficients,

$$D_\lambda = D_{LS'} \cos\alpha + D_{LL'} \sin\alpha \qquad \text{and} \qquad D_\sigma = D_{SS'} \cos\alpha + D_{SL'} \sin\alpha,$$

where $\alpha \simeq 235°$ is the spin precession angle for scattered protons deflected by the K600 to this port.

These states are expected to demonstrate collective properties. In an inelastic scattering model based on an effective nucleon-nucleon t-matrix, the most important terms should be the spin-independent central and spin-orbit. Both of these terms are strongly affected by Pauli blocking in the exit channel. These effects have been parameterized by Seifert, *et al.*[1] for $^{16}O(p,p')^{16}O$ and $^{40}Ca(p,p')^{40}Ca$ at 200 MeV. Our measurements allow us to test this empirical effective interaction at lighter mass and for in-plane polarization transfer.

Electron scattering measurements have recently become available for both longitudinal and transverse components of these transitions.[2] Using Cohen and Kurath[3] wavefunctions,

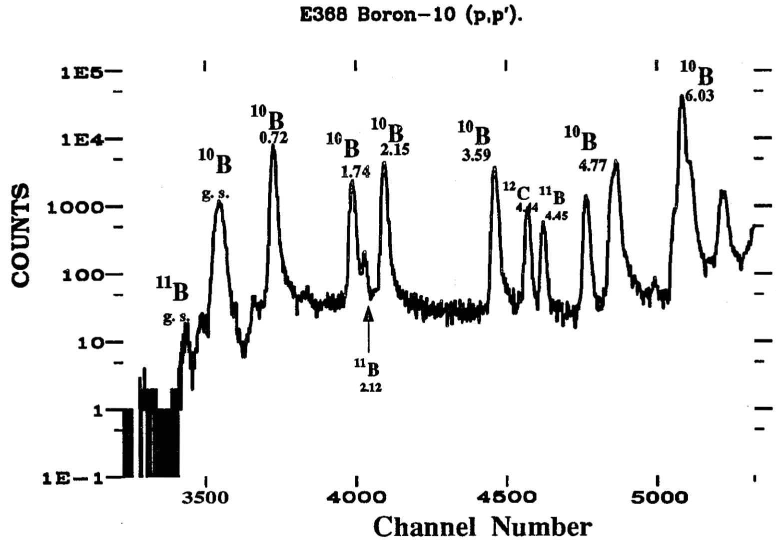

Figure 1. The excitation energy spectrum of $^{10}B(\vec{p},\vec{p}')^{10}B$, at $\theta_{lab} = 20°$. The elastic scattering was scaled down about 40 times in order to increase the count rate for other transitions.

the longitudinal portion of these transitions is dominated by C2 through rearrangements in the p-shell. For our calculations, this component had to be increased to match the electron scattering. This accounts for the collectivity of these transitions within a larger basis. The magnetic formfactors show a mixture of E2 and M3, which was also rescaled to match the (e,e′) data. Harmonic oscillator wavefunctions were used with oscillator parameters chosen to match the momentum transfer dependence of the (e,e′) data.

Figure 2 shows the cross section, D_λ and D_σ measurements together with calculations using the program LEA.[4] The PH3 interaction of Seifert provided both the density-dependent t-matrix and the folded optical potential for the entrance and exit channel distortions. Best agreement with the in-plane polarization transfer is found for the 4^+ state at 6.03 MeV, which also has the smallest M3 component. Agreement is only qualitative for the 1^+ and 2^+ transitions. The reproduction of the cross section is only fair, and for the lowest and highest states would suggest that Pauli modifications to the t-matrix, which enhance the large angle cross section, are too large. The 3^+ state is a special case. The spin coupling allows for a monopole term. Such a term is absent in the Cohen and Kurath wavefunctions, but is likely to be present in a larger shell model basis.[5] This may be a factor in the particularly poor agreement with the data for this transition.

1. H. Seifert, *et al.*, Phys. Rev. C **47**, 1615 (1993).
2. A. Cichocki, *et al.*, Phys. Rev. C **51**, 2406 (1995).
3. S. Cohen and D. Kurath, Nucl. Phys. **73**, 1 (1965); and T.S. Lee and D. Kurath, Phys. Rev. C **21**, 293 (1980).
4. Program LEA, Linear Expansion Analysis, from J. Kelly, private communication.
5. J. Millener, private communication.

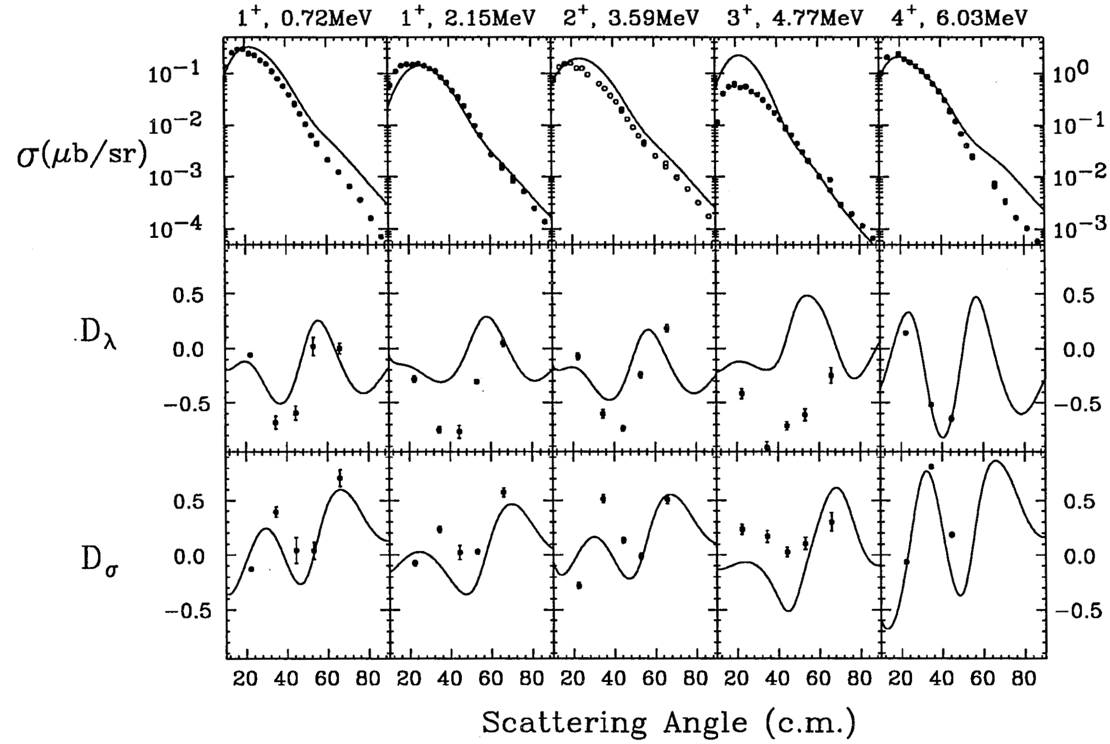

Figure 2. The cross section, D_λ and D_σ angular distributions for the isoscalar transitions in $^{10}B(\vec{p},\vec{p}')^{10}B$. The curves represent the effective interaction of Seifert, *et al.*

MEASUREMENT OF THE REMAINING IN-PLANE POLARIZATION TRANSFER COEFFICIENTS FOR THE $^{10}B(\vec{p},\vec{p}')^{10}B$ REACTION AT 200 MeV

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In order to understand the modification of the nucleon-nucleon force within the nuclear medium, we have undertaken the measurement of several "stretched states" that have well understood structure. In the case of ^{10}B the state of interest is the the 0^+ state at 1.74 MeV. This transition has a single-particle, single-hole configuration with a well