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STATUS OF THE 3-BODY $\vec{d}$+p BREAKUP EXPERIMENT

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Recently, there has been considerable interest in the off-shell components of the fundamental nucleon-nucleon interaction. Specifically, predictions of current models and parameterizations yield similar on-shell (asymptotic) features, but differ in their off-shell (interior) behavior. Many experiments have examined low-energy 3-body observables in various geometries intended to enhance off-shell effects. Unfortunatly, those experiments have suffered from either large Coulomb effects, or in the case of neutron experiments, insufficient precision. The need to utilize energies which would limit the importance of the Coulomb contribution led to the suggestion that experiments should be carried out which utilize energies of greater than 40 MeV per nucleon. We chose to examine the d+p breakup system at E_d=95 MeV in a geometry which necessitates a large momentum change for each of the nucleons. The small relative distances required in such a kinematic condition may enhance off-shell effects. In addition, we want the protons to

be in a relative $S_{pp}=0$ state. One geometry which yields this is the Symmetric Constant Relative Energy (SCRE) geometry, in which the three nucleons emerge with equal center-of-mass energies. Fadeev calculations have shown measurable discrepancies between different N-N interactions for the tensor analyzing powers A_{xx} and A_{yy}.

In June, 1985, Experiment 274 was approved for the measurement of the tensor analyzing powers for the entire SCRE geometry ($0° \leq \alpha \leq 180°$, where α is the scattering angle of the outgoing neutron in the center-of-mass). The experiment will detect the energies and angles of both of the outgoing protons, yielding a kinematically complete measurement. Two wire chambers will be used to obtain the angle information, while light yield and time-of-flight measured with stopping plastic detectors will define the protons' energy.

A test run has been completed to study the rates and resolution in the plastic counters. As we did not yet have the wire chambers, two small and thin (5mm x 5mm x 1.5mm) coincidence scintillators defined small regions of the large (23cm x 30cm x 2.5cm) stopping scintillators. The centers of the stopping scintillators were positioned at 32° on either side of the beamline at a distance of about 51cm from the target. Each large counter had two phototubes located at either end. Polyethylene targets of thicknesses ranging from 3 to 27 mg/cm^2 were used. The resolution of the counters was obtained by looking at elastic d+p events.

We found that changes in phototube gain limited the singles event rate to 250,000Hz. The resolution was then measured at a series of positions using the small coincidence scintillators moved across the face of the large detectors. The best resolution obtained was 5% while the worst was about 10%. A comparison of the resolution obtained with only one phototube and that obtained using two yielded a ratio of about 1.4. The similarity of this result to the statistical factor of $2^{1/2}$ indicates that more efficient light collection could further improve the resolution. In addition, we obtained raw scattered particle rate information as a function of scattering angle over the SCRE scattering region.

This test run resulted in changes to the experimental design. The large background rates, especially at the smaller scattering angles, coupled with the reduction in the SCRE cross section for those angles, caused us to limit the coverage of the experiment to angles greater than 30° ($\alpha > 60°$). In addition, we have decided to replace the large plastic detectors woth an array of eight smaller (6.4cm x 6.4cm x 5.1cm) scintillators. The phototubes of these detectors are mounted directly to the plastic to enhance the light collection efficiency, and thereby improve the resolution.

Currently, we have one working wire chamber and will use it to map the response of the new plastic detectors. A test of the complete system is to be scheduled for mid-April and the production run for May 1987.