with only L=0 and 1 contributions. The behavior of the background subtracted under the GR is shown in Fig. 3. Also shown is the plot of the analyzing power $A(\theta)$ of the continuum at $E_x \sim 21$-25 MeV as a function of θ. It is found that $A(\theta)$ in both cases is nearly a constant and has an average value of ~ 0.06. The present work indicates that simultaneous measurement of $A(\theta)$ and $\sigma(\theta)$, besides confirming the GQR and GMR strengths obtained from other measurements, can also put much more stringent limits on the amount of L=4 strength allowable in this region.

A more detailed analysis of the data and comparisons with DWBA calculations are in progress.

1) F.E. Bertrand, Annu. Rev. Nucl. Sci. 26, 457 (1976).

2) Proc. Giant Multipole Resonance Topical Conference, Oak Ridge, TN (1979).

3) P.P. Singh, et al., IUCF Annual Report, 1979.

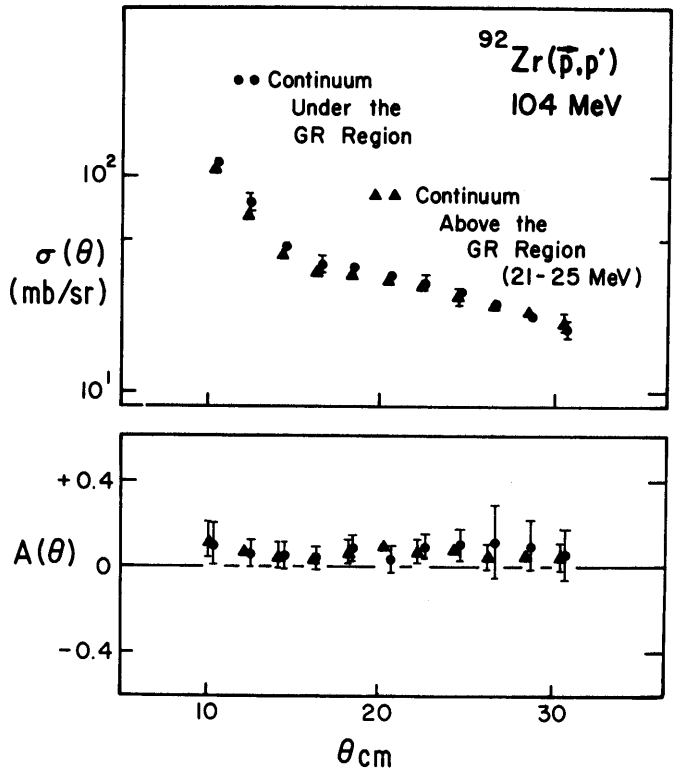

Figure 3. The behavior of the background subtracted from under the GR and the continuum above the GR at E_x = 21-25 MeV.

SEARCH FOR α-CLUSTER STATES IN THE GIANT RESONANCE REGION

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We have measured (^{6}Li,d) spectra at 10° for the interaction of 90 MeV ^{6}Li with targets of ^{12}C, ^{16}O, ^{24}Mg, ^{54}Fe, ^{90}Zr, and ^{196}Pt. Spectra from the ^{12}C and ^{16}O (mylar) targets exhibit the same selectivity reported[1] for this reaction with lower energy ^{6}Li, but states at high excitation energy are less obscured by the breakup background at this higher energy. The breakup background on ^{24}Mg is also sufficiently weak that many transitions to highly excited states in ^{28}Si stand out clearly; there is some correlation between the excitation energies of states populated in this reaction and those reported[2] to be isoscalar giant quadrupole resonance fragments in a ^{28}Si(α,α')^{28}Si study. Several states in the excitation energy region 8-10 MeV are weakly populated in ^{58}Ni, but no structure is observed above the slowly-rising breakup background in the region of the giant quadrupole resonance. No transitions populating discrete states are observed for the heavier targets. Future work will concentrate on studying the giant quadrupole resonance of ^{28}Si.

1) A.A. Ogloblin, Proceedings of the International Conference on Nuclear Reactions Induced by Heavy Ions, eds. R. Boch and W.R. Hering, (Heidelberg, 1969), p. 231

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DECAY MODES OF ISOSCALAR GIANT RESONANCES THROUGH $(\alpha,\alpha'\gamma)$ COINCIDENCE STUDIES

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Using the 150 MeV alpha beam from IUCF the particle decay channels of isoscalar giant resonances in ^{62}Ni are being investigated by observing the discreet gamma transitions of residual nuclei in coincidence with scattered alpha particles. The particles were identified with a solid state silicon telescope at a laboratory angle of 15.8°, and gamma-rays were detected using three Ge(Li) detectors located at 40°, 94°, and 150° with respect to the beam. Isoscalar resonance-like structure at 65 $A^{-1/3}$ MeV is observed in alpha-gamma coincidence spectra and the gamma-producing decays proceed predominantly through one neutron emission.

In the statistical model of decay calculated by the computer code MB II[1] from an initial spin of 2$\hbar$ in ^{62}Ni at 16.4 MeV excitation, the particle decay distribution is predicted to be 92% neutron, 7% proton, and 1% alpha evaporation. Reasonable sharp cut-off initial distributions vary these predictions by less than one percent. The evaporation neutrons are distributed as approximately 16% s-wave, 40% p-wave, 34% d-wave, 8% f-wave, and 1% g-wave, and leave the residual ^{61}Ni-nucleus in a broad band with an upper limit around 6.5 MeV excitation and with a wide spin distribution centered around 2-3 $\hbar$. Purely statistical dipole transitions directly to the low-lying states without regard to nuclear structure yields the intensity patterns in spin as indicated in the fourth column of Table I. Also presented is continuum behavior for initial sharp cut-off distributions with maximum spins 3 and 7 $\hbar$ (the maximum spin transfer from semi-classical momentum transfer at radius R = 1.2 $A^{-1/3}$). We conclude that it would be difficult to extract the resonance admixture in the observed pattern. Also, angular correlations with the alpha particle are not strong. This may be due to the coupling of the average d-wave neutron and at least one p-wave gamma-ray to this initial orientation.

Figure 1 presents the side feeding strength with excitation in ^{61}Ni for spins 1/2, 3/2, 5/2, and 7/2 populations. Ignoring nuclear structure, the dipole transitions from 4 MeV excitation would go as $(4-E)^3$

Table I. Percentage sidefeeding strength in ^{61}Ni from decay of 11.2 to 23.8 MeV excitation of ^{62}Ni

Spin in ^{61}Ni	MBII CALCULATION Sharp cut-off J_{max}=7	MBII CALCULATION approx. J_{max}=3	Initial J=2	Measurement
1/2	1.5	5	7	12 (1)
3/2	5	17	22	21 (3)
5/2	9	25	31	26 (1)
7/2	14	23	25	24 (2)
9/2 & higher	71	21	16	17 (2)

Errors include only statistics and do not reflect the errors introduced from estimations of ground state, first excited state, or 9/2 and higher strengths from systematics of the data.