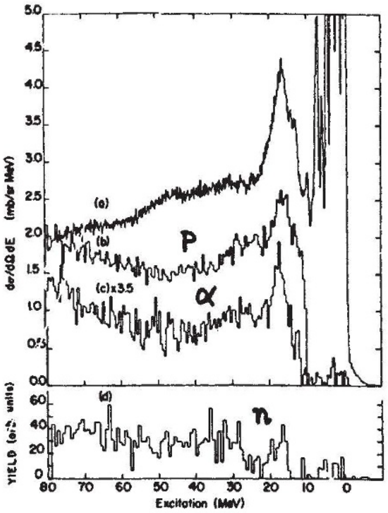

The top curve is the total spectrum, and the three lower curves are of the alpha-particles in coincidence with protons, alpha-particles and neutrons respectively. The energy scale refers to the excitation energy in the ^{58}Ni nucleus.

subtracting the background continuum. The giant quadruple resonance is visible in all the coincidence spectra, showing that the resonance decays by proton, alpha-particle and neutron emission.

These spectra were integrated to give the branching ratios for the decay of the giant quadrupole resonance, giving 59± 12% proton decay and 12±4% alpha-particle decay. The difficulty of detecting the neutrons prevents the accurate determination of the neutron branching ratio. These results may be compared with the branching ratios from the statistical decay of a 2^- state in ^{58}Ni at an excitation energy of 16 MeV. These were calculated using the Hauser-Feshbach theory, giving 51% proton decay and 6% alpha-particle decay. These are very similar to the observed values, suggesting that the giant quadrupole resonance decays statistically. To confirm this possibility it would be necessary to make similar measurements on a range of nuclei with different particle emission thresholds and penetrabilities, and to compare the results with statistical theory.

An investigation of the decay of the giant quadrupole resonance in ^{40}Ca by Youngblood *et al.* (*Phys.Rev.***C15**, 246; 1977) gave 70±15% proton decay and 21±10% alpha-particle decay, quite similar to the values for ^{58}Ni. For this nucleus the statistical theory gives 74% and 21% respectively, in accord with the experimental results. The relative proportion of alpha decays increases towards the lighter nuclei, and the measurements of Knöpfle *et al.* (*Phys.Lett.***74B**, 191; 1978) gives essentially 100% alpha decay for ^{16}O.

The new results for ^{58}Ni are thus in line with the trend expected from measurements of the decay of the giant quadrupole resonance in lighter nuclei. Detailed shell model calculations of the decay of the resonance in ^{16}O and ^{40}Ca reproduce this trend, thus confirming the experimental results.

It is thus no longer necessary to assume a particular alpha-particle structure to account for the decay of the giant quadrupole resonance in the nickel isotopes. The earlier results that indicated a high probability of alpha-particle decay are thus probably attributable to unrecognised difficulties in the method used by the Maryland group. □

IN a recent comment (*News & Views* **280**, 15; 1979) P.E. Hodgson drew attention to an experiment at the National Bureau of Standards in Washington DC (Wolynec, Dodge & Hayward *Phys. Rev. Lett.* **42**, 27; 1979) which appears to show that alpha particle emission is the dominant decay mode of the isoscalar giant quadrupole resonance in the nickel isotopes. This surprising result, derived from an analysis of electron and bremsstrahlung excitation function data is, in the light of recent work at three other laboratories, more controversial than implied by Wolynec *et al.* Work in this laboratory (McGeorge *et al. Int. Conf. on Nuclear Physics with Electromagnetic Interactions*, Mainz, 1979) using a similar experimental procedure but a different approach to the analysis, and alpha scattering coincidence experiments at Maryland (Collins *et al. Bull. Am. Phys. Soc.* **23**, 506; 1979; *Phys. Rev. Lett.* **42**, 1440; 1979) and Heidelberg (Knöpfle *Int. Conf. on Nuclear Physics with Electromagnetic Interactions*, Mainz 1979) have not succeeded in reproducing the NBS result. We should like to point out that a number of unsubstantiated assumptions were made in the NBS analysis and that these taken with other considerations cast considerable doubt on the derived result.

Hodgson points out that the analysis depends on the accuracy of the E1 and E2 virtual photon spectra calculated from theory; there is no experimental test of the E2 spectra (Hayward *Int. Conf. on Nuclear Physics with Electromagnetic Interactions*, Mainz 1979) and tests of the E1 spectra (for example Martins, Wolynec & Moscati *Phys. Rev.* **C16**, 613; 1977) do not seem to be better than 5%. The accuracy of the E1 spectrum is important because the E2 strength is essentially derived from the small difference between the calculated E1 contribution to the electro-alpha cross section and the experimental measurements.

The analysis also depends on knowledge of the monoenergetic photoalpha cross sections which are folded with the E1 virtual photon spectra to predict the E1 contribution to the electro-alpha yield. These cross sections have not been separately measured for nickel and the accuracy of the excitation function data obtained so far does not allow determination of both the multipole contributions and the photo-alpha cross sections. It is therefore necessary to make some assumptions; in the NBS analysis an asymmetric Lorentz shape is assumed for the photo-alpha cross section. The resulting E1 contribution to the electro-alpha cross section increases less rapidly with energy than the experimental data and the difference could also be due to a high energy tail on the photo-alpha cross section.

We have performed a statistical model calculation of the photo-alpha cross sections starting with the photo-neutron cross sections measured by Berman (Lawrence Livermore Laboratory Report No. UCRL 78482, 1976) and find a larger high energy tail than the Lorentz shape of the NBS analysis. We then find that the electro-alpha data can be fitted adequately by including an E2 contribution which exhausts only 10% of the energy weighted sum rule. This E2 contribution is consistent with the alpha particle scattering coincidence experiments but much less than that found by Wolynec *et al.*

Folding our calculated photo-alpha cross sections with the bremsstrahlung spectrum leads to 'radiator-in' yields 20-30% larger than those published by NBS but in agreement with recent measurements in our laboratory. In such experiments it is possible that enlargement of the beam spot size due to multiple scattering in the radiator can lead to counting losses unless a sufficiently large detector is used in the focal plane of the alpha particle spectrometer. In our measurements these losses are kept below 1%. Our electro-alpha results for which these losses are much smaller agree reasonably well with the NBS data.

The main point we wish to emphasise is that E2 strengths derived from electro-excitation function data depend sensitively on the virtual photon spectra and on the photo-alpha cross sections used in the analysis. It is therefore necessary to treat the results with considerable caution.

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A hundred years ago

The British Association at Sheffield

The reports of the sectional proceedings in the local papers seem to us unusually meagre, though the space devoted to the Association both in provincial and in London papers becomes each year increasingly great. The *Times* alone this year has had several leaders on the Association generally, as well as on the principal addresses, and it is gratifying to notice the decided improvement not only in the knowledge displayed in these articles, but also in the attitude of the leading paper towards science. In a somewhat hysterical article on Prof. Allman's address, the *Observer* of last Sunday seems to forget that science has all sorts of followers, and that the real workers rarely come before the public. Notwithstanding the apparently complete ignorance of the writer in the *Observer* as to what science really is, we cannot help agreeing with much that he says as to the present condition of the Association, and the urgent need of reform in its method of work, if it is not rapidly to degenerate into a "scientific garden party".

From *Nature* **20** 28 August, 406; 1879