

then k would be reduced to 3.6. It seems likely, however, that any change in the wavefunctions that would increase the value of $\langle 0 \parallel \mathcal{M}(E2) \parallel 2 \rangle$ would also increase the value of $\langle 0 \parallel \mathcal{O}^2 \parallel 2 \rangle$, thus leading to a value of k intermediate between 3.6 and 4.4.

These calculations suggest that k for ^{18}O should be large compared with unity, and probably about 4. The reason why Ball *et al.* (1982) regarded 1.5 as an approximate upper limit for k seems to be due to confusion regarding the meaning or definition of k . Many authors, including Ball *et al.*, have taken k to be equal to

$$k' = \sigma_{-2} / (3.5 A^{5/3} \mu\text{b MeV}^{-1}). \quad (18)$$

The denominator in (18) is the hydrodynamic model value of σ_{-2} , as empirically renormalized by Levinger (1957) in order to fit experimental values of σ_{-2} for nuclei with $A \gtrsim 20$, so that it is not surprising that $k' \approx 1$ for ^{18}O ; the results of Woodworth *et al.* (1979) give $k' = 1.26$. But $k = k'$ implies that the parameter η_0 has its hydrodynamic value, namely $\frac{4}{3}\pi^{\frac{1}{2}} \langle 0 \parallel \mathcal{M}(E2) \parallel 2 \rangle / ZeR_0^2$, with $R_0 = 1.2 A^{1/3}$ fm (Häusser *et al.* 1973), and it is not at all obvious that this should be a good approximation for ^{18}O .

Use of $k = 4$ in the analysis of the Coulomb excitation measurements on ^{18}O would increase the derived value of $B(E2; 0^+ \rightarrow 2^+)$. For example, the published value of $39.0 e^2 \text{fm}^4$ of Fewell *et al.* (1979) (for $k = 1$ and destructive interference, as implied by the LSF wavefunctions) would increase to $47.1 e^2 \text{fm}^4$ for $k = 4$ (Kuehner *et al.* 1982), in good agreement with the adopted value $47.6 e^2 \text{fm}^4$ of Ball *et al.* The $k = 1$ value of $45.3 e^2 \text{fm}^4$ of Flaum *et al.* (1977) is already consistent within experimental errors with the value of Ball *et al.*, but Flaum *et al.* found that their derived value of $B(E2; 0^+ \rightarrow 2^+)$ was very insensitive to the value of k , being only $0.7 e^2 \text{fm}^4$ less for $k = 0$. Thus, the use of $k = 4$ in the Coulomb excitation analyses would seem to make the derived values of $B(E2; 0^+ \rightarrow 2^+)$ more consistent among themselves, and also with the DBLA value obtained by Ball *et al.*

Changing k in the analysis of Fewell *et al.* (1979) also changes the derived value of Q_{2+} from $-2.3 e \text{fm}^2$ for $k = 1$ to $1.0 e \text{fm}^2$ for $k = 4$ (Kuehner *et al.* 1982). The Q_{2+} value of Flaum *et al.* (1977) is more sensitive to k , and would probably also be near zero for $k = 4$. Most model calculations have given $Q_{2+} \approx -5 e \text{fm}^2$ (see Table 1 of Fewell *et al.*). Vold *et al.* (1977) have pointed out that values of Q_{2+} near zero can be obtained with the LSF model provided the collective states belong to a triaxially deformed band rather than one with axial symmetry. Positive values of Q_{2+} have been predicted in calculations based on energy-weighted sum rules (Koo 1979; Koo and Tassie 1979).

We note that the crude wavefunctions (14) used here for ^{20}Ne give $k(^{20}\text{Ne}) \approx 2.3$ (assuming $E_g - E_0 \approx 20$ MeV). Such a moderately large value of k could contribute to the discrepancy between calculated and experimental values of $Q_{2+}(^{20}\text{Ne})$, which was pointed out for example by Spear (1981), since the experimental values were based on the assumption that $k = 1$.

In summary, these calculations and estimates suggest that $k(^{18}\text{O}) \approx 4$, which is sufficiently large to remove the discrepancy between values of $B(E2; 0^+ \rightarrow 2^+)$ for ^{18}O derived from Coulomb excitation and from other measurements.

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References

- Ajzenberg-Selove, F. (1978). *Nucl. Phys. A* **300**, 1.
- Ajzenberg-Selove, F. (1982). *Nucl. Phys. A* **375**, 1.
- Ball, G. C., Alexander, T. K., Davies, W. G., Forster, J. S., and Mitchell, I. V. (1982). *Nucl. Phys. A* **377**, 268.
- Barker, F. C. (1982a). *Aust. J. Phys.* **35**, 291.
- Barker, F. C. (1982b). *Aust. J. Phys.* **35**, 301.
- Berant, Z., Broude, C., Engler, G., and Start, D. F. H. (1974). *Nucl. Phys. A* **225**, 55.
- Disdier, D. L., Ball, G. C., Häusser, O., and Warner, R. E. (1971). *Phys. Rev. Lett.* **27**, 1391.
- Fewell, M. P., Baxter, A. M., Kean, D. C., Spear, R. H., and Zabel, T. H. (1979). *Nucl. Phys. A* **321**, 457.
- Flaum, C., Barrette, J., Le Vine, M. J., and Thorn, C. E. (1977). *Phys. Rev. Lett.* **39**, 446.
- Gemmeke, H., Deluigi, B., Lassen, L., and Scholz, D. (1978). *Z. Phys. A* **286**, 73.
- Häusser, O., McDonald, A. B., Alexander, T. K., Ferguson, A. J., and Warner, R. E. (1973). *Nucl. Phys. A* **212**, 613.
- Koo, W. K. (1979). *Phys. Lett. B* **87**, 307.
- Koo, W. K., and Tassie, L. J. (1979). *Nucl. Phys. A* **315**, 21.
- Kuehner, J. A., Spear, R. H., Vermeer, W. J., Esat, M. T., Baxter, A. M., and Hinds, S. (1982). A measurement of the giant-dipole-resonance contribution to the Coulomb excitation of ^{17}O . *Phys. Lett.* (to be published).
- Lawson, R. D., Serduke, F. J. D., and Fortune, H. T. (1976). *Phys. Rev. C* **14**, 1245.
- Levinger, J. S. (1957). *Phys. Rev.* **107**, 554.
- Spear, R. H. (1981). *Phys. Rep.* **73**, 369.
- Vold, P. B., Cline, D., Russo, P., Sprinkle, J. K., Scharenberg, R. P., and Mitchell, R. J. (1977). *Phys. Rev. Lett.* **39**, 325.
- Woodworth, J. G., *et al.* (1979). *Phys. Rev. C* **19**, 1667.

