

TABLE III
Shortest intermolecular contacts (Å)

I	molecule at	x	y	z
II	"	\bar{x}	$1/2+y$	\bar{z}
III	"	$1-x$	$1/2+y$	\bar{z}
IV	"	$1-x$	$1-y$	$1-z$
N ₁ (I) - N ₂ (III)			3.17	
C ₃ (I) - N ₂ (IV)			3.56	
N ₂ (I) - C ₄ (IV)			3.67	
C ₁ (I) - C ₆ (II)			3.70	
C ₁ (I) - C ₂ (II)			3.71	
N ₂ (I) - N ₂ (III)			3.79	

Thanks are due to Professor Ben Post of the Polytechnic Institute of Brooklyn, U.S.A., and Professor S. Ramaseshan for their interest in the problem.

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GAMMA-GAMMA ANGULAR CORRELATION IN W^{182} *

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THE level structure of tungsten W^{182} has been investigated by a number of workers.^{1,2} The spin of various levels and multipolarity of various gamma-rays have been determined, both by internal conversion method³⁻⁵ and by gamma-gamma angular correlation measurements.⁶⁻⁸ Due to the complexity of the level structure of W^{182} , shown in Fig. 1, it is found that some of

ray to be pure E_2 and 222 Kev gamma-ray to be pure E_1 in character, as determined by Murray *et al.*³ from the internal conversion measurements. Whereas more recently Korkman and Backlin⁵ have reported, from internal conversion measurements, that 1231 Kev gamma-ray is an admixture of E_2 and M_1 , dipole component being of the order of $29 \pm 8\%$. In view of this discrepancy, it was thought worthwhile to study the angular correlation of 68-1222, 264-68 and 222-1231 Kev cascades in order to establish the spin 1289, 1331 and 1554 Kev levels and thereby determine the multipolarity of 1231 Kev gamma-ray from angular correlation measurements.

Measurements and Results.—The measurements were carried out with a conventional fast-slow coincidence arrangement with an effective resolving time of about 70 n-secs and two $3" \times 3"$ NaI(Tl) crystals. The source was used in liquid form in order to minimise any electric quadrupole interaction. The coincidence data was taken with a 256 channel analyser to precisely assess the Compton contribution in the low energy region because of the high energy gamma-ray cascades. The gate was set at about 30 Kev higher than the composite photopeak of 1222-1231 Kev gamma-rays, with a window of 70 KeV, in order to avoid any interference because of 1122 Kev gamma-ray. In this way 68-1222 and 222-1231 Kev cascades could be run simultaneously. 264-68 Kev cascade was run separately with single channel analysers. The results of these measurements are as follows:

68-1222 Kev Cascade.—In this correlation, at each angle, the Compton component of 100, 151

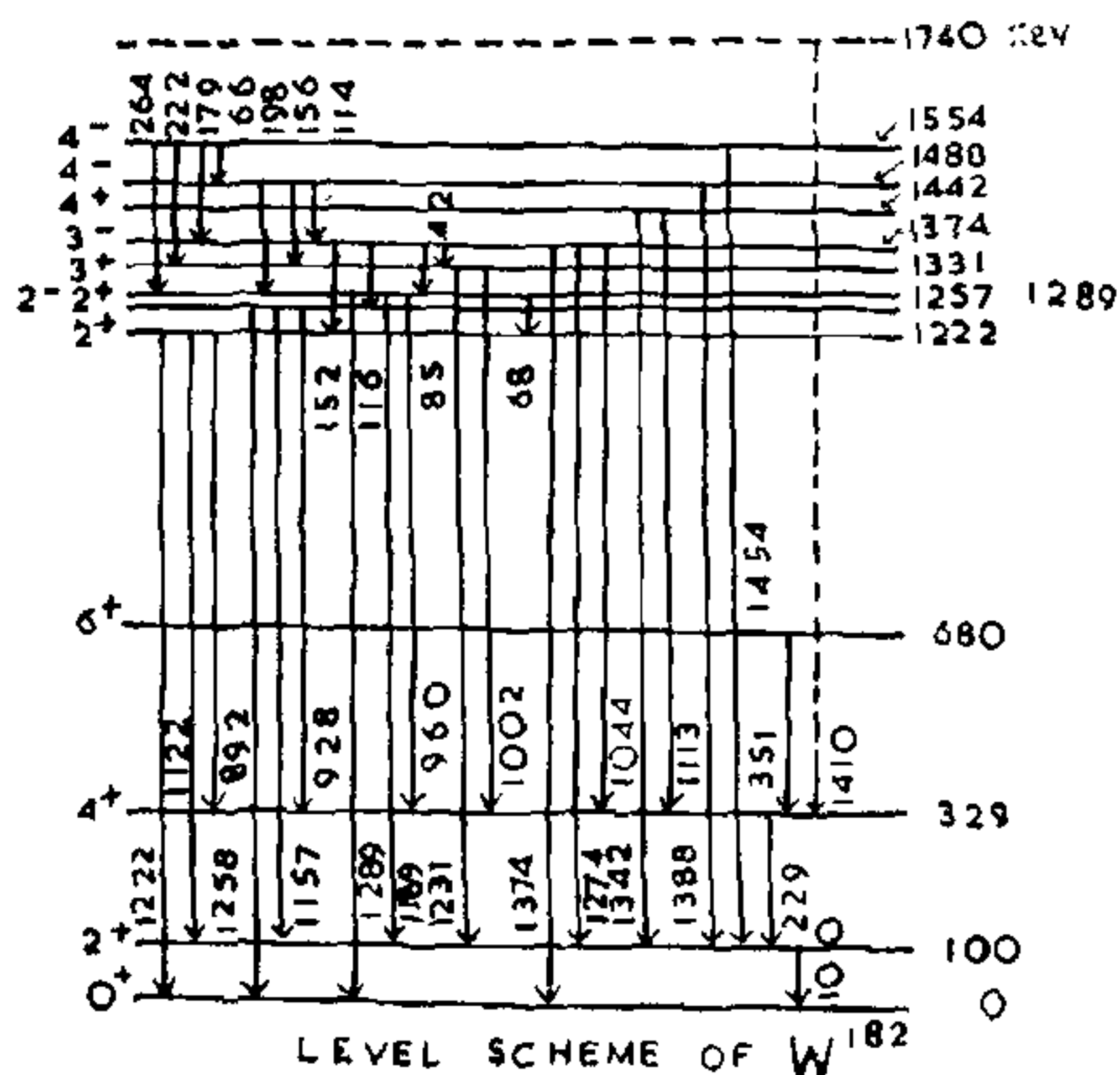


FIG. 1

the results obtained from these measurements are inconsistent. In particular Hickman and Wieldenbeck⁶ has assigned a spin 4 to 1554 Kev level on the basis of the angular correlation measurements of 222-1231 Kev cascade. In doing so, they have assumed 1231 Kev gamma-

* This work has been supported by the National Bureau of Standards, Washington, D. C., U.S.A.

and 222 Kev gamma-rays and any other weak low energy gamma-ray falling in coincidence with 1222 or 1231 Kev gamma-rays, was subtracted by peeling off method. The K X-ray component because of the low energy gamma-rays falling in coincidence with 1222 and 1231 Kev gamma-rays was estimated to be 33%. After making these two corrections and the finite solid angle correction, the measured coefficients come out to be :

$$A_2 = 0.284 \pm 0.008$$

$$A_4 = 0.002 \pm 0.010$$

These results are in agreement with the theoretical results of 2(Q) 2(D)0 sequence for 68-1222 Kev cascade. Consequently a spin 2 is established for 1289 Kev level.

264-68 Kev Cascade.—The correlation for 264-68 Kev cascade was corrected for the contribution due to the coincidences between 68 Kev gamma-ray and the Compton portion of high energy gamma-rays falling in 264 Kev gate. This component was measured by shifting the 264 Kev channel gate to a higher side by about 150 Kev and was found to be 47%. The measured coefficients after finite solid angle correlation are :

$$A_2 = 0.073 \pm 0.006$$

$$A_4 = 0.001 \pm 0.002$$

These results are in good agreement with a 4 (Q) 2(D)2 sequence for 264-68 Kev cascade thereby establishing a spin 4 for 1554 Kev level.

222-1231 Kev Cascade.—In this measurement, 264-1222 Kev was the only interfering cascade. Its contribution was subtracted by peeling off method. The measured coefficients after solid angle correction, are :

$$A_2 = -0.017 \pm 0.011$$

$$A_4 = 0.008 \pm 0.013$$

Taking the spin of 4 for 1554 Kev level as determined from 264-68 Kev cascade and assuming the spin 3 and 2 for 1331 and 100

Kev levels respectively, the theoretical coefficients for 4(D)3(Q)2 sequence come out to be :

$$A_2 = -0.018$$

$$A_4 = 0$$

These results are in good agreement with the measured values.

If we assume the mixed character $E_2 + M_1$ ($29 \pm 8\%$) for 1231 Kev gamma-ray, as recently reported by Korkman and Backlin⁵ from their internal conversion measurements, then the theoretical values of A_2 and A_4 for 4(D)3(D,Q) 2 sequence are :

$$A_2 = -0.095$$

$$A_4 = 0$$

This value of A_2 is much higher than the experimental value of A_2 . Consequently 29% dipole admixture of 1231 Kev gamma-ray is not favoured by present angular correlation measurements. It can be concluded from the present angular correlation measurements that 1231 Kev gamma-ray is pure quadrupole in character, which is in agreement with the assignment made by Murray et al.³ on the basis of internal conversion coefficient measurements. These results clearly support a spin assignment of 3 units to 1331 Kev level.

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A NEW FOSSIL INSECT FROM THE LOWER GONDWANAS OF KASHMIR*

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A NEW fossil insect, *Kashmiroblatta marahomensis* Gen. et sp. nov., has been collected by the author from the Gangamopteris Beds exposed at a small spur, locally known as Baliarpatti, near Marahom (Marhama) ($33^\circ 50'$; $75^\circ 05'$), Anantnag District, Kashmir. The

fossil is preserved in the form of an impression of the fore-wing on a slab of grey tuffaceous shale and has been found to be associated with a large number of fossil fishes, e.g., *Amblypteris kashmirensis* Woodward, *Amblypteris symmetricus* Woodward, and fossil plants,