correct for possible variation in temperature. The experimental error is of the order of 0·1 per cent.

The results for each of the three tuners were recorded separately and an average was then taken. The following table gives the fourteen recognizable intervals into which an octave was found to be subdivided compared with the diatonic and equitempered scales.

The four principal modes correspond to the following groups of notes (quoted by their numbers): (1, 3, 5, 7, 9, 11, 13), (3, 4, 8, 9, 11, 13, 1′), (3, 5, 7, 8, 11, 12, 1′), (1, 3, 4, 7, 9, 10, 14). Of these the last is the same as the minor scale in European music.

No. and Name of Note	Frequency ratios: Our results	Frequency ratios: Conf'nce results	Equi-tempered scale	Diatonic scale	Symbol
1 Rast	1	1	1	1	C
	..	..	..	1·042	C♯
2 Shahnaz	1·057	..	1·057	..	
	..	..	..	1·080	D♭
3 *Doka*	1·123	1·123	1·120	1·125	D
	..	..	..	1·171	D♯
	..	..	1·187	..	
4 Kurd	1·200	..	..	1·200	E♭
5 Sika	1·228	1·227	..	..	E½♭
	..	..	..	1·250	E
	..	..	1·257	..	
6 Nim Busalik	1·274	..	..	1·279	F♭
	..	..	..	1·302	E♯
7 Girka	1·330	1·337	1·330	1·333	F
	..	..	..	1·390	F♯
8 Higaz or Saba	1·417	..	1·411	..	
	..	..	..	1·440	G♭
9 Nawa	1·498	1·503	1·496	1·500	G
	..	..	..	1·562	G♯
10 Hisar	1·590	..	1·583	..	
	..	..	..	1·600	A♭
11 Huseini	1·685	1·685	1·677	1·667	A
	..	..	..	1·738	A♯
12 Agam	1·779	..	1·778	..	
	..	..	..	1·800	B♭
13 Irak	1·831	1·838	..	..	B½♭
14 Nim Mahur	1·880	..	1·882	1·875	B
	..	..	..	1·920	C♭
	..	..	..	1·955	B♯
1′ gawab el Rast	2·000	2·000	2·000	2·000	C

Other modes are obtained by changing the first note (key-note) in a group. The most characteristic feature of the scheme is the appearance of neutral thirds and neutral sevenths.

A fuller account will appear elsewhere.

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[1] "Oriental Music Conference," p. 559 (Cairo, 1932).

Magnetic Anisotropy of Rare Earth Sulphates and the Asymmetry of their Crystalline Fields

IN an important paper in the *Physical Review* for 1932 Penney and Schlapp[1] have discussed theoretically the Stark-splitting of the energy levels of the rare earth ions in crystals under the influence of the crystalline electric fields, and its influence on the magnetic behaviour of the ions. Experimentally, Spedding and his co-workers[2] have studied the absorption spectra of rare earth salts of the type $M_2(SO_4)_3.8H_2O$, where M=Pr, Nd, Er at different temperatures, and thence deduced the low-lying energy levels of the M^{+++} ions in the crystals. They find that (1) the number of low-lying energy levels and their relative separations are the same as predicted by the theory for a field of cubic symmetry acting on the M^{+++} ions; (2) the intensity of the cubic field required to produce the observed separations is the same in all the three crystals, as should be expected from their isomorphism; (3) the observed separation of the levels is not inconsistent with the available magnetic data for the mean susceptibilities of the crystals. From these and other results, it has been concluded that the fields acting on the M^{+++} ions in these crystals should be almost rigorously cubic in symmetry.

One direct result of such a cubic symmetry in the field would be a magnetic isotropy for the crystal, and any observed deviation from isotropy will give us some idea of the deviation of the field from cubic symmetry. We have recently measured the principal magnetic susceptibilities of single crystals of several rare earth salts, and we give below the values for the anisotropy of the sulphates; $\Delta\chi$ denotes the difference between the maximum and the minimum principal susceptibilities of the crystal, and χ the mean of the three principal susceptibilities.

Crystal	$\Delta\chi/\chi$
$M_2(SO_4)_3.8H_2O$	
M=Pr	0·20
Nd	0·11
Sm	0·21
Er	0·12

$\Delta\chi/\chi$ is not small, and when we remember that the group of atoms associated with each M^{+++} ion in the crystal should have at least this anisotropy, and has very probably more (as the different groups present in the unit cell of the crystal—probably eight in number—will not, in general, be oriented parallel to one another) and that it is the anisotropy of the above group (and not that of the crystal) which corresponds to the asymmetry of the field under consideration, it is easy to realize that the deviation from cubic symmetry should be quite marked. From an inspection of the table it becomes clear, as pointed out by Penney and Kynch[3], that the non-cubic part of the field has produced separations in levels, degenerate in the cubic field, comparable in size with those of the cubic field pattern itself.

A rediscussion of the valuable results on the absorption spectra of these crystals obtained by Spedding and his co-workers, taking into account the non-cubic nature of the crystalline fields as evidenced by the magnetic anisotropy of the crystals, is very desirable.

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[1] *Phys. Rev.*, **41**, 194 (1932).
[2] *J. Chem. Phys.*, **5**, 191, 316, 416 (1937).
[3] NATURE, **140**, 109 (1937).

Variations of Cosmic Ray Intensity during Magnetic Storms

IN a paper[1] on trajectories of electric particles with applications to cosmic rays, published January 4, 1937, I directed attention to possible effects of magnetic storms in the following words:

"As to other electromagnetic fields which may modify this supposition (regarding simplifying