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LETTER TO THE EDITOR

A New Suggestion for Aligning Certain Atomic Nucleï

At the discussion meeting on cryomagnetism connected with the Perrin-Langevin celebrations in Paris I mentioned a simple method to align the nucleï of some paramagnetic ions [1]), which avoids the difficult two-stage cooling procedures [2]). It is the purpose of this note to bring this suggestion to the notice of a larger number of scientists.

The hyperfine structures of the normal paramagnetic ions must be of the order of 0.01 to 0.1 cm^{-1} for nucleï possessing a nuclear magnetic moment of the order of one nuclear magneton [3]). This state of affairs may also be described by remarking that the electrons in the partially filled 3d- of 4f-shells bring about a field of almost a million oersted at the nucleus.

If now a salt containing such ions is brought to a temperature of 0.01 degree Kelvin the ions, and consequently also their nucleï, will be aligned in a field of a few hundred oersted. In order to cool the salt down we can mix it with another salt the paramagnetic ions of which have no nuclear moment (e.g. chromium [4])), in such a way that good thermal contact is obtained. If then the mixture is demagnetized from for instance 25000 oersted at one degree Kelvin to a few hundred oersted the bulk of the nuclear moments mentioned first, must be expected to be aligned. This may be utilized for the observation of directional anisotropy of nuclear reactions specific for those nucleï [5]). Preliminary preparations for testing these ideas have already been under way for some time.

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Leiden, December 5, 1948. Kamerlingh Onnes Laboratory, Leiden

Received December 7th, 1948.

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