

thin ones transitions of medium intensity.

From the point of view of the method under consideration, it is convenient to use similar transitions in the molecules  $N_2O$  and HCN:



In the HCN molecule the  $02^00 \rightarrow 01^10$  transition belongs to strong lines [1], thus facilitating satisfaction of the self-excitation condition.

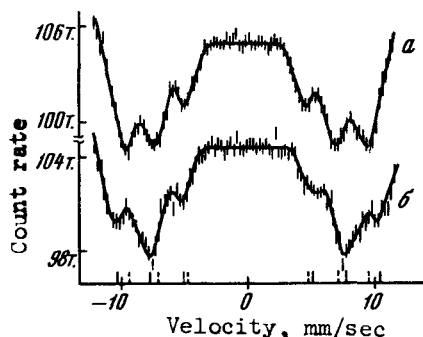
It is possible to excite molecules in a molecular-beam source not only by heating, but also by electric discharge, as in gas lasers. Contributing to the production of active particles is the addition of molecules possessing metastable levels and in "resonance" with the working levels of the active medium [2]. It turns out that the first excited vibrational state of the  $D_2$  molecule is close to the  $20^00$  and  $12^20$  levels of the  $CO_2$  molecule.

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#### SIGN OF THE MAGNETIC FIELD AT TIN NUCLEI IN A FERRODIELECTRIC MATRIX

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In an earlier paper [1] (see also the paper by Belov and Lyubutin [2]) we reported experimental observation of indirect (super-exchange) induction of a magnetic field of hundreds of kOe at the nuclei of nonmagnetic tin atoms introduced into an yttrium-iron-garnet matrix  $\{Y_{3-x}Ca_x\}[Sn_xFe_{2-x}](Fe_e)O_{12}$  with  $x = 0.25$ .



To determine the sign of this field we investigated the Mössbauer spectra of the same garnet sample placed in an external magnetic field. The obtained spectra ( $SnO_2$  source, room temperature) are shown in the figure. Spectrum a was obtained without an external field, and b in a field of 15 kOe. The positions of the peaks of spectra a and b are marked on the abscissa with dashed and solid lines, respectively.

The change in the intensity ratio of the various components of spectrum b, compared with a, is due to polarization of the sample in the external magnetic field, and accordingly to the change in the char-

acter of the angular distribution of the components of the transitions  $\pm 1/2 (3/2) \rightarrow \pm 1/2 (1/2)$  [3]. In an external magnetic field there is observed a clear-cut increase of the splitting of the components of the Mossbauer spectra. Consequently, the internal magnetic field at the tin nuclei coincides in direction with the applied external field. Since, as already mentioned, the ferrite is completely polarized in an external field of 15 kOe, the larger of the magnetic moments of its two sublattices - the moment of the tetrahedral sublattice - is oriented parallel to the applied field, and the smaller moment, that of the octahedral sublattice, antiparallel. The ferrimagnetic ordering, i.e., the antiparallel alignment of the moments of the two sublattices, is conserved in this case, since the molecular Weiss field in ferrites amounts to hundreds of kOe and is many times larger than the external applied field. Since the internal magnetic field at the iron nuclei is always negative relative to the magnetic moment of its ion [3,4], we can conclude that the fields of the nuclei, both tin and iron, situated in the same (octahedral) sublattice of the yttrium iron garnet, have the same sign. We shall consider in the future several possible explanations of this fact.

In conclusion, we are deeply grateful to Yu. S. Sherbinin for making possible the operation of the apparatus, and Yu. B. Baidarovtsev for supplying the magnet.

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#### CALCULATION OF THE DIRECT REACTION $C^{12}(n,n')C^{12*}(2+)$ BY THE DISPERSION METHOD

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In describing direct nuclear reactions, the effects of virtual scattering of the initial and final particles are apparently essential in many cases. Allowance for these effects can be made within the framework of the dispersion method [1,2]. The amplitude of the reaction is expressed in this case in terms of an amplitude that describes the mechanism of the process without account of the virtual-scattering effects, and in terms of the scattering phases of the initial and final particles.

We present in this note the results of a calculation, by the dispersion method, of the angular distribution of inelastically scattered neutrons in the reaction  $C^{12}(n,n')C^{12*}(2+)$  ( $E_n = 14$  MeV), with allowance for the interaction in the initial and final states, i.e., the sought reaction amplitude is expressed in terms of the amplitude without allowance for the effects of virtual scattering and of the scattering phase in the physical region.

As the initial approximation describing the mechanism of the process we consider the