08. INORGANIC AND MINERALOGICAL CRYSTALLOGRAPHY

08.5-01 MAGNETIC STRUCTURE OF BeCaFe$_4$O$_8$ : ANALYSIS OF NEUTRON DIFFRACTION MEASUREMENTS. By Y. Abbas, M. Mostafa and M. Fayek, Neutron Diffraction Group, Neutron Physics Department, Atomic Energy Establishment, Cairo, Egypt.

The compound BeCaFe$_4$O$_8$ crystallizes in the trigonal space group P3m1 with one formula unit per unit cell and the lattice constants are a = 5.4039, c = 7.7023 Å. Neutron diffraction measurements carried out on a powder sample in the temperature range 300 - 900 K showed that the compound undergoes a magnetic transition to an antiferromagnetic state at Neel temperature $T_N$ = (680±5) K. Analysis of the room temperature neutron diffraction pattern gave a magnetic unit cell with the same periodicity as the crystallographic one $K = [000]$. An antiferromagnetic model is proposed with the iron spin magnetic moments parallel to the C-axis of the unit cell. The magnetic moment value of the Fe$^{3+}$ ions was found to be (4.5±0.1) $\mu_B$.

08.5-02 MAGNETIC NEUTRON DIFFRACTION IN BISMUTH FERRITE. By I. Sosnowska, E. Steichele, T. Peterlin-Neuhaus, Fakultät für Physik, B 21 der Technischen Universität München, 8046 Garching, BND and M. Saayman, Warsaw University, Poland.

The magnetic structure of BiFeO$_3$ has been widely investigated with Mössbauer and neutron diffraction technique (e.g. Jacobson R., Fender B., J. Phys. C. 13, 844, (1975)). Bismuth ferrite has a slightly rhombohedrally distorted perovskite structure with $a = 89.25\%$, space group R3c, and the magnetic structure of G-type. It shows both antiferromagnetic and ferroelectric ordering. As only polycrystalline material is available, only the magnetic moment direction of Fe$^{3+}$ ions with respect to the 3-fold axis can be determined by the splitting of magnetic diffraction maxima. Such an experiment was performed at the Dubna Pulsed Reactor and the magnetic moment was found to be perpendicular to the 3-fold axis (Sosnowska I. et al. Reprint 1995, 2653, Dubna, (1964)).

08.5-03 OBSERVATION OF HYPERFINE-ENHANCED NUCLEAR ORIENTATION BY MEANS OF NEUTRON DIFFRACTION. By M. Steiner, H. Dachs, Y. Ajiro, J. A. Millerhouse, Y. Ohkoff, G. Rahn, U. Scheer, Hahn-Meitner-Institut, Glienicker Str. 100, D-1000 Berlin 39 (W-Germany).

By means of elastic neutron scattering we have observed the orientation of the $^{59}$Co-nuclei in the hyperfine field of the ordered electronic magnetic moments through the term $(b^+·b^-) \neq 0$ in the structure factor. The orientation of the nuclear moments $P_N$ gives rise to a new Bragg-peak in CoF$_2$ whose intensity is proportional to $P_N^2 (b^+·b^-)^2$. At very low temperatures ($T \leq 20$ mK) $P_N$ becomes large enough to produce a measurable (001) Bragg peak in CoF$_2$. Our results indicate that we have achieved $P_N = 0.25$ corresponding to a nuclear temperature of 14 mK. The corresponding (001)-intensity is 1% of the (002)-peak. Possible applications for crystallography of the influence of nuclear orientation on the structure factor are discussed.