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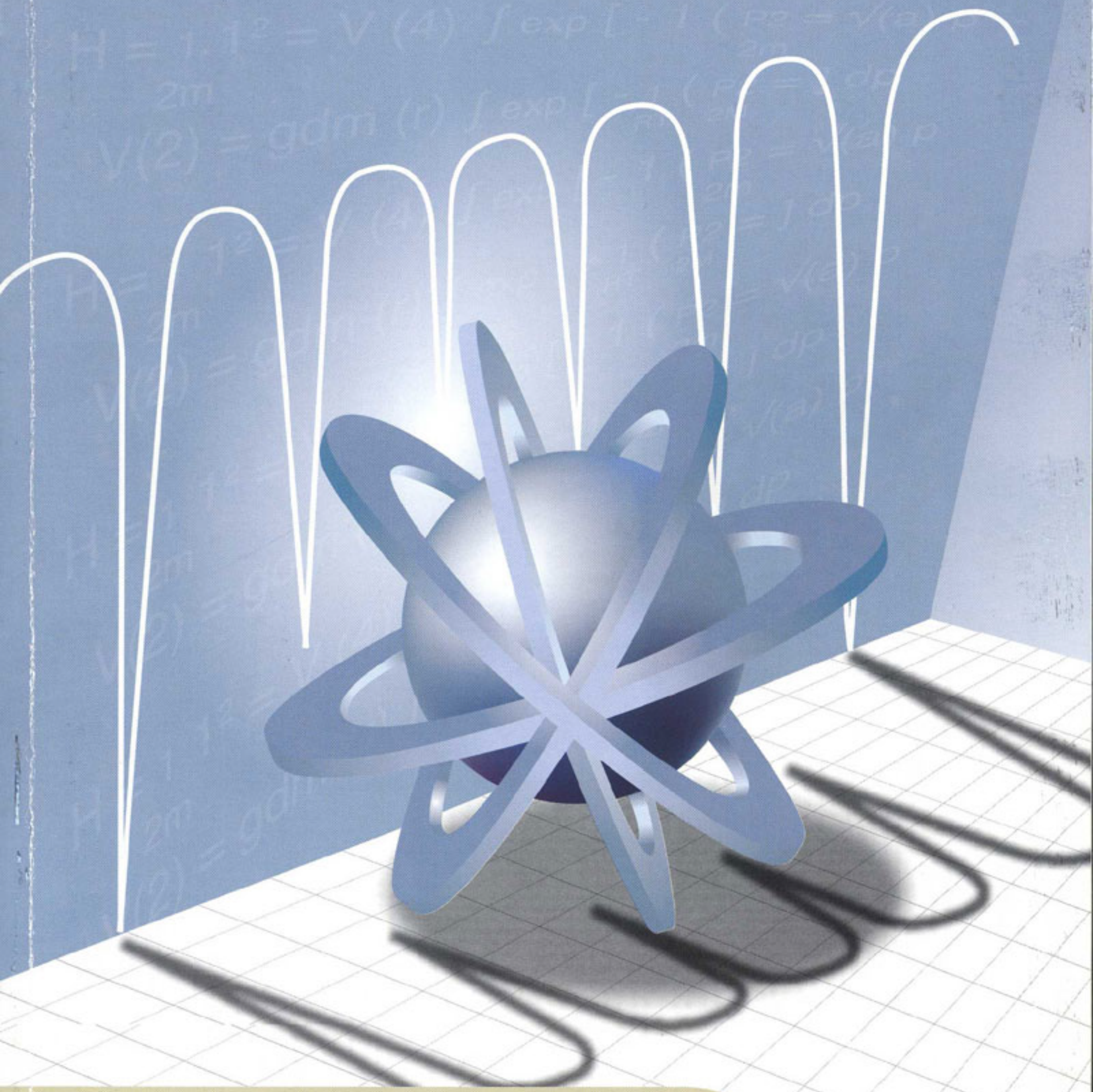

ABSTRACTS

I6 Invited

Mössbauer and neutron diffraction studies on Co-Al ferrite

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Al substituted $CoAl_xFe_{1-x}O_4$ (x=0.1, 0.2, 0.3, and 0.5) have been studied with x-ray and neutron diffraction, Mössbauer spectroscopy and magnetization measurements. Neutron diffraction at 10 K for $CoAl_{0.1}Fe_{1.9}O_4$ revealed a cubic spinel structure of ferrimagnetic long range ordering, with magnetic moments of Fe^{3+}(A)(-4.18 μ_B), Fe^{3+}(B)(4.81 μ_B), Co^{2+}(B)(2.99 μ_B), respectively.
Mössbauer data were collected in the temperature range of 14-850 K. The temperature dependence of the magnetic hyperfine field in ^{57}Fe nuclei at the tetrahedral (A) and octahedral (B) sites was analyzed based on the Néel theory of magnetism. For the sample $CoAl_{0.1}Fe_{1.9}O_4$, the intersublattice A-B interaction and intrasublattice A-A superexchange interaction were antiferromagnetic with strengths of $J_{A\text{-}B}$ = -23.3 k_B and $J_{A\text{-}A}$ = -17.6 k_B, respectively, while the intrasublattice *B-B* superexchange interaction was found to be ferromagnetic with a strength of $J_{B\text{-}B}$ = 5.5 k_B. With increasing Al substitution the A-B and B-B interaction decreased but the A-A interaction increased.
It is interpreted that the reduction of magnetic moment in Fe^{3+}(A) and a noticeable strength of the A-A interaction are closely related to the covalency effects.