Peculiarities of optical and magnetic properties of magnetoelectric $LiNiPO_4$ crystal in vicinity of the Neel temperature

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The $LiNiPO_4$ is one of magnetoelectric antiferromagnetic(AFM) crystals of the orthorhombic olivine family. This crystal is notable for its unique properties: the pronounced pre-transition spin correlations in the paramagnetic state; the incommensurate AFM phase existing in the narrow temperature interval near Neel temperature, 20.9-21.8K; several magnetic phases, sequentially arising in increasing magnetic field applied along AFM vector, and the ultra weak ferromagnetism in commensurate AFM phase. The results of magnetization and magnetic field-induced optical birefringence measurements, performed near the AFM ordering temperature in a magnetic field applied along the main AFM vector are reported. As the result a new property of incommensurate phase, i.e. the appearance of linear magnetooptical effect (the linear in magnetic field birefringence of linearly polarized light) was revealed. This property is characteristic for magnetically ordered material that has no antiinversion symmetry. Nature of the revealed property is discussed.