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Ferroelectric Phase Transition in $Pb_5Cr_3F_{19}$ and Coupling of Electric Polarization and Magnetization ZVONKO TRONTELJ, Physics Department, IMFM, Ljubljana, DAMIR PAJIC, Department of Physics, University of Zagreb, Croatia, MARKO JAGODIC, Physics Department, IMFM, Ljubljana, PAVEL CEVC, Josef Stefan Institute, Ljubljana, Slovenia — The ferroelectric fluoride $Pb_5Cr_3F_{19}$ with ferroelectric/paraelectric phase transition at 545 K offers a possibility of multiferroic behavior. The paramagnetic Cr^{3+} ion with electronic spin 3/2 has two inequivalent positions in the unit cell and is responsible for magnetic properties. These properties were measured with a SQUID magnetometer from 2 K to 630 K in addition to our earlier EPR measurements. At the ferroelctric/paraelectric phase transition the lattice parameters (c and a unit cell dimensions) experience relatively big changes leading to alteration of magnetic dipole-dipole and exchange interactions. The temperature dependence of magnetic susceptibility times temperature around the phase transitioin was analyzed following the usual free energy expansion. We obtained that a coupling between the electric polarization and the magnetization is quadratic. A magnetic anomaly was observed below 25 K.

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