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Linear Magnetoelectric Effect by Orbital Magnetism ANDREA SCARAMUCCI, Materials Theory, ETH Zurich, ERIC BOUSQUET, Institut de Physique, Université de Liège, MICHAEL FECHNER, Materials Theory, ETH Zurich, MAXIM MOSTOVOY, Zernike Institute for Advanced Materials, University of Groningen, NICOLA SPALDIN, Materials Theory, ETH Zurich — The linear magnetoelectric effect is the linear induction of a static magnetization (electric polarization) by an applied static electric (magnetic) field. Using symmetry analysis and ab initio calculations we show that, in addition to mechanisms involving magnetic moments of spins, such an effect can originate from the response of orbital magnetic moment to polar distortions induced by an applied electric field. Considering LiFePO<sub>4</sub> as model compound, we show that spin-orbit coupling partially lifts the quenching of 3d orbitals and causes small orbital magnetic moments at the magnetic ions sites. An applied electric field modifies the sizes of these orbital magnetic moments and results in a net magnetization. Furthermore, we discuss the link between this mechanism and the electric field dependence of magnetocrystalline anisotropy.

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