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Linear to quadratic magnetoelectric effect in Fe langasite SERGEY ARTYUKHIN, DAVID VANDERBILT, SANG-WOOK CHEONG, Rutgers University — Materials with coexisting and interacting switchable ferroic orders – multiferroics – are the subject of intense investigations due to their existing and potential applications in spintronics and information storage technology. Here we investigate the much debated magnetically induced polarization and magneto-electric effect in the hexagonal Fe-langasite $Ba_3NbFe_3Si_2O_14$ with distorted triangular layers of magnetic Fe ions. We propose a simple model for these phenomena, and discuss how application of the magnetic field induces a toroidal moment, responsible for the peculiar magnetoelectric effect in this material.

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