Abstract Submitted for the MAR07 Meeting of The American Physical Society

Multiferroicity induced by phase modulated spin-density waves JEROEN VANDENBRINK, Leiden University, JOSEPH BETOURAS, University of St. Andrews, GIANLUCA GIOVANNETTI, Leiden University — Materials in which magnetic and ferroelectric order coexist-termed multiferroics-have recently become the focus of much interest. From a technological point of view the possibility to control magnetic properties by electric fields and, vice versa, ferroelectric order by magnetic fields, is very attractive. But despite the possible coexistence of ferroelectricity and magnetism, materials with a pronounced interplay between these properties are very rare. Here we report on a novel route to generate such an interdependence: we show that symmetry arguments allow a finite magnetoelectric coupling for any spin-density wave that is phase modulated and commensurate, even if the spin ordering is collinear. It is this new coupling that drives the formation of multiferroic phases at the magnetic commensurability transitions, for instance the one of YMn_2O_5 at 23 K. This example makes clear that materials with phase modulated spin-density wave ordering are a new class of multiferroics with a strong interdependence of magnetization and ferroelectric polarization.

> Jeroen Vandenbrink Leiden University

Date submitted: 13 Nov 2006

Electronic form version 1.4