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**Inversion symmetry controlled multiferroic response in an Ising Chain Magnet** YOUNJUNG JO, SEONGSU LEE, HEETAEK YI, SANGWOOK CHEONG, LUIS BALICAS, NATIONAL HIGH MAGNETIC FIELD LABORATORY TEAM, RUTGERS CENTER FOR EMERGENT MATERIALS AND DEPARTMENT OF PHYSICS & ASTRONOMY TEAM — Recently, Choi et al. [1] discovered that ferroelectricity in the Ising chain magnet results from inversion symmetry breaking due to the formation of an alternating ionic order of two different ions leading to an up-up-down-down spin configuration. Here we report the observation of drastic changes in the multiferroic character as a function of magnetic field in the Ising chain magnet. Application of a magnetic field up to 33 T, leads to two abrupt changes in the dielectric constant, respectively at  $H_1 = 5$  T and at  $H_2=20$ T, with the first one leading to a fast suppression of the dielectric polarization. The saturation values of the magnetic moment observed by using a vibrating sample magnetometer and a cantilever beam magnetometer suggest that the one ionic moments align along the field for fields above 5 T followed by the subsequent alignment of the other ionic moments above 20 T. [1] Y.J. Choi *etal.* Physical Review Lett. submitted

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