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Reconstruction of Polarization Vortices by Diffraction Mapping of Ferroelectric $PbTiO_3/SrTiO_3$ Superlattice Using a High Dynamic Range Pixelated Detector[1] KAYLA NGUYEN, YI JIANG, MICHAEL CAO, PRAFULL PUROHIT, CELESTA CHANG, Cornell University, AJAY YADAV, MARGARET MCCARTER, University of California Berkeley, JAVIER HONG, University of Cantabria, MARK TATE, Cornell University, RAMAMOORTHY RAMESH, University of California Berkeley, SOL GRUNER, DAVID MULLER, Cornell University, SCHOOL OF APPLIED AND ENGINEERING PHYSICS,CORNELL UNIVERSITY COLLABORATION, DEPARTMENT OF PHYSICS, CORNELL UNIVERSITY COLLABORATION, DEPARTMENT OF MATERIAL SCIENCE AND ENGINEERING, UNIVERSITY OF CALIFORNIA BERKELEY COLLABORATION, DEPARTMENT OF PHYSICS, UNIVERSITY OF CANTABRI COLLABORATION — Ferroelectric polarization vortices realized in $PbTiO_3/SrTiO_3$ superlattice of complex oxides are emerging phenomena that can be used for low-power memory. Here, we apply a high dynamic range electron microscopy pixel array detector (EMPAD) developed at Cornell where convergent beam electron diffraction (CBED) pattern is recorded at 1 ms. Using the EMPAD, we measured <P>of individual diffracted spots where vectorization of <Px>and <Py>reconstructs the polarization vortices at 0.5-1 nm, over an arbitrarily large field of view. Applications of ptychography and careful inspection of <P>help us explore chirality in 3-dimensions and measure the orbital angular momentum of the polarization vortices.

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