Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Realization of a Ferroelectric-Domain-Wall Tunnel Junction JACOBO SANTAMARIA, G. SANCHEZ-SANTOLINO, J. TORNOS, D. HERNANDEZ-MARTIN, J. I. BELTRAN, M. CABERO, A. PEREZ-MUOZ, Z. SEFRIOUI, C. LEON , M. VARELA , GFMC. Univ Complutense. 28040 Madrid, C. MUNUERA, F. MOMPEAN, M. GARCIA-HERNANDEZ, M. C. MUOZ, Instituto de Ciencia de Materiales de Madrid ICMM-CSIC 28049 Madrid, S. J. PENNYCOOK, Department of Materials Science Engineering, National University of Singapore, Singapore 117575. — Incorporating ferroelectric domain walls as an active part of electronic devices holds the promise of interesting new functionalities. Here we form a ferroelectric BaTiO3 tunnel barrier just 4.4-nanometer thick, with ferromagnetic La0.7Sr0.3MnO3 electrodes, containing a head-to-head domain wall within its thickness. A confined electron gas is formed at the domain wall, stabilized by oxygen vacancies, which controls the tunneling transport of the magnetic tunnel junction. Resonant tunneling assisted by the discrete levels of the ferroelectric quantum well gives rise to strong quantum oscillations of the tunneling conductance. Our engineered, highly constrained, domain wall provides a major step forward towards the new concept "The Wall is the Device", exploiting the electronic properties of domain walls for ferroelectric tunnel barriers with new functionalities. Work at UCM supported by MINECO MAT2014-52405-C02-01 and ERC Starting Investigator Grant #239739 STEMOX. MCM acknowledges financial support from MICINN through grant MAT2012-38045-C04-04.

Jacobo Santamaria
GFMC. Univ Complutense. 28040 Madrid

Date submitted: 06 Nov 2015 Electronic form version 1.4