Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Non-local effect in superconducting nanowires ROSA CORDOBA, Instituto de Ciencia de Materiales de Aragn (ICMA), JAVIER SESE, RICARDO IBARRA, Instituto de Nanociencia de Aragn (INA), Universidad de Zaragoza, ISABEL GUILLAMON, HERMANN SUDEROW, SEBASTIAN VIEIRA, Laboratorio de Bajas Temperaturas, Instituto de Ciencia de Materiales Nicols Cabrera, Universidad Autnoma de Madrid, JOSE MARIA DE TERESA, Instituto de Ciencia de Materiales de Aragn (ICMA) — The template-free fabrication of superconducting wires with nanometric control opens fascinating research fields in condensed-matter physics. Ga^{+}-based focused ion beam induced deposition (FIBID) technique is utilized for the fabrication of W- based superconducting nanostructures using $W(CO)_6$ as the precursor material. This type II superconducting material presents superconducting properties below 5 K and fits correctly to the BCS theory. In this contribution, we report a non-local electrical signal observed in superconducting W-based nanowires (NWs) grown by FIBID. Thus, by applying a bias current in an upper horizontal NW, the generated Lorentz-type force pushes the vortex lattice through a connected vertical NW, and this vortex motion is detected as a non-local voltage in a connected lower horizontal NW, where no current is present. The weak pinning in our material combined with a vortex density determined by the external magnetic field, lead to an efficient driving force of the vortex lattice through the vertical NW. We notice that a non-local signal of 0.42 μV can be propagated through long distances -above three micrometers- compared to the intervortex distance (only a few nanometers) of the Abrikosov vortex lattice.

Rosa Cordoba
Instituto de Ciencia de Materiales de Aragn (ICMA)

Date submitted: 10 Nov 2016 Electronic form version 1.4