

Imaging electronic states at interfaces with scanning SQUID

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The interface formed by growing LaAlO_3 on SrTiO_3 (STO), both non magnetic insulators, exhibits conductivity, superconductivity and even magnetism. It is not surprising that the symmetry of the STO substrate is a dominant player in the plethora of physical phenomena found at the interface. We first encountered the interplay between the STO ferroelastic domain walls and the interface while imaging the magnetic flux generated from the interfacial current flow. We found that a big part of the current can be modulated over the STO domain walls and that macroscopic transport measurements are strongly affected. We then investigated the origin of the modulations by imaging the electrical response to locally applied stress. Surprisingly, we found that the resistivity changed mainly along the domain walls which are highly sensitive to pressure. Our study shows that the Scanning SQUID is very useful for the investigation of buried domain walls and their effect on nearby layers.