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The two-dimensional metal forming at the interface between an oxide insulator and SrTiO₃ provides new opportunities for oxide electronics. However, the quantum Hall effect, one of the most fascinating effects of electrons confined in two dimensions, remains underexplored at these complex oxide heterointerfaces. Here, we report the experimental observation of quantized Hall resistance in a SrTiO₃ heterointerface based on the modulation-doped amorphous-LaAlO₃/SrTiO₃ heterostructure, which exhibits both high electron mobility exceeding 10,000 cm²/V s and low carrier density on the order of ~10¹² cm⁻². Along with unambiguous Shubnikov-de Haas oscillations, the spacing of the quantized Hall resistance suggests that the interface is comprised of a single quantum well with ten parallel conducting two-dimensional subbands. This provides new insight into the electronic structure of conducting oxide interfaces and represents an important step towards designing and understanding advanced oxide devices.

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