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Single electron transistors without tunnel junctions tailored by local oxidation of metallic ultra thin films VINCENT BOUCHIAT, CNRS, MARC FAUCHER, CÉCILE DELACOUR, THIERRY FOURNIER, BERNARD PANNETEIR, CNRS/CRTBT — We present the fabrication and low temperature electric properties of nanoscale metallic constrictions made by local oxidation with an Atomic Force Microscope of weakly localized niobium ultra-thin (3nm) strip lines. These constrictions implements nanoscale resistors with resistance of the order of the resistance quantum. Both laterally constrained and variable thickness junctions are made with a lateral gate coupled to the interjunction electrode. Circuits following both geometries exhibits reproducible low contrast gate oscillations at 4K which phase inverts with drain source voltage. The gate modulation of the current is in strong disagreement with the orthodox theory that involves tunnelling. Transport is interpreted as single or multiple islands in series for which Coulomb blockade is induced by the highly resistive sheet resistance.

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