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Single Electron Turnstiles: Improving Performance for a Quantum Metrological Current Standard THOMAS AREF, Aalto Univ, Low Temp Lab, Espoo, Finland, VILLE MAISI, MIKES, Espoo, Finland, OLLI-PENTTI SAIRA, Aalto Univ, Low Temp Lab, Espoo, Finland, ANTTI KEMPPINEN, MIKES, Espoo, Finland, JUKKA PEKOLA, Aalto Univ, Low Temp Lab, Espoo, Finland — A top priority in metrology is to develop measurement standards that are based on fundamental physical constants. Although such standards exist for resistance and voltage (the quantum Hall effect and the Josephson effect respectively), no such standard exists for the unit of current, the ampere, at the present time. The best candidate for a quantum metrological standard for current is a single electron turnstile. Such turnstiles allow electrons through one at a time. When operated at a specific frequency, they produce a proportional current traceable to the single electron charge. Our turnstiles are based on a normal metal copper island contacted through insulating barriers by superconducting aluminum electrodes. By engineering improvements such as on-chip filtering and increased charging energy, we have improved our turnstiles to suppress both first order leakage and second order Andreev currents thus approaching the required accuracy for a new quantum metrological current standard. This current standard would allow the closing of the quantum metrological triangle created by voltage, resistance and current.

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