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Switching Current Fluctuation of Superconducting Aluminum Nanowires PENG LI, Duke Unviersity, PHILLIP WU, ALBERT CHANG, Duke University — The switching current (I_s) from superconducting state to normal state in Aluminum superconducting nanowires is studied. The degree of I_s fluctuation first increases and then decreases with temperature rising. The result is qualitatively in agreement with the theory that the transition is triggered by a single phase slips at low temperature and by multiple consecutive phase slips at higher temperature. The fluctuation in whole temperature range shows phase slips assisted by thermal fluctuation, but the systematic deviation at low temperature indicates possible phase slips by quantum tunneling. This suggests the ultra-narrow superconducting nanowire can behaves very much like an under-damped Josephson junction.

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