

Description of additional supplementary file

Supplementary Move 1: This movie demonstrates the transition from the superconducting phase to the normal phase under both forward and reverse current. It shows the time evolution of the Cooper pair density distribution and temperature, corresponding to the data shown in Figure 3.

Supplementary Move 2: This movie demonstrates the transition from the superconducting phase to the normal phase under both forward and reverse current. It shows the time evolution of the Cooper pair density distribution and temperature, corresponding to the data shown in Figure 5.

Supplementary Move 3: This movie demonstrates the transition from the superconducting phase to the normal phase under both forward and reverse current. It shows the time evolution of the Cooper pair density distribution and temperature, corresponding to the data shown in Figure 7.

Supplementary Move 4: This movie demonstrates the transition from the superconducting phase to the normal phase under both forward and reverse current. It shows the time evolution of the Cooper pair density distribution and temperature, corresponding to the data shown in Figure 9.

Supplementary Move 5: This movie demonstrates the transition from the superconducting phase to the normal phase under both forward and reverse current. It shows the time evolution of the Cooper pair density distribution and temperature, corresponding to the data shown in Figure 10.