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Superconducting Sr_2RuO_4 films A key step toward ground-state quantum computing

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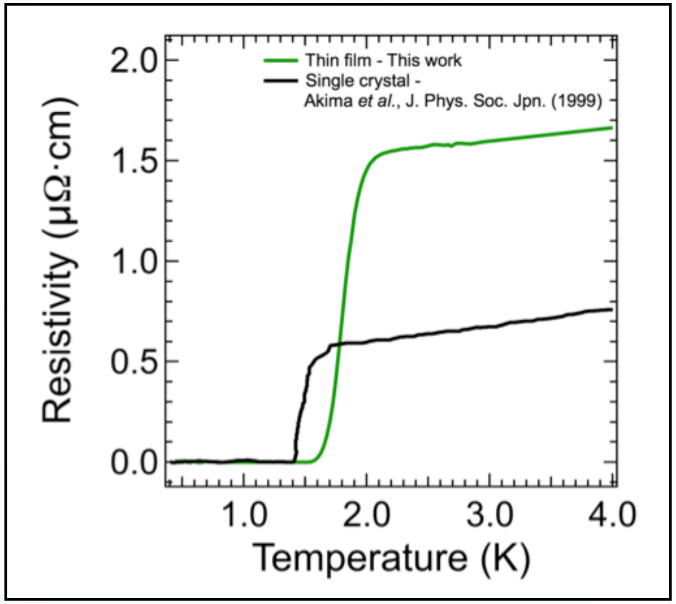
Quantum computers promise exponentially enhanced efficiency in performing calculations of great real-world importance. Unfortunately, in virtually all implementations of a quantum computer, one of the states is an excited state that must, of necessity, decay spontaneously into its ground state. This 'decoherence' quickly destroys the quantum calculation. A fascinating alternative form of quantum computing has been proposed: braiding pairs of ground-state non-abelian anyons in two dimensions. Importantly, an anyon is *not* an excited state and so does not suffer decoherence, preserving quantum information *ad infinitum*. In principle one of the simplest ways to create and use pairs of such anyons occurs in odd-parity topological superconductors (OPTS). Sr_2RuO_4 is the leading candidate for an OPTS and phase-sensitive measurements on Sr_2RuO_4-based heterostructures would be an excellent way to test whether Sr_2RuO_4 is suitable for this application.



H.P. Nair *et al. APL Mater.* **6** (2018) 101108.

Thin film techniques are appropriate for making such heterostructures, provided superconducting Sr_2RuO_4 films can be grown and incorporated into them. The challenge has been that Sr_2RuO_4 is the most disorder-sensitive superconductor known. PARADIM's in-house research team recently became the only group in the United States to have successfully synthesized superconducting thin films of Sr_2RuO_4. The temperature at which PARADIM's Sr_2RuO_4 films superconduct is not only nearly twice as high as the best prior superconducting Sr_2RuO_4 films, but as can be seen from the figure even exceeds that of the best Sr_2RuO_4 single crystals.

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