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Quantum flows of probability and heat

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Textbook quantum mechanics uses a "probability current" to establish the "conservation of probability" for an evolving spatial wave function. This idea can be adapted to simple quantum systems with finite-dimensional Hilbert spaces, including open systems that exchange energy and information with their surroundings. Through a series of undergraduate projects at Kenyon over the last few years, we have used probability currents to study heat and work flows in quantum thermodynamic systems, including the tiniest possible heat engines.