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Leo Szilard In Physics and Information

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The excellent biography by William Lanouette, “Genius in the Shadows,” tells it the way it was, incredible though it may seem. The 1972 “Collected Works of Leo Szilard: Scientific Papers” Bernard T. Feld and Getrude W. Szilard, Editors, gives the source material both published and unpublished. Szilard’s path-breaking but initially little-noticed 1929 paper, “On the Decrease of Entropy in a Thermodynamic System by the Intervention of Intelligent Beings” spawned much subsequent research. It connected what we now call a bit of information with a quantity $k \ln 2$ of entropy, and showed that the process of acquiring, exploiting, and resetting this information in a one-molecule engine must dissipate at least $kT \ln 2$ of energy at temperature T . His 1925 paper, “On the Extension of Phenomenological Thermodynamics to Fluctuation Phenomena,” showed that fluctuations were consistent with and predicted from equilibrium thermodynamics and did not depend on atomistic theories. His work on physics and technology, demonstrated an astonishing range of interest, ingenuity, foresight, and practical sense. I illustrate this with several of his fundamental contributions nuclear physics, to the neutron chain reaction and to nuclear reactors, and also to electromagnetic pumping of liquid metals.