Black holes and information theory

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abstract During the past three decades investigators have unveiled a number of deep connections between physical information and black holes whose consequences for ordinary systems go beyond what has been deduced purely from the axioms of information theory. After a self-contained introduction to black hole thermodynamics, we review from its vantage point topics such as the information conundrum that emerges from the ability of incipient black holes to radiate, the various entropy bounds for non-black hole systems (holographic bound, universal entropy bound, etc) which are most easily derived from black hole thermodynamics, Bousso’s covariant entropy bound, the holographic principle of particle physics, and the subject of channel capacity of quantum communication channels.