

## **Randomness, second law of thermodynamics, and computational complexity**

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We will relate the concept of irreversibility in Physics to the computational complexity of well known classes of problems. In particular, we will show that if NP complete problems can be solved efficiently, then one would be able to violate the coarse-grained Second Law of Thermodynamics. Applications of this equivalence to the design of universal secret-key cryptography systems will be pointed out.