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Information entropy exchange during a measurement for free and interacting particles GRACE DUNLEAVY, DANIEL DEETER, ATHANASIOS PETRIDIS, Drake University — The quantum mechanical transition amplitude for a free particle is calculated using the path integral formalism. This amplitude is the kernel of the Schrödinger equation. A Wick rotation of the time increment transforms the kernel into a partition function that depends on the space and time intervals of the transition, with the temperature being proportional to the inverse of the time increment. The information entropy exchange between the system and the observer during the transition is calculated from the partition function. The requirement that this be real-valued leads to uncertainty-type relations. Furthermore, the transition exhibits positive information entropy exchange for small time intervals and negative entropy for large ones. The related statistical weight is inversely proportional to the square root of the time interval. The calculation is extended to particles in a harmonic-oscillator potential. Implications for the collapse of the system to an eigenstate are investigated.

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