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Information entropy exchange between a particle and an observer and the arrow of time ATHANSIOS PETRIDIS, DANIEL DEETER, 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 Schrdinger 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 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. Coordinate-time reversal maintains the sign of the information entropy exchange, therefore, producing an arrow of time. The related statistical weight is inversely proportional to the square root of the time interval and can be interpreted based on simple statistical rules. In the way the fundamental equations of quantum mechanics can be derived from a postulate on information entropy exchange.

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