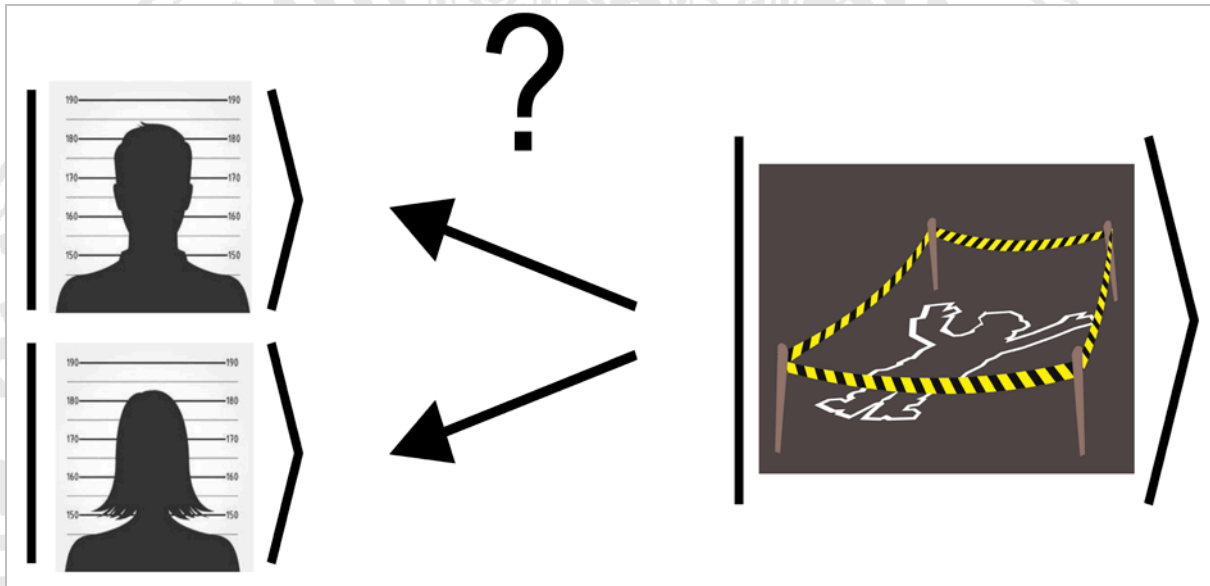


PHYSIKALISCHES KOLLOQUIUM

AM 3. JUNI 2019 UM 17 UHR C.T.

IM HÖRSAAL 1 DES PHYSIKHOCHHAUSES



QUANTUM RETRODICTION: IS THERE AN ARROW OF TIME IN QUANTUM MECHANICS?

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When first introduced to quantum theory, a student is taught to solve the Schrodinger equation starting from an initial wavefunction. This enables one to make predictions about concerning the results of later measurements. But it doesn't have to be this way. Retrodiction (or postdiction) is the use of current information to make statements about past events. We shall present the rules governing retrodictive probabilities both in the quantum and classical domains. In doing so we develop a powerful tool with which to interpret physical phenomena and both analyse and interpret experiments. We use retrodictive methods to analyze a number of phenomena from quantum optics including photon antibunching, entanglement and ghost imaging and the yet more exotic ideas of of quantum scissors and quantum computation in the past. We conclude with some remarks on the more philosophical issues related to the arrow of time and "wavefunction collapse" in the measurement process. Retrodictive theory suggests that neither this collapse nor the many-worlds interpretation of quantum theory can be responsible for the arrow of time.