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Path Integrals and Mode Conversion[1] N. ZOBIN, Mathematics Dept, William and Mary, A.S. RICHARDSON, E.R. TRACY, Physics Dept, William and Mary — The phase space path integral arises naturally in the ray-tracing approach to the solution of wave equations, including those which exhibit mode conversion. The wave evolution operator is related to the exponential of the dispersion matrix, and the path integral can be used to find this exponential using the method of operator symbols. Thus, the path integral can be used even in nonstandard conversions which are not of the "avoided crossing" type, and we hope to exploit this to develop new types of ray-based treatments for these conversions. In order to do this, a deeper understanding of the nature of this path integral will be useful. Here we show that the phase space path integral can be interpreted as a Fourier transform on the space of measures using a new formalism for infinite dimensional Fourier transforms proposed by Zobin. Approximate expressions for this type of Fourier transform are developed using entropy arguments and, in the classical limit where smooth ray trajectories exist, we recover the familiar sum over all histories. We also give an example for the case of a discrete phase space, in which smooth paths are not defined, but where the Fourier transform over measures can still be evaluated using entropic techniques.

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