CHARACTERIZATION OF INFORMATIONAL COMPLETENESS FOR COVARIANT PHASE SPACE OBSERVABLES

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A covariant phase space observable is uniquely characterized by a positive operator of trace one and, in turn, by the Fourier-Weyl transform of this operator. We study regularity properties of such observables, connecting them to zero set of this transform. More specifically, p-regularity is defined as the norm density of the span of translates of the operator in the Schatten-p class. In particular, we show that the observable is informationally complete iff the zero set has dense complement. We also show that the relation between zero sets and p-regularity can be mapped completely to the corresponding relation for functions in classical harmonic analysis.