

REPRESENTING FUNCTORS ON COHERENT SHEAVES

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ABSTRACT. Starting with Mukai’s analog of the Fourier transform for coherent sheaves on abelian varieties, there has been a lot of activity studying a kind of “functional analysis for algebraic geometers”, in which classical function spaces are replaced by derived categories of sheaves. In particular the (Riesz, Schwartz etc.) representation theorems describing continuous maps of function spaces as integral transforms have algebraic analogs, asserting that reasonable functors on categories of sheaves are representable by Fourier-Mukai style kernels. I will review some of these results, with an emphasis on recent work focused on incorporating and measuring the impact of singularities on coherent sheaves. The primary motivation comes from geometric representation theory, in which one seeks an analog of classical harmonic analysis in this algebraic setting. (Based on work with John Francis, David Nadler and Anatoly Preygel.)