1099-65-304 **Rachel Ward*** (rward314@gmail.com), 2515 Speedway, Austin, TX 78712, and **Holger Rauhut**. *Interpolation via l1 minimization.*

Functions of interest are often smooth and sparse in some sense, and both priors should be taken into account when interpolating sampled data. Classical linear interpolation methods are effective under strong regularity assumptions, but cannot incorporate nonlinear sparsity structure. At the same time, nonlinear methods such as l1 minimization can reconstruct sparse functions from very few samples, but do not necessarily encourage smoothness. Here we show that weighted l1 minimization effectively merges the two approaches, promoting both sparsity and smoothness in reconstruction. More precisely, we provide specific choices of weights in the l1 objective to achieve rates for functions with coefficient sequences in weighted lp spaces, p<=1. We consider the implications of these results for spherical harmonic and polynomial interpolation, in the univariate and multivariate setting. Along the way, we extend concepts from compressive sensing such as the restricted isometry property and null space property to accommodate weighted sparse expansions; these developments should be of independent interest in the study of structured sparse approximations and continuous-time compressive sensing problems. (Received February 10, 2014)