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**Akram Aldroubi\*** (akram.aldroubi@vanderbilt.edu), S C 1520 Department of Mathematics, Vanderbilt University, Nashville, TN 37240, and **Carlos Cabrelli** and **Ursula Molter**. *Optimal Non-Linear Models for Compressed Sensing and Sampling*.

Given a set of functions, we prove the existence of an optimal collection of subspaces minimizing the sum of the square of the distances between each function and its closest subspace in the collection. This collection of subspaces gives the best sparse representation for the given data, and provides an optimal model for sampling in union of subspaces. The results are applied to the case of low dimensional subspaces of  $R^N$  and to infinite dimensional shift-invariant spaces in  $L^2(R^d)$ . These results are tightly connected to the new emergent theories of compressed sensing and dictionary finding, signal models for signals with finite rate of innovation, and the subspace segmentation problem. (Received August 07, 2007)