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Akram Aldroubi, Jacqueline Davis* (jacqueline.t.davis@email.vanderbilt.edu) and
Ilya Krishtal. *Reconstruction of spatially undersampled signals in dynamical systems.*

We propose a new type of inverse problem that arises from sampling an evolving field at various times. We show that coarse samplings taken at varying times often contain the same information as a finer sampling taken at the earliest time. In other words, under some conditions on the evolving system, we can trade spatial samples for time samples.

This talk explores the recovery of a signal $x \in \ell^2(\mathbb{Z})$ in a dynamical system with evolution rule given by the operator $A : \ell^2(\mathbb{Z}) \rightarrow \ell^2(\mathbb{Z})$, where $Ax = a * x$ for some $a \in \ell^1(\mathbb{Z})$. In other words, the signal at time $t = n$ is given by $A^n x = \underbrace{(a * \cdots * a)}_n * x$. Undersampling the original signal by a rate m can be offset by $m - 1$ additional time samples and a few extra samples of the original signal. (Received August 13, 2013)