1068-41-131 **C. Sinan Gunturk**, **Mark Lammers**, **Alex Powell**, **Rayan Saab*** (rayans@math.ubc.ca) and **Ozgur Yilmaz**. *Sobolev Duals of Random Frames and Sigma-Delta Quantization for Compressed Sensing.*

Compressed sensing, as a signal acquisition method, has been shown to be highly effective for dimensionality reduction. On the other hand, quantization of compressed sensing measurements has been relatively under-addressed. In particular, the results of Candes, Romberg and Tao, and of Donoho guarantee that if a uniform quantizer of step size δ is used to quantize m measurements $y = \Phi x$ of a k-sparse signal $x \in \mathbb{R}^N$, where Φ satisfies the restricted isometry property, then the reconstruction error via ℓ_1-minimization is $O(\delta)$. This is the simplest and most commonly assumed approach for quantization of compressed sensing measurements.

We show that if instead of uniform quantization, an rth order $\Sigma\Delta$ quantization scheme with the same output alphabet is used to quantize y, then there is an alternative recovery method via Sobolev dual frames which guarantees a reduction of the approximation error by a factor of $(m/k)^{(r-1/2)\alpha}$ for any $0 \leq \alpha \leq 1$, if $m \gtrsim_r k(\log N)^{1/(1-\alpha)}$. The result holds with high probability on the initial draw of the measurement matrix Φ from the Gaussian distribution, uniformly for all k-sparse signals x satisfying a mild size condition on their supports. (Received January 16, 2011)