1154-65-163 **Mark A Iwen*** (markiwen@math.msu.edu), **Bosu Choi** and **Toni Volkmer**. *On Best s-Term Approximation Guarantees for Bounded Orthonormal Product Bases in Sublinear-Time.*

In this talk we will discuss fast and memory efficient numerical methods for learning the best s term approximation of functions of many variables in terms of a given bounded orthonormal product bases. Let $\mathcal{B}$ be a finite Bounded Orthonormal Product Basis (BOPB) of cardinality $|\mathcal{B}| = N$. Herein we will develop methods that rapidly approximate any function f that is nearly sparse in the BOPB, that is, f of the form

$$f(\mathbf{x}) \approx \sum_{b \in \mathcal{S}} c_b \cdot b(\mathbf{x})$$

with $\mathcal{S} \subset \mathcal{B}$ where $|\mathcal{S}| = s$ is much less than N. Our method has a runtime of just $(s \log N)^{O(1)}$, uses only $(s \log N)^{O(1)}$ function evaluations on a fixed and nonadaptive grid, and not more than $(s \log N)^{O(1)}$ bits of memory. We emphasize that nothing about $\mathcal{S}$ or any of the coefficients c_b is assumed in advance other than that $\mathcal{S} \subset \mathcal{B}$ has $|\mathcal{S}| \leq s$. Both $\mathcal{S}$ and its related coefficients c_b will be learned from the given function evaluations by the developed method. Note that for $s \ll N$, the runtime $(s \log N)^{O(1)}$ will be less than what is required to simply enumerate the elements of the basis $\mathcal{B}$ once. (Received August 16, 2019)