Title: A novel sampling theorem on the sphere with implications for compressive sensing

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Abstract: I will discuss a novel sampling theorem on the sphere and corresponding fast algorithms that we have developed very recently by associating the sphere with the torus through a periodic extension. The fundamental property of any sampling theorem is the number of samples required to represent a band-limited signal. To represent exactly a signal on the sphere band-limited at L, all sampling theorems on the sphere require O(L^2) samples. However, our sampling theorem requires less than half the number of samples of other equiangular sampling theorems on the sphere, such as the canonical Driscoll & Healy (1994) sampling theorem. A reduction in the number of samples required to represent a band-limited signal on the sphere exactly has important implications for compressive sensing, both in terms of the dimensionality and sparsity of signals. I will illustrate the impact of this property with an inpainting problem on the sphere, where we show superior reconstruction performance when adopting our new sampling theorem.