1147-28-854 **Irfan Alam*** (irfanalamisi@gmail.com), Department of Mathematics, Louisiana State University, Baton Rouge, LA 70803. *Asymptotic spherical means as Loeb integrals.* Preliminary report.

The coordinates, along any fixed direction(s), of points on the sphere $S^{n-1}(\sqrt{n})$ (equipped with the uniform surface measure $\bar{\sigma}_n$), are asymptotically normally distributed as n approaches infinity. We revisit this classical result from the point of view of a nonstandard analyst. Fixing a "good" real-valued function f on $\mathbb{R}^k$ (and extending it canonically to $\mathbb{R}^n$ for any $n \geq k$), we expect $\lim_{n\to\infty} \int_{S^{n-1}(\sqrt{n})} f d\bar{\sigma}_n = \int_{\mathbb{R}^k} f d\mu$, where μ is the standard k-dimensional Gaussian measure. A difficulty in working with such a limit is that the measure spaces are changing with n. We will discuss some results applicable to the situation of integrals over varying measure spaces in general. For any hyperfinite N, we will define an appropriate measure on $S^{N-1}(\sqrt{N})$ and show that the above limit is equal to an integral on this sphere for all μ-integrable functions f, thereby proving the classical result for the largest class of functions possible. A generalization to limits of integrals over spheres intersected with affine subspaces of $\ell^2(\mathbb{R})$ will be explored. (Received January 29, 2019)