1014-37-517 **Ian Melbourne** and **Matthew Nicol*** (nicol@math.uh.edu), Department of Mathematics, University of Houston, Houston, TX 77204-3008. *Limit laws for chaotic dynamical systems.*

One of the most useful descriptions of a physical system is provided by the statistics of time series of observations on the system. We describe recent work on establishing the almost sure invariance principle (ASIP) for Hölder observations on a broad class of non-uniformly hyperbolic dynamical systems. The ASIP essentially states that there is a Brownian motion that approximates measurements along almost every trajectory of the system. Suppose $f : X \to X$ is a map and $\phi : X \to R$ is an observable satisfying the ASIP. The ASIP implies that aspects of the asymptotic behavior of Brownian motion translate to the sequence of random variables $\{\sum_{j=0}^{N-1} \phi \circ f^j\}$. The ASIP implies weaker distributional results such as the central limit theorem as well as bounds on the rate of growth such as the law of the iterated logarithm. (Received September 19, 2005)