1133-37-116 **Eduardo Dueñez*** (eduenez@spelman.edu), Mathematics Department, Spelman College, Atlanta, GA 30314, and **José Iovino** (jose.iovino@utsa.edu), Mathematics Department, The University of Texas at San Antonio, San Antonio, TX 78249. *Mean convergence of polynomial ergodic averages and continuous logic.* Preliminary report.

We provide a "soft" proof of the mean convergence of averages under a polynomial abelian group action on a Hilbert space (a special case of current results due to Tao, Host-Kra and Walsh). We use the formalism of continuous logic via Henson structures, and introduce a suitable class of structures consisting of a Hilbert space $\mathcal{H}$ endowed with a polynomial action of an (abelian) group G by unitary automorphisms of $\mathcal{H}$. For fixed G (plus a notion of "averaging over G" as given by a fixed Følner net $\{G_j\}$ therein) we show, roughly speaking, that the class of all structures $(\mathcal{H}, G, \{G_j\}, f)$ such that $f : G \to \mathrm{U}(\mathcal{H})$ is a Leibman polynomial of degree at most d is axiomatizable in a suitable Henson language. As a by-product of the compactness of the Henson logic, the theorem is refined *gratis* to a statement about uniformly metastable convergence (in Tao's sense). Our approach owes much to Tao's outline of a nonstandard analysis proof of Walsh's Theorem. (Received July 18, 2017)