1054-37-155 **Amanda J. Potts*** (`apotts@math.northwestern.edu`), Department of Mathematics, Northwestern University, 2033 Sheridan Road, Evanston, IL 60208-2730. *Multiple ergodic averages for flows and configurations in sets of positive density in* $\mathbb{R}$.

We show the L^2-convergence of continuous time ergodic averages of a product of functions evaluated at return times along polynomials. These averages are the continuous time version of the averages appearing in Furstenberg's proof of Szemerédi's Theorem. For each average we show that it is sufficient to prove convergence on special factors, the Host-Kra factors, which have the structure of a nilmanifold. We also give a description of the limit. In particular, if the polynomials are independent over the real numbers then the limit is the product of the integrals. We further show that if the collection of polynomials has "low complexity", then for every set E of real numbers with positive density and for every $\delta > 0$, the set of polynomial return times for the "δ-thickened" set E_δ has bounded gaps. (Received September 12, 2009)