1056-65-453 **Ben Niu*** (`nben@iit.edu`), Applied Mathematics Office, Engineering 1 Building, Chicago, IL 60616, **Fred Hickernell** (`hickernell@iit.edu`), Applied Mathematics Office, Engineering 1 Building, Chicago, IL 60616, and **Thomas Müller-Gronbach** and **Klaus Ritter**. *Evaluating expectations of functionals of Brownian motions: a multilevel idea.*

Pricing a path-dependent financial derivative, such as an Asian option, requires the computation of $E[g(B(\cdot))]$, the expectation of a payoff functional, g, of a Brownian motion, $(B(t))_{t=0}^{T}$. The expectation is an infinite-dimensional integration which is approximated by the sample average of a $d-$dimensional approximation to the Brownian motion. In this talk, a multilevel algorithm with low discrepancy designs is used to improve the convergence rate of the worst case error. The paper investigates the worst case error as a function of each level l's sample size, n_l, and truncated dimension, d_l, for payoff functionals that arise from certain Hilbert spaces with moderate smoothness. If the error in approximating an infinite dimensional expectation by a $d-$dimensional integral is $\mathcal{O}(d^{-q})$, and the error for approximating a $d-$dimensional integral is $\mathcal{O}(n^{-p})$, independent of d, then it is shown that the error in computing the infinite dimensional expectation may be as small as $\mathcal{O}(N^{-\min(p,q)})$ for a well-chosen multilevel algorithm, where N is the cost of the algorithm defined as $N = n_1 d_1 + \cdots + n_L d_L$. Numerical experiments in computational finance will be presented. (Received September 08, 2009)