1100-16-8   **Jerry Lodder*** (`jlodder@nmsu.edu`), Mathematical Sciences, Dept. 3MB, Box 30001, New Mexico State Univ., Las Cruces, NM 88011. *A Comparison of Products in Hochschild Cohomology.*

Recall that the usual Gerstenhaber product in Hochschild cohomology, HH^*, is graded commutative, although the two canonical chain homotopies available to show this are not themselves chain homotopic, which gives rise to the Gerstenhaber bracket. The Hom_k dual of the b-complex in Hochschild homology yields the b^* complex, which supports a simplicial cup product and the construction of Steenrod's cup-i products. The simplicial product is graded commutative in cohomology via an E-infinity algebra. For A the group ring $k[G]$, the cohomology of the b^* complex is isomorphic to the singular cohomology of the free loop space, L, maps of S^1 into BG. Note that BG is naturally a subspace of L by considering constant maps of S^1 into BG. In this talk we transport the cup-i products to Hochschild's original cochain complex defining Hochschild cohomology. In this way, $HH^*(A, A)$ is seen to support two product structures, the Gerstenhaber product and the simplicial cup product. Both products agree for cochains supported on BG. Moreover, Gerstenhaber's pre-Lie product agrees with Steenrod's cup-one product for these cochains. Thus, Gerstenhaber's product can be deformed to an E-infinity product for cochains supported on BG. (Received November 01, 2013)