1053-14-219 **Susan M Cooper*** (scooper4@math.unl.edu), Department of Mathematics, University of Nebraska - Lincoln, Avery Hall, Room 338, Lincoln, NE 68588, **Brian Harbourne** (bharbour@math.unl.edu), Department of Mathematics, University of Nebraska - Lincoln, Avery Hall, Room 331, Lincoln, NE 68588, and **Zach Teitler** (zteitler@tamu.edu), Department of Mathematics, Mailstop 3368, Texas A & M University, College Station, TX 77843. *Tearing Down Fat Point Schemes.*

Certain data about a finite set $\mathbb{X}$ of distinct reduced points in projective space can be obtained from the Hilbert function of $\mathbb{X}$. A characterization of these Hilbert functions is well known, and it is natural to try to generalize this characterization to non-reduced schemes.

In this talk we consider fat point schemes. In general, Hilbert functions of these schemes have not been characterized. However, if the points are in projective 2-space then Geramita-Migliore-Sabourin give a criterion characterizing a subclass of functions, all of which occur as Hilbert functions of double point schemes. For each function h in that subclass, Geramita-Migliore-Sabourin use a sequence of basic double links to construct a specific double point scheme whose Hilbert function is h. We take the opposite approach: by tearing down the fat point scheme as a sequence of residuals with respect to lines, we obtain upper and lower bounds for the Hilbert function. Moreover, we give a simple criterion for when the bounds coincide, yielding a precise calculation of the Hilbert function. In this case, we also obtain upper and lower bounds on the graded Betti numbers for the ideal defining the fat point scheme. (Received September 04, 2009)