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999-13-114 **Giuliana Fatabbi** and **Brian Harbourne*** (`bharbour@math.unl.edu`), Department of Mathematics, University of Nebraska-Lincoln, Lincoln, NE 68588-0130, and **Anna Lorenzini**.
Resolutions of ideals of fat points with support in a hyperplane. Preliminary report.

Let $p_1, \ldots, p_r$ be distinct points on a hyperplane $H \subset \mathbf{P}^n$, let m be a positive integer, and regard H as $\mathbf{P}^{n-1}$. Let $J(i)$ be the ith symbolic power of the ideal in $\mathbf{C}[\mathbf{P}^{n-1}]$ generated by all forms vanishing at the r points (regarded as points in $H = \mathbf{P}^{n-1}$), and let $I(i)$ be the ith symbolic power of the ideal in $\mathbf{C}[\mathbf{P}^n]$ generated by all forms vanishing at the r points (regarded as points in $\mathbf{P}^n$). Thus both $J(i)$ and $I(i)$ define fat point subschemes, but in different projective spaces. We obtain a Poincaré series formula for the graded syzygy modules in the graded minimal free resolution of $I(m)$ in terms of those for the graded syzygy modules in the graded minimal free resolutions for $J(i)$ for $0 < i \leq m$, proved by giving an explicit graded minimal free resolution of $I(m)$ in terms of those for the $J(i)$. As applications, we determine the resolution of the ideal $I(m)$ whenever the points are either collinear or $r \leq 3$. The case that $r = 2$ is, by other methods, due to Valla, based on previous results of Fatabbi and Lorenzini. (Moreover, our results generalize to fat point subschemes having different multiplicities at different points.) (Received August 17, 2004)