1019-13-207 **C-Y. Jean Chan*** (chan@math.purdue.edu) and **Claudia Miller**. *Local cohomology and the constant term of a Hilbert-Samuel polynomial.* Preliminary report.

Let $(A, \mathfrak{m})$ be a regular local ring. Let $P_M(t)$ be the Hilbert-Samuel polynomial of a finitely generated A-module M such that $P_M(n) = \ell(M/\mathfrak{m}^n M)$ for $n \gg 0$. The *Rees module* $R_{\mathfrak{m}}(M) = \oplus_{n\geq 0}\mathfrak{m}^n M$ of M is a graded module over the Rees algebra of A.

We will prove that the difference between the Hilbert function and the Hilbert-Samuel polynomial of M, at any non-negative integer, is the alternating sum of the length of the graded pieces of the local cohomology of $R_{\mathfrak{m}}(M)$. This proof is an application of a well-known formula due to Serre and is modified from the work of Johnston and Verma whose results are mainly on $\mathfrak{m}$-primary ideals.

By the Grothendieck-Riemann-Roch formula for the projective spaces, we relate the Hilbert-Samuel polynomial $P_M(t)$ to the Chern characters of the graded Rees module $R_{\mathfrak{m}}(M)$ up to a constant term. The constant term of $P_M(t)$ can be recovered using the graded pieces of the local cohomology of $R_{\mathfrak{m}}(M)$. (Received August 15, 2006)