1102-13-176 **Catalin Ciuperca*** (catalin.ciuperca@ndsu.edu), Department of Mathematics 2750, North Dakota State University, PO Box 6050, Fargo, ND 58108. *Asymptotic growth of multiplicity functions.*

A well know result of Rees shows that if $J \subseteq I$ are $\mathfrak{m}$-primary ideals in a formally equidimensional local ring $(R, \mathfrak{m})$, then J is a reduction of I if and only if the ideals I and J have the same Hilbert-Samuel multiplicity. In the literature there are results in several directions that generalize this numerical characterization of reductions to the situation when the ideals are not necessarily $\mathfrak{m}$-primary, in which case the classical Hilbert-Samuel multiplicity is no longer defined. One such direction was initiated by Amao and Rees who showed that if $J \subseteq I$ are ideals such that the length $\lambda(I/J)$ is finite, then the function $\lambda(I^n/J^n)$ is eventually a polynomial function whose degree is at most $\dim R - 1$ if and only if J is a reduction of I.

In this talk we review results originated by the work of Amao and Rees and present a generalization of them in the case when the length $\lambda(I/J)$ is not necessarily finite by considering several multiplicity functions associated with the pair of ideals $J \subseteq I$. (Received July 28, 2014)