

**Meeting:** 999, Nashville, Tennessee, SS 6A, Special Session on Local and Homological Algebra

999-13-215            **Neil M Epstein\*** (epstein@math.ku.edu), 405 Snow Hall, 1460 Jayhawk Blvd., Lawrence, KS  
66045. *Phantom depth and stable phantom exactness.*

The concepts in the title were developed by Aberbach, Hochster and Huneke as tight closure analogues of the classical concepts of depth and exactness, respectively. (In this presentation, tight closure theory will only be used in positive prime characteristic.) They were used to obtain powerful localization results and to attempt solutions to some homological conjectures. However, some foundational questions remained: Can the phantom depth of an  $R$ -module  $M$  be computed from an arbitrary maximal phantom  $M$ -regular sequence? Does phantom depth behave well across a flat local homomorphism that has a good closed fiber? I answer these questions in the affirmative. Of the necessary ingredients to do this, one is a tight closure analogue of the Nakayama lemma. Another ingredient is a method of obtaining information from a short stably phantom exact sequence of complexes analogous to what one would get from a short exact sequence of complexes. Thirdly, I obtain alternate characterizations of phantom depth and phantom  $M$ -regular sequences. A final topic of interest is "stable phantom rigidity". (Received August 23, 2004)