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**Mel Hochster** and **Yongwei Yao\*** (yyao@gsu.edu), 750 COE, 7th floor, 30 Pryor Street,  
Department of Math & Stat, Georgia State University, Atlanta, GA 30303. *A (weak) embedding  
theorem for modules of finite (phantom) projective dimension.* Preliminary report.

Let  $R$  be a commutative Noetherian ring. Then it is clear that, for any  $R$ -regular sequence  $x_1, \dots, x_i \in R$ , the cyclic module  $R/(x_1, \dots, x_i)$  has finite projective dimension. For any finitely generated  $R$ -module  $M$  with finite projective dimension (or finite G-dimension), we show that  $M$  embeds into an  $R$ -module that is a finite direct sum of cyclic modules of the above form.

Further assume that  $R$  is an excellent domain of characteristic  $p$ . Then, for any parameters  $x_1, \dots, x_i \in R$ , the module  $R/(x_1, \dots, x_i)$  has finite *phantom* projective dimension. Under some additional assumptions, we show that there is a fixed module-finite extension of domains  $R \subset S$  such that for any finitely generated  $R$ -module  $M$  with finite phantom projective dimension,  $M \otimes_R S$  *weakly* embeds into an  $S$ -module that is a finite direct sum of cyclic  $S$ -modules of the form  $S/(x_1, \dots, x_i)$  in which  $x_1, \dots, x_i \in S$  form a parameters of  $S$ . This allows us to show the existence of a uniform test exponent for all finitely generated  $R$ -modules with finite phantom projective dimension.

All the results are joint work with Mel Hochster. (Received August 04, 2007)