

*The 12th Seminar on  
Commutative Algebra and Related Topics, November 11 and 12, 2015  
School of Mathematics, IPM, Tehran*

## **Homological Dimensions of Rigid Modules**

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We obtain various characterizations of commutative Noetherian local rings  $(R, \mathfrak{m})$  in terms of homological dimensions of certain finitely generated modules. For example, we establish that  $R$  is Gorenstein if the Gorenstein injective dimension of the maximal ideal  $\mathfrak{m}$  of  $R$  is finite. Furthermore we prove that  $R$  must be regular if a single  $\operatorname{Ext}_R^n(I, J)$  vanishes for some integrally closed  $\mathfrak{m}$ -primary ideals  $I, J$  of  $R$  and for some integer  $n > \dim(R)$ . Along the way we observe that local rings that admit maximal Cohen-Macaulay Tor-rigid modules are Cohen-Macaulay.

This is a joint work with O. Celikbas, M. Gheibi and M. Zargar.