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Infinitely generated tilting and cotilting modules.

Infinitely generated tilting modules occur naturally in the study of approximations of modules over arbitrary rings. We will start by characterizing tilting and cotilting approximations, and then proceed to structure theory for particular rings: we will give a full characterization of tilting and cotilting modules over Dedekind domains, of tilting modules over Pruefer domains, etc. The key fact is showing that all 1-tilting modules are of countable type; moreover, there is an explicit duality between tilting modules of finite type and cotilting modules of cofinite type. Finally, we will apply tilting approximations to prove the first finitistic dimension conjecture for all (non-commutative) Iwanaga-Gorenstein rings. (Received February 18, 2004)