Derived equivalences, stable equivalences and homological dimensions

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Homological dimensions (global dimension, dominant dimension, etc.) of finite dimensional algebras are not preserved by derived equivalences in general, while they are all preserved by stable equivalences of Morita type. It is natural to ask: *Which derived equivalences preserve (certain) homological dimensions?* In this talk, we will answer this question in two aspects: (i) Certain class of derived equivalences (for arbitrary finite dimensional algebras), called iterated almost ν-stable derived equivalences, including all derived equivalences between self-injective algebras, naturally induce stable equivalences of Morita type and thus preserve the homological dimensions. (ii) For the class of algebras admitting an anti-automorphism fixing all simple modules, arbitrary derived equivalence preserves global dimensions and positive dominant dimensions. This class of algebras is quite large: it contains all cellular algebras, including many algebras arising in algebraic Lie theory. As an application, the global dimensions and dominant dimensions of the blocks of q-Schur algebras $S_q(n,r), (n \geq r)$ are given. This is based on joint works with Changchang Xi, Ming Fang and Steffen Koenig.