Model structures and relative Gorenstein flat modules

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A recent result by J. Šaroch and J. Šťovíček shows that there is a unique abelian model structure on the category of left R-modules, for any associative ring R with identity, whose (trivially) cofibrant and (trivially) fibrant objects are given by the classes of Gorenstein flat (resp., flat) and cotorsion (resp., Gorenstein cotorsion) modules. We generalise this result. We introduce a relative version of Gorenstein flat modules, which we call Gorenstein $\mathcal{B}$-flat modules, where $\mathcal{B}$ is a class of right R-modules. We give sufficient conditions on the class $\mathcal{B}$ so that the class of Gorenstein $\mathcal{B}$-flat modules is closed under extensions. We also obtain a relative version of the model structure described above.

This is joint work with Sergio Estrada and Marco Perez.