Recollements associated to cotorsion pairs over upper triangular matrix rings

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Abstract. Let A, B be two rings and $T = \left(\begin{smallmatrix} A & M \\ 0 & B \end{smallmatrix} \right)$ with M an A-B-bimodule. Suppose that we are given two complete hereditary cotorsion pairs $(\mathcal{A}_A, \mathcal{B}_A)$ and $(\mathcal{C}_B, \mathcal{D}_B)$ in A-Mod and B-Mod, respectively. We define two cotorsion pairs $(\Phi(\mathcal{A}_A, \mathcal{C}_B), \mathrm{Rep}(\mathcal{B}_A, \mathcal{D}_B))$ and $(\mathrm{Rep}(\mathcal{A}_A, \mathcal{C}_B), \Psi(\mathcal{B}_A, \mathcal{D}_B))$ in T-Mod and show that both of these cotorsion pairs are complete and hereditary. If we are given two cofibrantly generated model structures $\mathcal{M}_A$ and $\mathcal{M}_B$ on A-Mod and B-Mod, respectively, then using the result above, we investigate when there exists a cofibrantly generated model structure $\mathcal{M}_T$ on T-Mod and a recollement of $\mathrm{Ho}(\mathcal{M}_T)$ relative to $\mathrm{Ho}(\mathcal{M}_A)$ and $\mathrm{Ho}(\mathcal{M}_B)$. Finally, some applications are given in Gorenstein homological algebra.

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