

Gluing and self-gluing of  $n$ -cluster tilting subcategories for  
representation-directed algebras

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Given  $n < d < \infty$ , we investigate the existence of algebras of global dimension  $d$  which admit an  $n$ -cluster tilting subcategory. First, given two representation-directed algebras  $A$  and  $B$ , we construct a new representation-directed algebra  $\Lambda$  such that the representation theory of  $\Lambda$  is described by the representation theories of  $A$  and  $B$ . Next we introduce  $n$ -fractured subcategories which generalize  $n$ -cluster tilting subcategories for representation-directed algebras. We then show how one can construct an  $n$ -cluster tilting subcategory for  $\Lambda$  by using  $n$ -fractured subcategories of  $A$  and  $B$ . As an application of our construction, we show that if  $n$  is odd and  $d \geq n$  then there exists an algebra admitting an  $n$ -cluster tilting subcategory and having global dimension  $d$ . We show the same result if  $n$  is even and  $d$  is odd or  $d \geq 2n$ . If time allows, we will describe another construction of algebras which are never representation-directed and admit  $n$ -cluster tilting subcategories. This last construction is based on similar methods and a result of Iyama and Darpö, and gives many examples of algebras of infinite global dimension which are not self-injective and admit  $n$ -cluster tilting subcategories.