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Following Markl and Shnider, we construct an explicit combinatorial diagonal on the pairahedra, which are contractible polytopes controlling the combinatorial structure of an  $A_\infty$ -algebra with homotopy inner products, and use it to define a categorically closed tensor product. A cyclic  $A_\infty$ -algebra can be thought of as an  $A_\infty$ -algebra with homotopy inner products whose higher inner products are trivial. However, the higher inner products on the tensor product of cyclic  $A_\infty$ -algebras are not necessarily trivial. (Received February 04, 2011)