Response to Referee Report

In light of the referee's very helpful comments, we have made significant changes to the structure and flow of the paper, and have worked to focus the textual content so that they concentrate on the primary goal, which is to provide a simple test of cluster separability for approaches of the type originally set forth by Bakamjian and Thomas.

We now address specific points raised by the referee.

1. *The bibliography contains only 6 papers, where 3 of them are rather historic ones. The authors write, for example in the fourth paragraph of the Introduction, that the method of Ref. [3] is used in many applications, but they do not give any references. I actually doubt whether the work of Ref. [3], which was written in 1953, has any relevance for modern nuclear and particle physics.*

   The approach originated by Bakamjian and Thomas has seen significant usage in strong-interaction physics. Our review article has ??? citations from various individual groups who are not our collaborators. The introduction now provides more references to illustrate that usage up through the present time.

2. *I find it impossible to follow the formal arguments in the paper, and actually I doubt whether they are meaningful. For example, in Eq. (2.2) the interaction is added to the mass operator squared (rather than the mass operator), without any explanations, justifications or references. Symbols ω_m or p_1 in Eq. (3.7) or (3.12) are not defined, the non-interacting mass operator of Eq.(2.1) becomes the interacting one M_{12} in Eq. (3.9), etc. Also, the meaning of the Lorentz transformations is unclear: For example, Eq. (3.6) expresses the Lorentz transformation from what to what? The authors write that it is a transformation to the spectator-nucleon rest frame, but what is the spectator-nucleon rest frame? In Fig. 1 they call the two-body subsystem the "spectator," but then "spectator-nucleon rest frame" would mean the rest frame of the total 3-body system, which is probably not what the authors have in mind. Also in all the following Lorentz transformations, for example in (3.9), it is never explained from which system the transformation starts.*

   We have added extra discussions about which frames we use and how they are connected. We have also streamlined the paper and eliminated formal aspects that do not have direct impact on the main purpose of the paper. These are dealt with in other references and we have cited those where appropriate.

3. *There are many misprints, and the usage of words and terms is often confusing. For example, at the beginning the authors speak about "particles", but later in Sect. III this becomes "nucleons". Also, the usage "spectator" is often confusing. Is this the interacting 2-particle subsystem or the remaining (non-interacting) particle? Many misprints, like in the*

last sentence of the Abstract, the third paragraph of Sect. I ("consisting or two interacting particles"), "nine-non-interacting operators the commute" near the end of Sect. II, "or the three-body system" above Eq. (3.11), "are related one of" above Eq. (3.18), "calculations vary the binding energy" in Sect. IVB, etc, indicate that this paper was not written very carefully.

We have clarified the use of the term "spectator," and reserved "nucleon" and "deutron" for specific numerical examples.

[need to fix "vary the binding energy" text]

To summarize: the approach originated by Bakamjian and Thomas has seen significant use in models of strongly interacting systems, but the known formal lack of cluster separability has never been quantitatively tested. This paper provides such a test in a simple model that is then applied to systems with scales appropriate to (1) nuclei composed of nucleons and (2) hadrons composed of quarks. We apologize for the confusion generated in the version of this paper as originally submitted, and hope that the revised version provides clarity and focus for the contribution it contains.