Spyrou *et al.* Replies: In the preceding Comment [1] Marqués *et al.* present an alternative interpretation of the experimental data of the original Letter [2]. In this Reply we demonstrate that their calculation does not describe the data as well as implied in the Comment. In addition, we would like to address some inaccurate statements made in the Comment.

The conclusions drawn by the Comment are based on their dineutron calculation which appears to be similar to their final-state interaction (FSI) model. However, as shown in Fig. 1, our dineutron calculation (which reproduces the data) is significantly different from the FSI model; thus, the implication in the Comment that the FSI model fits the data equally well is incorrect.

The original Letter did not claim that "… the first case of dineutron decay had been discovered." We were aware of publications describing the presence of dineutron components in bound systems (see, for example, Ref. [3]) and in the decay of unbound excited states [4]. As clearly stated in the title of Ref. [2], we reported the first observation of this process in the decay of the ground state of an unbound nucleus.

The *n*-*n* interaction was not "neglected" as stated in the Comment. It was explicitly mentioned in the Letter that no *n*-*n* interaction was used in order to show the extreme case of a noninteracting three-body decay. The other extreme is the dineutron model where the two neutrons are very strongly correlated. The experimental data could be well reproduced by the dineutron model, demonstrating the strong correlation of the two neutrons during their decay, for which we use the term "dineutron decay."

We agree with the Comment that full three-body calculations including a realistic *n*-*n* interaction are essential for providing insight into the *n*-*n* correlations in the nucleus; however, the formalism presented in the Comment does not represent such a model. Just as in our dineutron model, Marques *et al.* directly evolve the $1s_0$ dineutron state. The evolution of the $1s_0$ state is done using a Green's Function where the $1s_0$ state is a virtual pole. The position of the pole is described by the scattering length (a single "interaction parameter"). The interaction is treated indirectly as the one that binds the two neutrons together in the $1s_0$ state.

While the Comment [1] suggests that the final state interactions should be present in any final state in which the two neutrons are emitted over a short time scale, there are clear examples where the experimental data could be reproduced by a simple three-body phase space model [5,6].

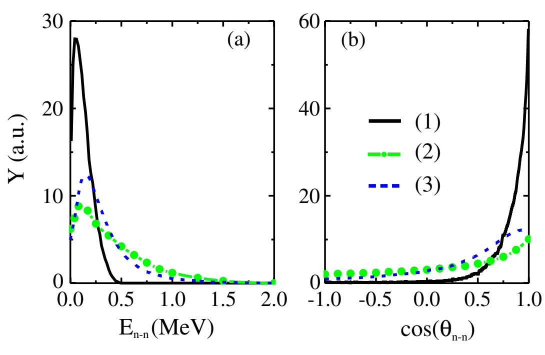

FIG. 1 (color online). Correlation parameters for $^{14}Be + n + n$ without the effect of acceptance cuts and resolutions for our dineutron model (1), the FSI model (2), and the Comment's [1] dineutron model (3). The curves for (2) and (3) were taken from the Comment. The distributions are normalized to the same area for each panel and are presented in arbitrary units (a.u.). The *n*-*n* relative energy is presented in panel (a) while (b) represents the *n*-*n* relative angle.

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