Dinh Dang, Kim Au, and Arima Reply: We applied in [1] the phonon damping model (PDM) ([7,8] of [1]) to calculate the electromagnetic cross sections (EMCS) of the double giant dipole resonance (DGDR) in ^{136}Xe and ^{208}Pb. The results agree well with the recent experimental data. It is claimed in [2] that our calculations of DGDR are wrong. We refute this claim, confirming the correctness of our results and conclusions.

(i) The DGDR strength function $S_{\rm DGDR}^{\rm PDM}(E)$ in (5) and (6) of [1] formally looks like the GDR strength function, but physically differs from the latter because the two-step phonon process already enters in deriving the equations for DGDR damping $\gamma_{\rm DGDR}(E)$ and its energy $E_{\rm DGDR}$ using the double-time Green function's method. Details are given in [6] of [1], where it is shown that the harmonic limit of this model reproduces the result of the independent phonon picture, obtained by folding two GDRs within the PDM. This confirms the nature of the two-step process for DGDR within PDM.

(ii) The DGDR cross section is calculated using (6), not by inserting (6) in (7). Coefficient $c^{(2)}$ (in mb) in (6) is determined by calculating in two ways the DGDR EMCS in its harmonic limit, using (7) [3] and (8) of [1]. Equation (7), containing $c^{(2)}$, derives the EMCS from the harmonic DGDR strength function $S_{\rm DGDR(har)}^{\rm PDM}(E)$, obtained by folding two GDR strength functions [see (i)], while (8) calculates the same EMCS by folding two GDR EMCSs. As the result should be the same, $c^{(2)}$ is found by equalizing (7) and (8) in [1]. This $c^{(2)}$ is then used in (6) to calculate the DGDR cross section. A nonlinear term of E in (6) would not conserve the units of the DGDR strength function (MeV^{-1}) and EMCS (mb).

(iii) The graphs of PDM illustrate the infinite hierarchy of Green functions. To close the set of equations, this hierarchy must be truncated. It is possible to effectively include the contribution of the omitted higher-order graphs in the phenomenological parameter of the model, which is adjusted so that the calculated GDR width reproduces its experimental value. Within PDM-1 only the lowest-order ph-phonon coupling graphs are microscopically included. Contribution of higher-order graphs is effectively included in the parameter $F_{ph}^{(1)}$. Within PDM-2, all higher order graphs up to two-phonon ones are explicitly included. Therefore, the value of $F_{ph}^{(1)}$ within PDM-2 is naturally much smaller than the one determined in PDM-1 as the main part of the damping is now given by (2.17) and (2.18) in [8] of [1] with summations over many ph states. The same reference shows that both versions of PDM give similar results. This indicates the correctness of damping mechanism in PDM-1. Although, in general, $F_{ph}^{(1)}$ decreases with increasing the mass number (see [7] of [1]), deviation from this trend depends on several factors such as the single-particle energies and anharmonicities, to which the GDR line shape is sensitive. A larger value for $F_{ph}^{(1)}$, e.g., 0.163 MeV, would increase the GDR width for ^{136}Xe to 6.3 MeV, showing a large effect of anharmonicities in this nucleus.

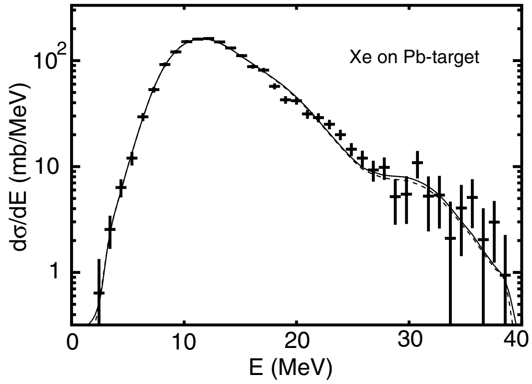

FIG. 1. Differential EMCS for ^{136}Xe (0.7 A · GeV) on ^{208}Pb. Both of the results obtained using EMCS of DGDR within PDM (solid line) and the best fit with χ^2 to the data points (dashed line) are based on a normalization of GDR (the bump on the left) which exhausts 90% of Thomas-Reich-Kuhn sum rule.

(iv) One of the merits of the PDM is that, within the same parameter set used to obtain a good description of GDR, it correctly predicts the DGDR properties including the detailed line shape of its differential EMCS, which is the ultimate characteristic of the DGDR. After [1] was published, Boretzky of GSI LAND Collaboration succeeded in folding the differential EMCS obtained within PDM [1] with the detector response. The results are shown in Fig. 1 in comparison with the latest experimental data for ^{136}Xe. The agreement between theory and experiment is remarkable. For ^{208}Pb the agreement is even better.

We thank K. Boretzky for providing us with Fig. 1 including the latest data before publication.

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Received 22 November 2000; published 6 December 2001
DOI: 10.1103/PhysRevLett.87.269202
PACS numbers: 24.30.Cz, 21.10.Pc, 21.60.−n, 25.70.Lm

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[3] The differential dE is missing on the second line of Eq. (7) of [1]. This does not affect any other part of [1].

