DRAFT 93-026 TN ??? - best viewed in COLOR display

Sensitivity of A^V_{eD} to approximations and G^n_E models.

As Arenhoevel-Leidemann-Tomusiak say in their paper, around $\theta^*_{np} = (180 \pm 20)°$, all approximations in calculating A^V_{eD} for a given G^n_E model give very similar results, but there are big differences when $A^V_{eD}$is calculated using different G^n_Emodels. This is still quite valid at our kinematics, at least for the Q^2= 0.5 $[GeV/c]^2$ output that I have examined in detail. Fig. 1 and fig. 2 show this feature of A^V_{eD}, for the Gari-Krümpelmann and the Galster models. For each model, three approximations are shown, indicated by the labels used by ALT: Normal (DWBA), Born approximation - BA (PWBA) and full (Normal + Meson exchange currents + Isobar currents + Relativistic corrections). The full range of θ^*_{np} and a limited region around 180° are shown.

FIGURES

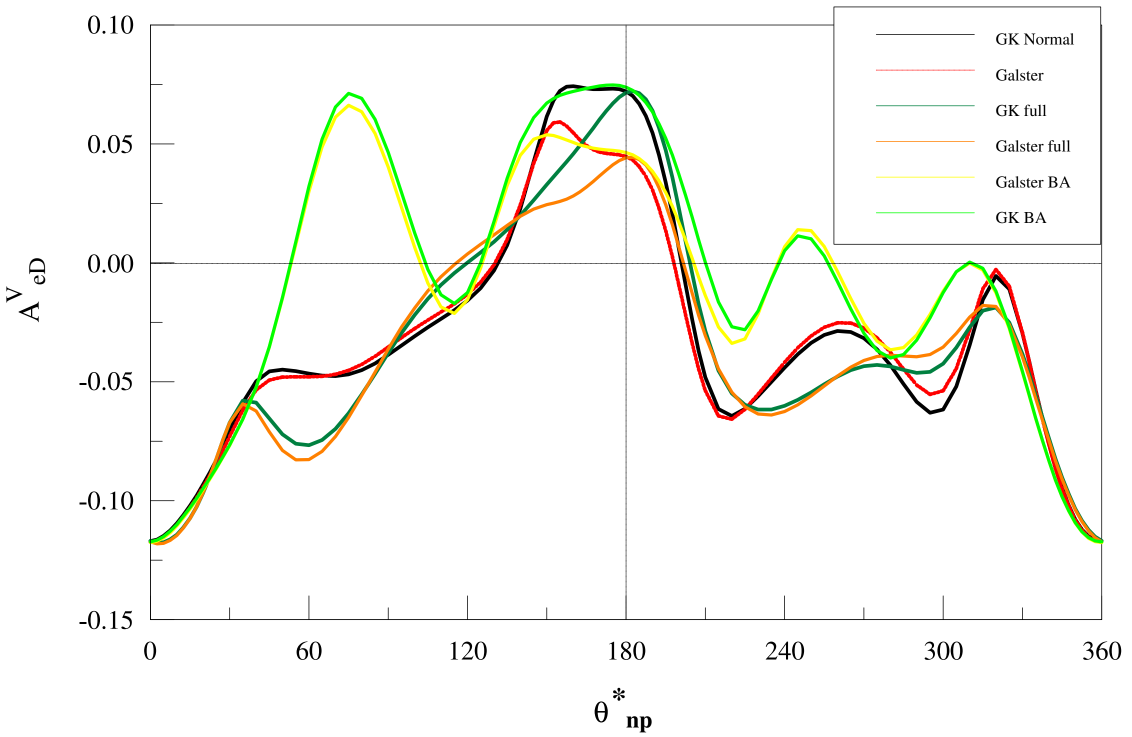

FIG. 1. A^V_{eD} for two models (Galster and Gari-Krümplemann) and three approximations for each model (Normal, Born and Full)

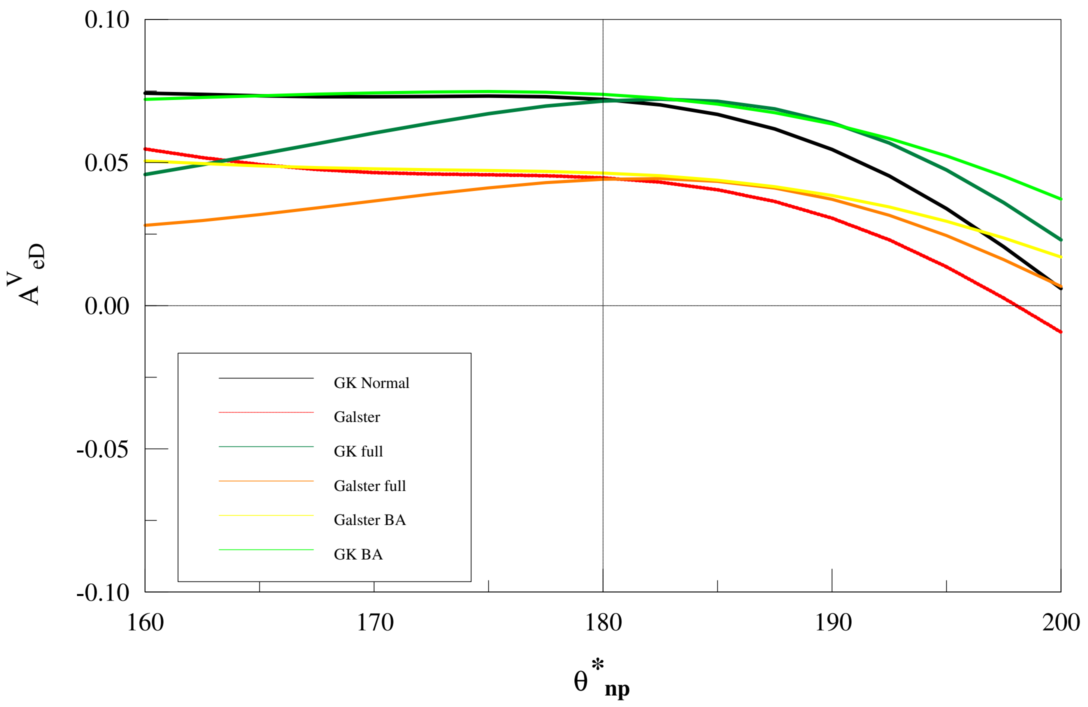

FIG. 2. Same as above, for $160^\circ \leq \theta_{np} \leq 200^\circ$.

The two models of GEn (Galster and G-K) give A^V_{eD} values that differ by more than 50% in the same range. The differences of four A^V_{eD} calculations for the two G^n_E models relative to to the Galster model are shown in fig. 3. The calculations are the ones mentioned earlier (Normal, PWBA, full) and the one called PWBA + Relativistic corrections

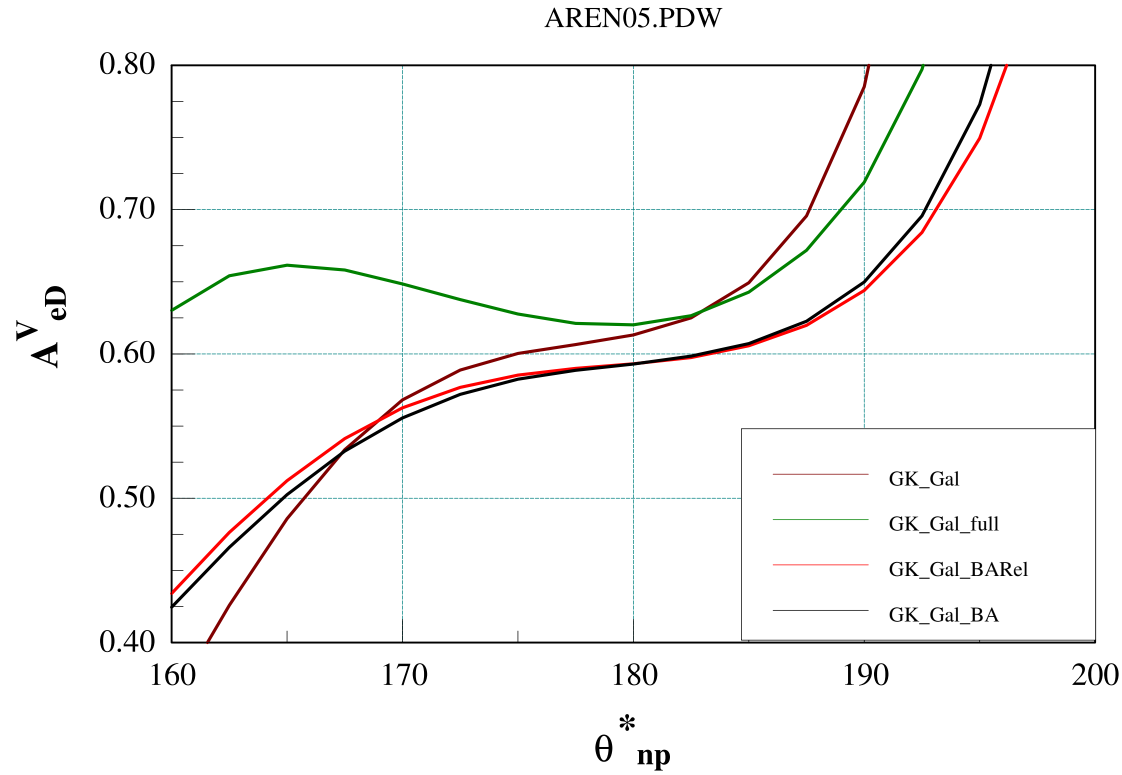

FIG. 3. Relative differences for two G_E^n models and four approximations of A_{eD}^V for $160° \leq \theta_{np} \leq 200°$.

What is useful for our needs is that the PWBA calculation for a given model, (Galster or G-K), is $< 15\%$ away from the"Normal" or even the "full " calculations for the same G_E^n model in the range $\sim 170 \leq \theta^*_{np} \leq\sim 190$. Fig. 4 and fig. 5 illustrate this for the two models and the three approximations. All differences are computed relative to the Born Approximation

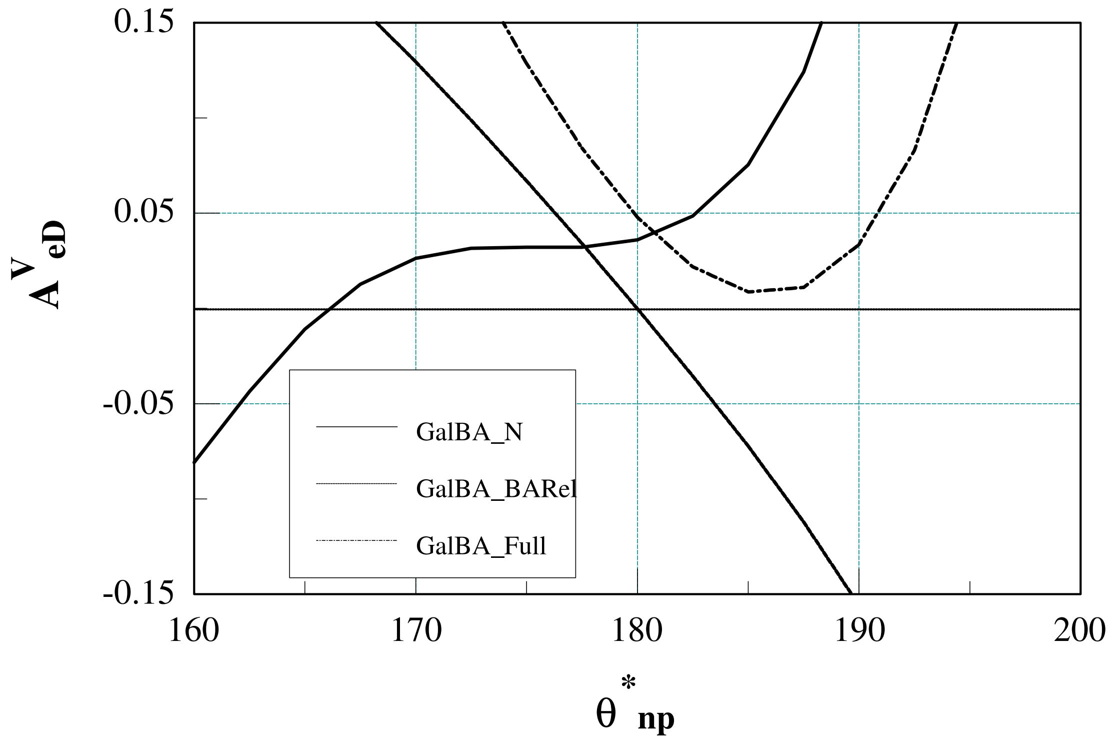

FIG. 4. Relative differences for Galster G_E^n model and three calculations of A_{eD}^V for $160° \leq \theta_{np} \leq 200°$.

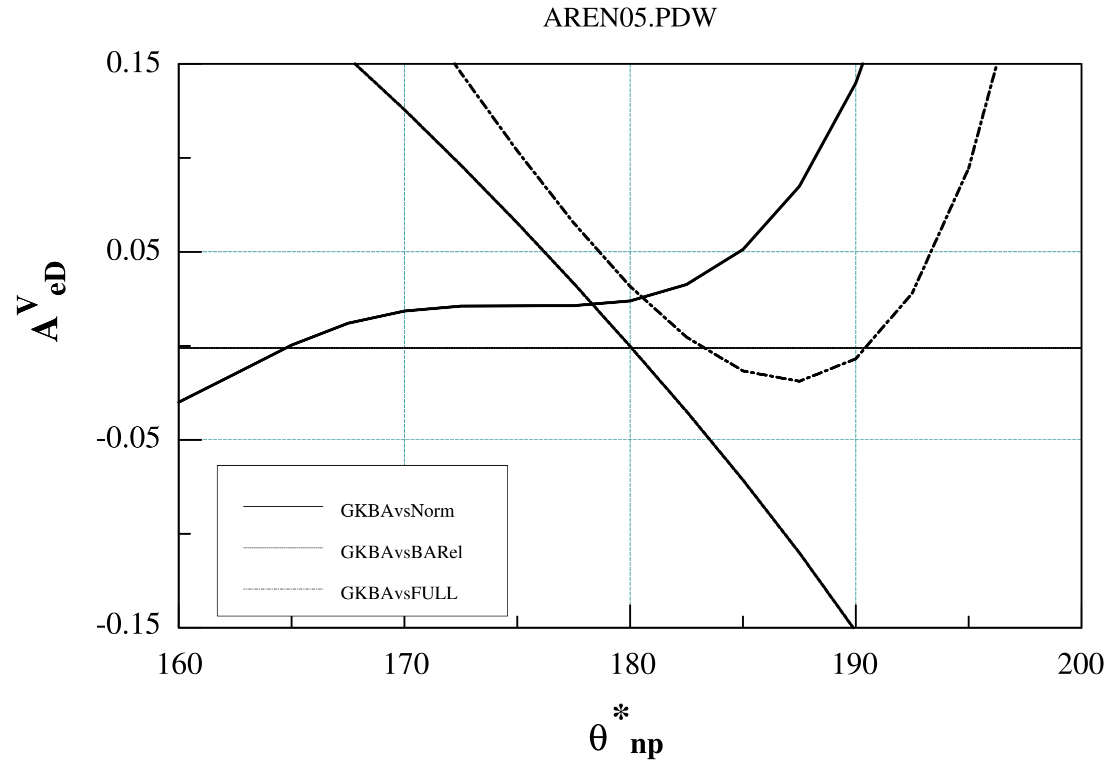

FIG. 5. Relative differences for G-K G_E^n model and three calculations of A_{eD}^V for $160° \leq \theta_{np} \leq 200°$.

This means that we can use the explicit Born approximation form of the t-matrix (eq. 113 of ALT, or eq. 68 of Fabian-Arenhoevel) to calculate $A^V_{eD}(\theta^*_{np}, G^n_E)$, and fit our data with this form of A^V_{eD}, leaving one parameter in G^n_E to be free (for example the Galster model's "p" parameter). Then we would know what G^n_E should be. Of course, since G^n_E is not a function of θ^*_{np}, the shape of the fit may not be quite like our data, but we will at least have some sort of normalization of G^n_E, i.e. what is the Galster parameter that best fits our data, without giving our data away. Next is the question of how to introduce corrections so the fit looks more like the data as function of θ^*_{np}. For this we could try things like those discussed after eq. 68 of F-A, or we may just ask Arenhoevel to calculate A^V_{eD} with different corrections, using "OUR" model of G^n_E, i.e. our fit. To make things better, we can also include the contributions from the $\cos(\phi_d \neq 0)$ factor and the $\cos(\theta_d \neq \pi/2)$ term, which I am sure will help in reducing significantly the distortions we will probably see in the shape of our data as compared to our $A^V_{eD}(\theta^*_{np})$ fit.