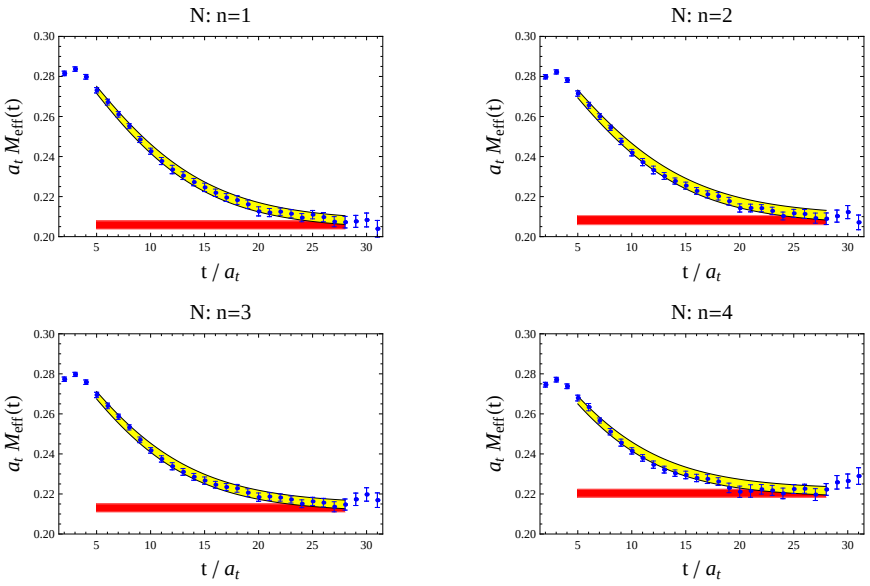

FIG. 6: Effective mass plots for unpolarized neutron correlation functions. For each value of the electric field strength, the curved band shows the result of the fit to unpolarized correlation functions using Eq. (B3). The band accounts for the uncertainty in the extracted ground-state effective energy, $E_{\rm eff}(n)$. The flat band shows the extracted value of $E_{\rm eff}(n)$ with the uncertainty.

for $n \geq 0$. This ensemble of unpolarized correlators was then used to generate 200 bootstrap ensembles for $n = 0, \ldots, 4$. The average unpolarized correlator is similarly denoted but without the subscript referring to configuration number, namely by $\overline{\mathfrak{g}}(x_4, n)$. The standard effective mass is then formed

$$M_{\rm eff}(t) = -\log \frac{\overline{\mathfrak{g}}(t+1, n)}{\overline{\mathfrak{g}}(t, n)}, \tag{B2}$$

and is used to guide spectroscopic analysis of the unpolarized correlators.

For a given value of the electric field, $\mathcal{E}$, or equivalently the integer n, we extract the effective energy, $E_{\rm eff}(n)$ given in Eq. (6), using a two-state fit function of the form

$$\overline{\mathcal{G}}(t, n) = Z(n) \exp\left[-tE_{\rm eff}(n)\right] + Z'(n) \exp\left[-tE'_{\rm eff}(n)\right]. \tag{B3}$$

Notice without the boost projection, we cannot disentangle the magnetic moment contribution. While there are four parameters to fit in Eq. (B3), we utilize variable projection to eliminate the amplitudes $Z(n)$ and $Z'(n)$, leaving just two parameters: the effective energy of the ground and excited states. Time-correlated fits are performed, with results shown in Fig. 6. Fit details and extracted parameters are collected in Table III.

Fits are carried out on the entire bootstrap ensemble enabling us to form an ensemble of extracted effective energies of the ground state, $\{E_{{\rm eff},i}(n)\}$. The average of this ensemble we denote $\overline{E}_{\rm eff}(n)$. Using the fit function

$$E_{\rm eff}(n) = M + \mathcal{A}_E^{\rm latt} \left(\mathcal{E}^{\rm latt}\right)^2 + \mathcal{B}_E^{\rm latt} \left(\mathcal{E}^{\rm latt}\right)^4, \tag{B4}$$

electric field correlated fits are performed using Eq. (23). We perform two fits: a fit using all the data (fit I), and a fit that excludes results for the largest field strength (fit II). Results of