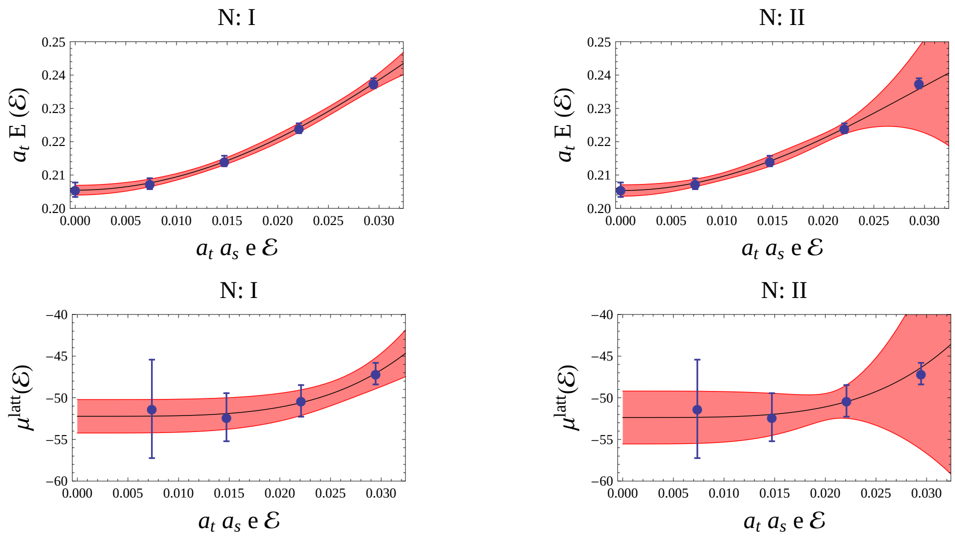

FIG. 3: Electric field strength dependence of extracted neutron parameters. The two different field-correlated fits [I (left panels) and II (right panels)] are described in the text. The bands in the plots reflect the total uncertainty.

ensemble, resulting fit parameters are averaged, and the uncertainties from fitting and bootstrapping are added in quadrature. The same is done for the magnetic moment function, as defined in Eq. (22). We find that the best fits result from taking $\overline{\mu}_E^{\rm latt} = 0$, and results quoted for the neutron use this constraint. Furthermore we perform two different field-correlated fits as follows: (I) a fit to all five field strengths using Eqs. (21) and (22), (II) the same fit function but excluding the largest field strength for which the quality of fit to the correlation functions is poor. Finally, to estimate the systematics due to the choice of fit window, we performed uncorrelated fits to the electric field dependence of meson energies determined on adjacent fit windows. We chose the nine fit windows obtained by varying the start and end times by one unit in either direction. On each time window, we determined the electric polarizability and magnetic moment. The systematic uncertainty on these observables due to the fit window is estimated as the standard deviation of the extracted observables over the various adjacent windows. Details of the correlated electric field fits and extracted parameters are tabulated in Table I.

From the extracted parameters, we can investigate the electric field dependence of the energies and magnetic moment couplings. This is done in Fig. 3, where we plot the field strength dependence of these quantities. The plots, moreover, show the results of the two fits (I and II) to the electric field dependence. The values of the extracted parameters are consistent with naïve expectations and it is useful to convert to physical units. Comparing the fit function in Eq. (20) to the correlator in physical units, Eq. (9), we have

$$\mu = \frac{2e\,(a_t M)^3}{a_t M_N} \mu^{\rm latt} = 0.0313(7) \times \mu^{\rm latt}, \tag{25}$$

with the physical mangetic moment, μ, given in units of nuclear magnetons, $\mu_N = \frac{e}{2M_N}$, where M_N is the physical mass of the nucleon, and the uncertainty arises from scale setting.[8]

[8] Without a factor of $a_t M/a_t M_N$, the magnetic moment would be given in units of lattice nuclear mag-