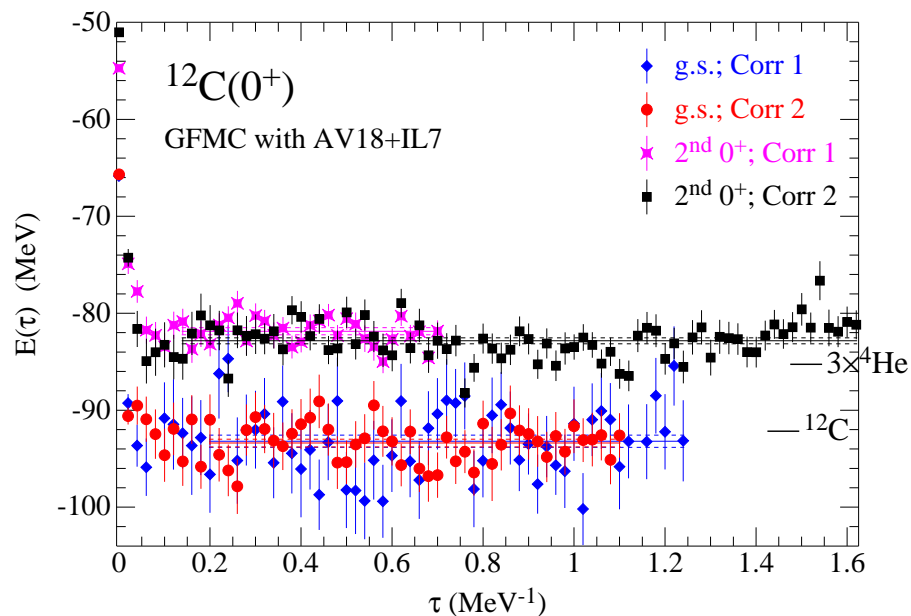


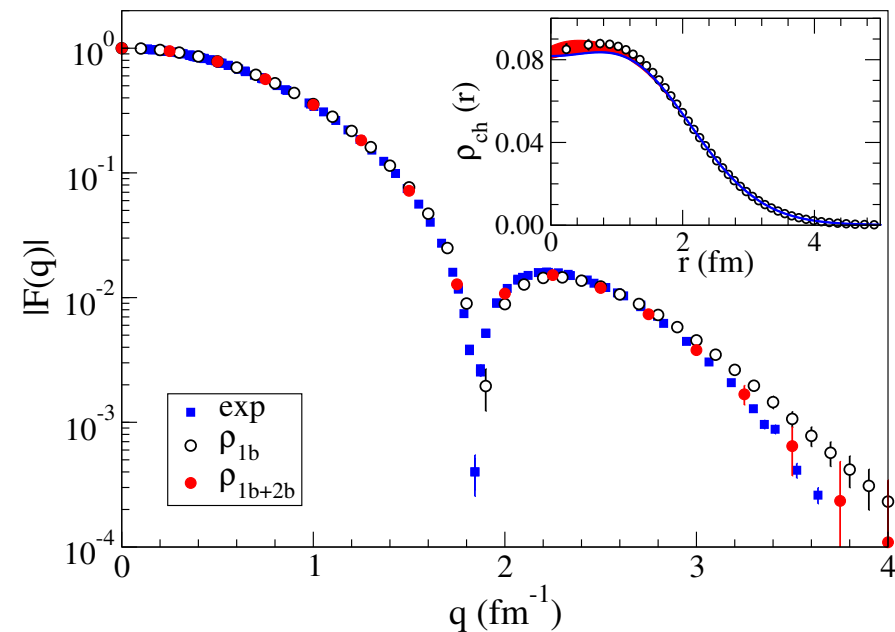
GFMC CALCULATIONS OF ^{12}C

- The Argonne V18 + Illinois 7 Hamiltonian reproduces many properties of $A = 2-10$ nuclei in Green's function Monte Carlo (GFMC) calculations
- It has now been used to calculate the 0^+ states of ^{12}C
- The GFMC energy for the ground and Hoyle states converges well
 - Left figure shows convergence versus imaginary time τ ; two different starting wave functions were used for each state.
 - G.S. energy is very good; Hoyle excitation is 10.4(5) MeV vs 7.65 expt.
- G.S. form factor is very good; two-body currents make small improvement

GFMC convergence of energies

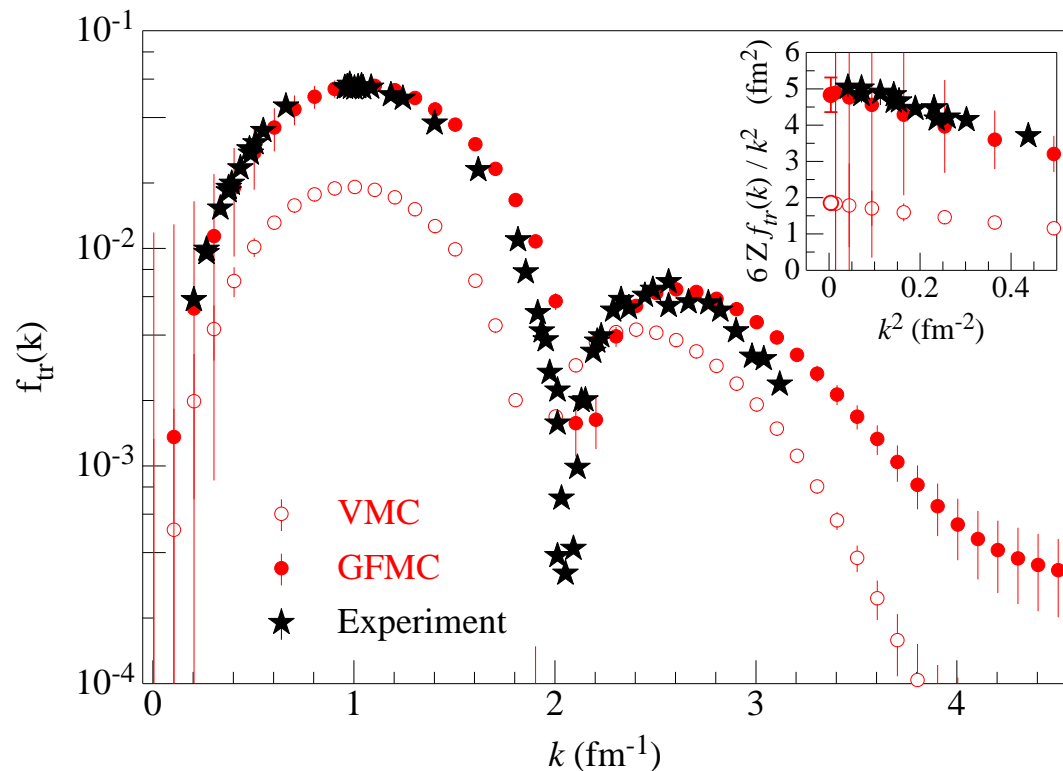


Ground-state form factor



THE HOYLE STATE DECAY AND FUTURE OPPORTUNITIES

Hoyle-state $E0$ form factor



The GFMC $E0$ form factor (solid red) is significantly larger than the starting wave function result (open red) and in excellent agreement with data (black stars).

Extrapolation to $k = 0$ (inset) gives the $B(E0)$; again the GFMC result agrees well with experiment.

- Calculation of other ^{12}C states and their electromagnetic transitions is underway
- Also computing electroweak response of ^{12}C ground state (see Carlson's contribution *Neutrino-nucleus scattering*).