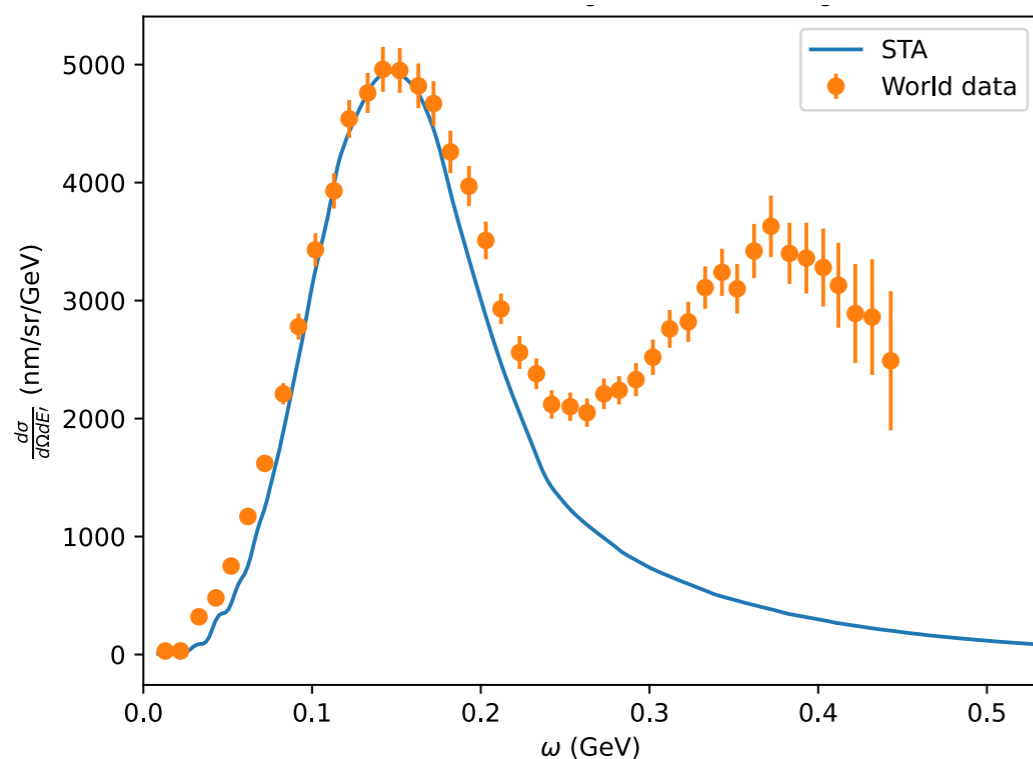




## Objectives

- Many-body Quantum Monte Carlo calculations of nuclear response densities and functions for lepton-nucleus scattering in the quasi-elastic regime
- STA's factorization scheme will allow calculations of electroweak scattering from  $A \geq 12$  without losing two-body physics
- We calculated nuclear response densities, response functions and cross-sections for  $^{12}\text{C}$



Cross-section for electron scattering off  $^{12}\text{C}$ , at electron beam energy  $E=0.56$  GeV and scattering angle  $\theta=60^\circ$ , calculated within the STA

## Impact (as of now)

- The STA formalism was introduced for calculations of electromagnetic nuclear responses for  $^4\text{He}$ , and benchmarked against other methods based on the same nuclear description (Green Function Monte Carlo and Spectral Functions) for  $A=3$  systems
- It correctly reproduces nuclear responses and cross-sections up to moderate values of  $\mathbf{q}$ . Current calculations are limited by relativistic effects, their inclusion is necessary both in the electromagnetic currents and kinematics

## Accomplishments (as of now)

- L. Andreoli, J. Carlson, A. Lovato, S. Pastore, N. Rocco, and R. B. Wiringa, Phys. Rev. C 105, 014002 (2022), editor suggestion
- Short-Distance nuclear structure and PDFs, ECT\*, Trento, invited talk (July 2023)
- New physics searches at the precision frontier, PROGRAM INT-23-1B, INT, Seattle, invited talk (May 2023)
- 4th International Workshop on Quantitative Challenges in Short-Range Correlations and the EMC Effect Research, CEA, Paris-Saclay, invited talk (February 2023)