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# Precision measurement of the isospin dependence in the 2N and 3N short range correlation region

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The goal of this experiment is to measure the isospin sensitivity of 2N-SRC, also called the "tensor force dominance" through inclusive scattering. It uses the same approach as E08-014, i.e. enhancing the isospin sensitivity in inclusive scattering through a careful choice of complementary targets. Isospin-independent and isospin-dependent models predict a 40% difference in the cross section ratios of the two light mirror nuclei $^3$He and $^3$H. Data taken on tritium, $^3$He and deuterium will allow direct comparisons to realistic theoretical calculations with sensitivity to the nucleon-nucleon potential components and their amplitudes.

This experiment will run jointly with the DIS $^3$H/$^3$He measurement, i.e. the MARATHON experiment. The combined results of the two experiments, in particular 2N-SRC and the EMC effect in $^3$H, will add a very important data point in the study of the correlation between 2N-SRC probability and the EMC effect amplitude. The use of mirror nuclei brings key information to the understanding of the SRC-EMC relation.

In addition, this experiment will measure the isospin dependence of 3N-SRC for the first time and the sum of cross sections for $^3$H and $^3$He give an effective isoscalar 3N configuration, allowing study of the momentum sharing independent of the isospin structure. In particular, this "isoscalar" A=3 cross section will be extremely valuable in the 3N-SRC region, where so far one has only been able to use A/$^3$He to extract the 3N-SRC probability amplitudes.

We will also extend our measurement to the quasielastic peak with the goal of performing a measurement of the neutron magnetic form factor, $G_M^n$. Our measurements will be at $Q^2$ between 0.6 and 1.7 (GeV/c)$^2$, which will be of great interest for few-body calculations.

Finally, measurements of the absolute cross section for $^3$H and $^3$He as $x \to 3$ will provide additional information that can be used to study the impact of final state interactions on inclusive cross section in the region dominated by SRCs. While FSI are expected to be limited to interactions between the nucleons in the SRC and thus cancel in the target ratios, this assumes that there is no isospin dependence in the FSI. Comparisons to cross section calculations using realistic $^3$He and $^3$H distributions will allow us to determine the size of FSI, or else to set limits on their size.