

## An Update – Safety bringing experiments using a Tritium target to Jefferson Lab

*Friday, 22 September 2017 09:00 (25 minutes)*

A tritium target is foreseen to execute four approved nuclear science experiments in Hall A at Thomas Jefferson National Accelerator Facility. One experiment (E12-14-009) aims to measure the ratio of elastic scattering of  $^3\text{H}$  and  $^3\text{He}$  and improve on the radius of  $^3\text{H}$  as compared to the radius of  $^3\text{He}$ . The aim is to reduce this uncertainty by a factor of five. This can then be compared with state-of-the-art nuclear science calculations. An experiment of quasi-elastic knockout of protons from  $^3\text{H}$  and  $^3\text{He}$  (E12-14-011) is a quantitative measure of the pairing mechanisms in the nucleus. The measured ratio can again be compared with state-of-the-art nuclear science calculations. A similar measurement of the ratios of quasi-elastic electron scattering off  $^2\text{H}$ ,  $^3\text{H}$ ,  $^3\text{He}$ , and  $^4\text{He}$  (E12-11-112) gives a count of the amount of short-range paired nucleons. The comparison of  $^3\text{H}$  and  $^3\text{He}$  will test the isospin character of this pairing. Last but certainly not least, a measurement of deep-inelastic scattering off  $^3\text{H}$  and  $^3\text{He}$  (E12-06-118) will map the ratio of proton to neutron structure functions with minimal nuclear uncertainty and will then constrain the ratio of down to up quarks in nucleons. In the kinematic limit of quark momentum fraction  $x \rightarrow 1$  there are definite QCD predictions for this ratio.

The laboratory experimental review process requires all experimental apparatus including a tritium target for these experiments to undergo several readiness reviews. To date the reviews have resulted in the collaborators conscientiously following up on numerous recommendations which have resulted in an intelligent design carefully folding in safety considerations to minimize risk and having layers of containment both for beam operations and shipping. There was a final review last year and it concentrated on documentation and operational procedures. At this time with the experimental apparatus being staged in the experimental hall, technical reviewers are confirming readiness for safe operations for the first of these experiments scheduled later this year.

The presentation will provide some of the concerns and details for safely running tritium experiments at Thomas Jefferson National Accelerator Facility.

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**Track Classification:** Technical risks and Risk assessment