

**LOI12-16-007: *First Measurement of the  $e-^3\text{He}$   
Parity Violating Deep Inelastic Scattering  
Asymmetry Using an Upgraded Polarized  $^3\text{He}$  Target***

*D.G. Richards*

This LOI argues for a program to measure parity-violating DIS on a *polarized*  $^3\text{He}$  target using an unpolarized electron beam, in contrast to earlier programs using a polarized electron beam on an unpolarized target. The aim is to understand the spin-structure of the proton, and in particular the contribution of the different quark flavors; the determination through the weak interaction heads to a different combination of quark flavors than that involving the electromagnetic interaction. By combining with  $g_1^p$  and  $g_1^n$  they will then obtain a value for  $\Delta\Sigma$  *without* the assumption of SU(3) symmetry.

The value of such experiments is dependent on the precision, and the extent to which, for example, two-boson contributions are correctly accounted for, but there is sufficient theoretical expertise in the proposal to address that issue, and there is on-going work by the JAM collaboration to explore the impact of the expected results without assumptions of SU(3). A suggestion: it would be valuable also to look at the unpolarized structure functions, since these are also poorly known without assumptions of SU(3) symmetry. I assume this would entail running with an unpolarized target, rather than just looking at the average of the two polarizations, and the overall normalization of the cross section would then be important. One minor point: there is a typo in eqn 16.