

MUSE Review Meeting

The meeting for the technical review of the TDR of the Muon Proton Scattering Experiment Collaboration (MUSE), R-12-01.1, took place July 25, 2012 from 8:30–18:30.

MUSE review subcommittee

present: D. Bryman
M. Distler
B. Filippone
Q. Ingram
K. Kirch
C. Petitjean
S. Ritt
R. Rosenfelder
A. Signer (secretary)
U. Straumann (chair)

Presentations

The following presentations were given by the collaboration:

Overview	R. Gilman
Beamline	R. Gilman
Backgrounds and shielding	K. Myers
Beam Scintillating Fibers	E. Piasetzky
GEMs	M. Kohl
Target	R. Gilman
Wire chambers	V. Sulkosky
Scintillators	S. Strauch
Trigger	R. Gilman
DAQ	G. Ron
Radiative corrections	A. Afanasev (remote)
Analysis and fits	G. Ron and J. Arrington (remote)

Committee's Remarks

The committee thinks there is a very strong physics case for the proposal. A particular strength of the proposal is the ability to study μ^\pm and e^\pm scattering

within the same experiment. The experiment has the potential to provide critical data towards the solution of the so-called proton radius puzzle.

The committee felt that the TDR in its current form is not suitable to serve as a basis for a conclusive decision about the proposal. However, the committee was pleased to note that much useful information that was missing in the TDR has been added in the presentations.

The crucial point is to establish if the beam properties allow the proposed measurements to be made, as was pointed out by the BVR committee in its 43rd session in February 2012. To this end a detailed understanding and study of the beam through measurements, possibly complemented by simulations, is indispensable. These tests should take place in the autumn of 2012. The beam time for these test has already been approved.

The beam tests should provide essential input and will be a prerequisite for a more complete proposal. It will give the collaboration a much better idea about the amount and nature of the effort that is required.

Apart from the beam tests, a full realistic simulation of all aspects of the experiment should be done, paying particular attention to multiple scattering effects and energy losses in material in the beam.

The committee raised a number of further questions/issues the collaboration should address:

1. to provide a detailed plan for the available manpower during beam tests and operations, taking into account possible delays beyond 2016
2. how to deal with the fact that the beam structure is not sharp in time
3. timing of experiment and monitoring of stability
4. should there be some effort to try to improve the IFP timing?
5. to what accuracy does the event-by-event momentum need to be known
6. what is the influence of the average beam momentum error?
7. to provide an error estimate of effects due to the target walls
8. to provide an estimate of theoretical uncertainties of radiative correction calculations
9. how important is it to have data for the lowest (115 MeV) energy?

10. is there a bias on angle resolution and cross section measurements due to large multiple scattering?

The committee is looking forward to receive a complete TDR. If the feasibility of the experiment can be demonstrated and the points mentioned above have been addressed in a satisfactory way, the committee will seriously consider a positive recommendation.

September 19, 2012 U. Straumann, A. Signer