Plan for 2013-201x
LCTPC Collaboration

Taking into account the two documents of WPmeeting 176

1.) Gate
- Measure ion drift velocity in our gas/E-field. (0.5 PhD. + setup)
- Design and test a grid system with high enough transparency for electrons:
  * GEM gate – test ion absorption/electron transparency (0.5 PhD. + setup)
  * wire gate – test ion absorption/electron transparency (0.5 PhD. + setup)
- Simulation of various ideas (mono-voltage vs. bi voltage etc.) (0.5 PhD.)

2.) Simulation
- (Physics simulation to study the benefit of a TPC (vs. Si detectors): dE/dx, continuous tracking Find appropriate channels and show what a TPC can do better. (1.0 PhD.)) → ILD
- Physics analysis studying detector parameters, in particular the pad size necessary (width and height) to reach performance (tracking, double track resolution, occupancy and angular pad effect) (1.0 PhD.)
- Study benefit of pad or pixel-based readout. (0.5 PhD.)
- Perform simulation of physics events to understand requirements on two track/two hit resolutions. (0.5 PhD.)
- Develop a simulation that can reproduce the local field distortions seen from the measurements. (0.5 PhD.)

3.) Electronics
- Detailed simulation of physics events studying the effect of various electronics parameters on physics performance; including number of ADC bits (tracking and dE/dx!), rise time, sampling frequency, power consumption (0.5 PhD.)
- Start group of experts on chip design (really necessary now? Maybe one chip designer to collect some ideas/designs and make general design proposals?)
- Development of a S-ALTRO-based readout system (Post-doc)
- Development of a Timepix-3 readout system for large scale. (0.5 PhD. + hardware + x Timepix wafer)
- Address the problem of power pulsing. (?)

4.) Software
- Further development of Marlin TPC and better understanding of the data already taken. (3.0 PhD.)
- Develop correction procedure for local field distortions → give 'final' result for single point resolution in PCMAG and 3.5 T. (0.5 PhD.)
- Develop simulation and reconstruction tools for 2 hit/2track reconstruction. (0.5 PhD.)
- Develop methods for dE/dx measurements. (0.5 PhD.)

5.) High Field Magnet

- Test performance of current module design in 3.5 T field – in particular the design to reduce the local field distortions. (1.0 PhD.)
- Test gating device in 3.5 T (0.5 PhD.)
- Test power pulsing in 3.5 T (0.5 PhD.)

6.) Criteria for technology choice will be based on (1.0 PhD.)

- Reliability in performance
- Momentum resolution
- Point resolution in bending plane and z-direction
- dE/dx resolution
- Two track resolution in bending plane and z-direction

Exact specifications have to be determined. Probably physics simulations of key channels have to be done.

7.) External tracking device for T24/1

- Building and operating it (1.0 PhD.)

8.) Mechanical aspects

- More simulation studies of endcap and field cage are necessary (influence of larger modules on mechanical rigidity of endcap) (1.0 technician)
- Build test samples for the field cage to test HV stability (70-100 kV) and mechanical rigidity. Feed information in simulation study. (1.0 Technician + material)
- Design cathode and HV connection to cathode (0.5 technician)
- Mounting of TPC – more detailed calculations are necessary. (0.5 technician)

9.) Temperature

- Cooling
- Study how much T-variation we can accept.