

Summary of Gaseous Detector Parallel Session

Instrumentation Frontier Workshop
Gaseous Detector Subpanel
Boulder 19 Apr 2013

Attendance

- ▶ Thomas Hemmick, Stony Brook
- ▶ Marcus Hohlmann, F.I.T.
- ▶ Bob Wagner, Argonne
- ▶ Andy White, UT-Arlington
- ▶ Jae Yu, UT-Arlington (remote by ReadyTalk)

Topics

- ▶ White papers by Marcus, Andy, Jae, and Vinnie Polychronakos on MPGDs for
 - tracking and muon detection
 - calorimetry
- ▶ White paper by José Répond on RPCs
- ▶ Discussion of Outline and Writing of Gaseous Detector Summary Report (white paper)



Scope of Detectors

- ▶ Wire chamber
 - MWPC
 - Drift Chamber
 - Straw Tube
 - Gas TPC
- ▶ Micro–Pattern Gas Detectors
 - GEMs
 - Micromegas
- ▶ Resistive Plate Chambers
- ▶ Thin Gap Chambers
- ▶ Dual Phase Noble Liquid Chambers



Applications

- ▶ Charged particle tracking
 - Momentum measurement
 - Vertexing
 - Muon detection & tracking
- ▶ Calorimetry
 - Fine grained sampling
 - Particle flow algorithms
- ▶ Dual Phase Liquid Detectors



Technical Requirements/Limitations

- ▶ Wire chambers
 - Rate limited
 - Wire aging in high fluence environments
 - Detector mass
 - Compactness
- ▶ Micro–Pattern Gas Detectors
 - Low Cost Construction
 - Radiation damage tolerance
 - Foil production capability (U.S.)
- ▶ RPC
 - Need improved high rate capability
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Key R&D Directions

- ▶ Wire Chamber
 - Low mass fabrication
- ▶ MPGD
 - Cost reduction
 - Efficiency/dead area
 - Large scale construction techniques
 - Flex circuitry on GEMs
 - Cluster counting to improve space resol. & dE/dX
 - Transition Radiation Detectors?
- ▶ RPC
 - Lower resistant plates
 - Improve spatial resolution
 - Timing resolution?



Outline for Gaseous Detector Summary Report “Whitepaper”

- ▶ Introduction
 - Very brief history
 - Physics justification
 - Current uses
 - Future direction
- ▶ Applications in the Energy Frontier
 - Physics capability
 - Limitations specific colliders
- ▶ Applications in the Intensity Frontier
 - Physics capability
 - Limitations for high rate environments
- ▶ Cosmic Frontier – Dual Phase Detectors
- ▶ R&D Needs of Specific Technologies
- ▶ Opportunity/Prospect for U.S. Leadership

