Report on WG1/task 1 meeting of 21 January 2009
Large area micropattern gas detectors

21 January 2009, 13:00–18:00, 513/1-024, CERN, Geneva.
Indico link: http://indico.cern.ch/conferenceDisplay.py?confId=47406

contribution	speaker
Intro & A large area GEM tracker	Serge Duarte Pinto (CERN)
Tests of Micromegas muon chamber performance	Fabien Jeanneau (CEA Saclay)
Micromegas for muon chambers ATLAS upgrade	Joerg Wotschack (CERN)
The 1m² Micromegas prototype for HCAL	Max Chefdeville (LAPP)
Large Area GEM needs for KLOE2 inner tracker	Danilo Domenici (LNF)
Recent achievements and projects in large MPGDs	Rui de Oliveira (CERN)
Strategies for upgrade of manufacturing workshop	Hans Taureg (CERN)
Recent simulations of neutron imaging	Xiaodong Zhang (TU Munich)
Large GEMS for muon tomography	Kondo Gnanvo (FIT)
Large GEMS for a DHCAL	Jaehoon Yu (Arlington)
Covering a Large area ILC-TPC endplate	Paul Colas (CEA Saclay)

Most talks about applications: muon chambers (Micromegas), inner tracking (GEMS), hadronic calorimetry (Micromegas & GEMS), neutron imaging (Micromegas), muon tomography (GEMS), TPC readout (Micromegas, GEMS or gridpix). No contribution from THGEM community at this meeting. Talks and discussions about production, and possible upgrade of CERN workshop facilities. Announcement of GEM and Micromegas design and assembly trainings in the week of 16–20 February 2009.

Date for next WG1/task 1 meeting fixed to 28 April 2009, 13:30–18:00, 160/1-009.
Indico link: http://indico.cern.ch/conferenceDisplay.py?confId=50793

Common issues

Design & manufacturing

Mechanics — need to reconsider mechanical rigidity when MPGDs get larger without getting thicker. Frascati group gave first input with stress simulations of GEM frames. Also feasibility of machining frames of large dimensions, fabrication of honeycomb panels, and the use of new composite materials need to be studied. LC-TPC studies mechanics for a large diameter support of many detector panels, including ideas on how to minimize dead area between panels for both GEM and Micromegas.

Signal routing — front-end electronics on outer edge of chambers will result in ever longer signal traces; increased capacitance and noise. Annecy group showed area-independent front-end connectivity, embedded in the back plane.

Resistive electrodes — resistive/capacitive electrodes are generally a method to reduce channel count in large detectors, if rate permits. Should the grounding layout be modified for large areas if rate is not very low? Rate dependent planar currents are thus far unstudied.

Increased capacitances — all technologies will have to deal with increasing capacitances, and the effect on discharges. Methods available for segmenting electrodes in GEM/thickGEM, and proposed but not yet validated for Micromegas.

Homogeneity — not obvious that all aspects of performance will be uniform over a large area. ATLAS muon chamber group from CERN showed data for gain and efficiency of Micromegas. Even thickGEMs are not naturally homogeneous due to significant thickness variations in FR4 substrate.

Production & industrial partnership

Cost — generally, the techniques developed for large areas (single mask GEM, bulk Micromegas) reduce cost per unit area strongly. Also small area applications will benefit from this. ThickGEM does not seem to follow this trend. Center of gravity of total detector cost for larger areas will generally shift toward the readout board; it would be worthwhile to investigate if and how cost can be suppressed there. Large scale production offers more opportunities for price reduction, except probably for thickGEM.

Investment — discussion on a possible upgrade of the CERN workshop reached no clear conclusions. Also, the question was raised how much we must be able to do "in the house". Suggested answer: we must be able to make even the largest detectors in our workshop, but large volume production belongs as far as possible to industry. It was generally agreed upon that first decisions concerning workshop upgrades (especially if they concern SLHC applications) must be made within a few months. Necessary to estimate the volumes needed and the time at which they will be needed.

Time — Talks on applications barely mentioned timescales. For SLHC applications planning must already be quite aggressive. Rui presented an analysis of possible GEM production rate for a large production volume; this suggested thousands of m^2 per month, seemed reassuring. It included subcontracting major part of the metal patterning work, for which industrial candidate partners have already been contacted. Such a partner has also been located for bulk Micromegas production, but an explicit production rate estimate may be desirable. Much controversy around large scale production of large thickGEMs, cost development and time scales. Suggestions of time scales run into many years, needs objective clarification.

Serge Duarte Pinto, Paul Colas — *conveners*