

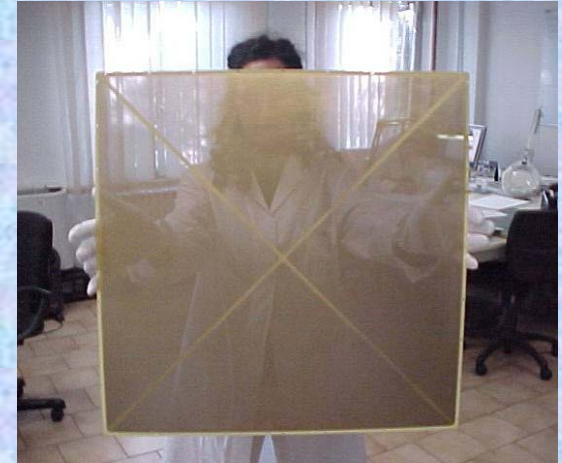
Bulk Micromegas



Single mask GEM



THGEM



**Large Area MPGD Production Issues
(RD51 inputs to the CERN workshop upgrade planning)**

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WG1 Meeting @CERN, April 28 2009

RD 51 Collaboration Survey

H. Taureg,
(RD51 Collaboration meeting,
Paris, October 2008)

Detector Technology	Currently produced	Future Requirements
	cm * cm	cm * cm
GEM	40 * 40	50 * 50
GEM, single mask	70 * 40	200 * 50
THGEM	70 * 50	200 * 100
RTHGEM, serial graphics	20 * 10	100 * 50
RTHGEM, Kapton	50 * 50	200 * 100
Micromegas, bulk	150 * 50	200 * 100
Micromegas, microbulk	10 * 10	30 * 30
MHSP (Micro-Hole and Strip Plate)	3*3	10*10

Future Dimensions:

- MPGD technology available → to be demonstrated on large-area prototypes
- But infrastructure not available → investment for CERN workshop upgrade

CERN MPGD Workshop Upgrade & RD51

**Current: CERN-DEM is the major MPGD production facility
(generic R&D, detector components production, quality control)**

**Future: CERN-DEM contribution is crucial to advance large-area MPGD
(including large-area MPGD R&D, production of demonstrators)**

**→ first price estimate of CERN workshop upgrade
(separately for each technology - GEM, Micromegas, THGEM)**

• Discussions with sLHC upgrade coordinators (ATLAS, CMS, LHCb, ALICE):

**→ Significant interest in the development of large area MPGD detectors
→ Large-area demonstrators to be built in ~ 2010 - 2011**

Next: MPGD developments for the ILC/CLIC

Future: CERN Workshop as a R&D Facility for Large-area MPGD

followed by the

**Technology Industrialization → transfer “know-how” from
CERN workshop to industrial partners for large scale mass production**

E.g. : Interest of ATLAS Collaboration in Micromegas for sLHC upgrade

MPGD Technology / Detector upgrade	Total detector size	Timescale
<p><i>Gridpix (Micromegas/Ingrid + CMOS pixel ASIC)</i></p> <p>B-layer Pixel detector ATLAS TRT</p>	<p>~ 0.2 m² ~ 5 m² ~ 100 m²</p>	<p>2018-2019</p>
<p><i>Micromegas</i></p> <p>ATLAS Muon System (add chambers to inner ring of a small wheel)</p> <p>ATLAS Muon System (replacement of a small wheel and inner ring of a large wheel)</p>	<p>~100 m² (single module size ~ 1-2 m²)</p> <p>~ 1000 m²</p>	<p>2013-2014 (demonstrator prototypes ready in 2010-2011)</p> <p>2018-2019</p>

Complimentary Development	Function Required	Timescale
Timepix2 /Gossip CMOS pixel chip	Time information & resolution ~ few ns, external triggering capability, radiation hardness	2011-2013
General purpose electronics chip for ATLAS Muon/Micromegas	Time information, external triggering capability, radiation hardness, integration to long strips (~ 1 m)	2011-2012
Software / MC simulation	Integration of gas detector packages (Garfield, Magboltz) into GEANT4 framework	2010-2011

Need an information from all people (not only from sLHC and/or HEP community) about expectations and needs in the MPGD technology and electronics for common projects

<i>MPGD Technology / Detector upgrade</i>	Total detector size	Timescale

(what are your gains by using large area (~few m²) MPGD in your experiment – cost optimization, minimization of dead area, engineering aspects, etc ...)

It is important for a timely upgrade of a CERN workshop !

Complimentary Development	Function Required	Timescale

**See e.g. Development of common electronics → WG5 meeting, April 27, 2009
H. Muller “Scalable readout systems for large prototypes”**

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