Studies of Purification of the LHC RPC Gas Mixture

Status June 08

RG, MC

Objectives

- ## Understanding RPC-irradiated gas mix
  - Concentration of impurities
  - Identification of harmful impurities

- ## Systematic understanding of purifier agents
  - Filters capacity, efficiency
  - Overall lifetime
  - Optimal filter combination, etc
  - Try new filters?

- ## Final optimization of LHC closed-loop gas systems operation

Set-up (status June 2008)

- Main users of GIF till end of 2008, possibly ✓
  also in 2009

- Set-up:
  - 5 (+1) CMS Double Gaps (HV P.S, SW, etc)   ✓
  - Refurbished ATLAS GIF Gas system   ✓
  - new Filters rack   ✓
  - Gas Analysis: GC/MS   ✓
  - Fluoride measurement   ✓

Detectors

5 (+1) CMS-RPC double gap

Leak test performed
after installation

GIF source at about
2.5 m from RPC.
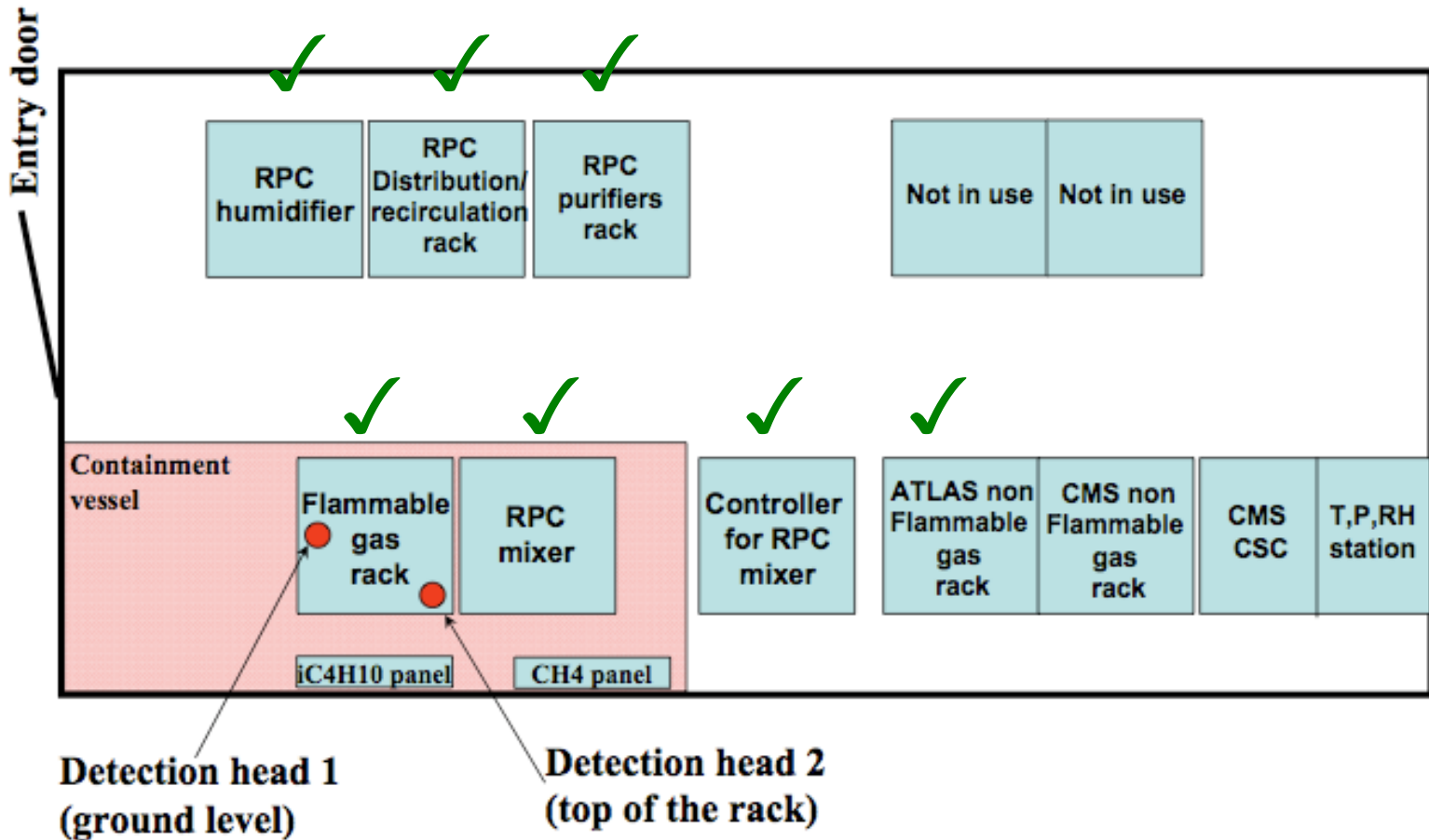If needed we will tune the radiation
using max ABS2

High voltage system

The high voltage system is just outside the radiation area.

SY1527 + 2 HV modules + HV cables have been provided by CMS

Gas System Racks Layout

- All pipes and racks have been tested for leak tightness (30' at constant P)
- Pipes from gas panel to chambers inside GIF and return are new (rilsan)
- When needed, (many) rubber joints have been replaced
- MFCs have been re-calibrated
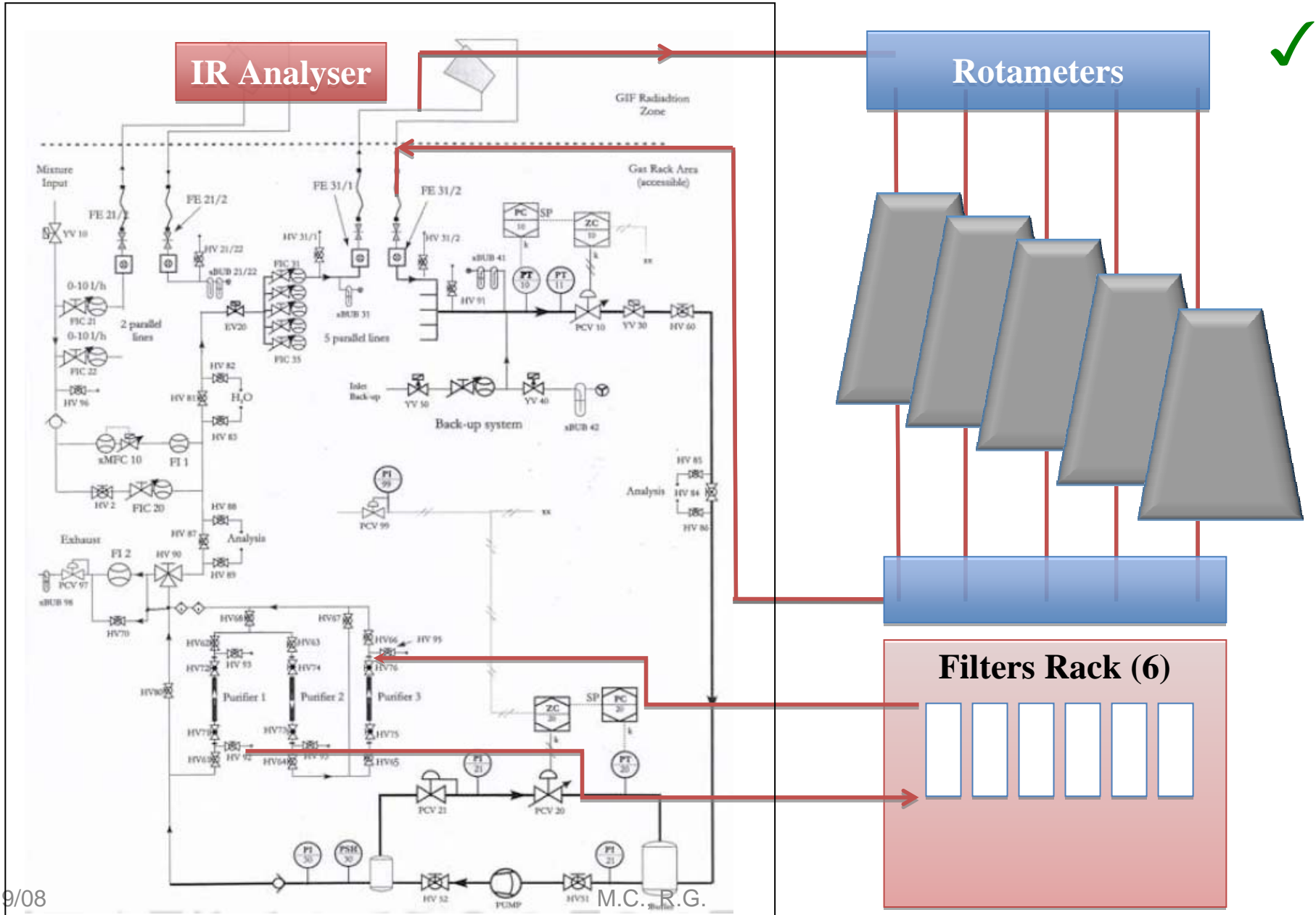
M.C., R.G.

Gas system

Gas re-circulation rack (from ATLAS). During the first phase of the test we will use the system in open mode. The gas from the RPC will be send to the filters rack and then vented.

Filters rack (PH-DT).
6 rotameters for the gas distribution to the chambers
6 cartridges with different purifier agents
6 rotameters for the gas distribution to each cartridge
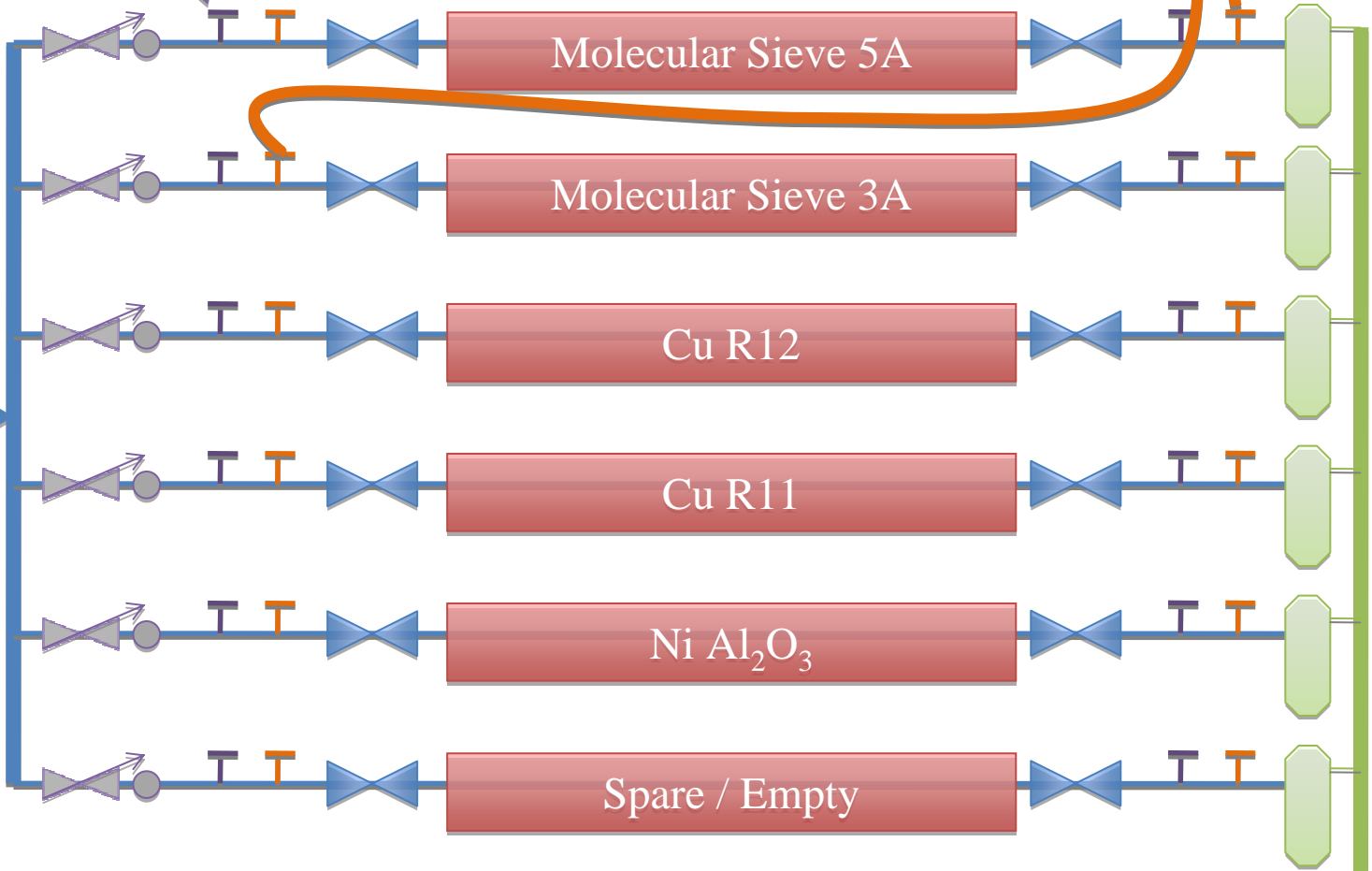
Gas system layout

ATLAS re-circulation rack

IR Analyser

Rotameters

Filters Rack (6)

GIF Radiadtion Zone

Gas Rack Area (accessible)

M.C. R.G.

Filters Rack

Pickage for Analysis

Example of connection 'a la carte'

Outlet of chambers

Molecular Sieve 5A

Molecular Sieve 3A

Cu R12

Cu R11

Ni Al$_2$O$_3$

Spare / Empty

Exhaust

M.C., R.G.