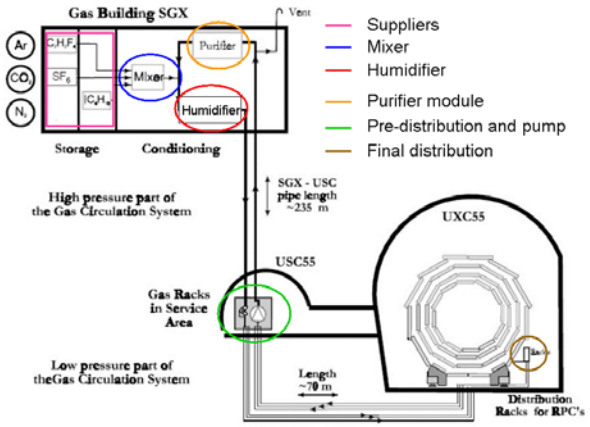
# Gas system upgrade for RE4

- RPC gas system status for RE4
- Cost estimate and schedule for the production of the distribution racks

# RPC gas system: missing parts for RE4

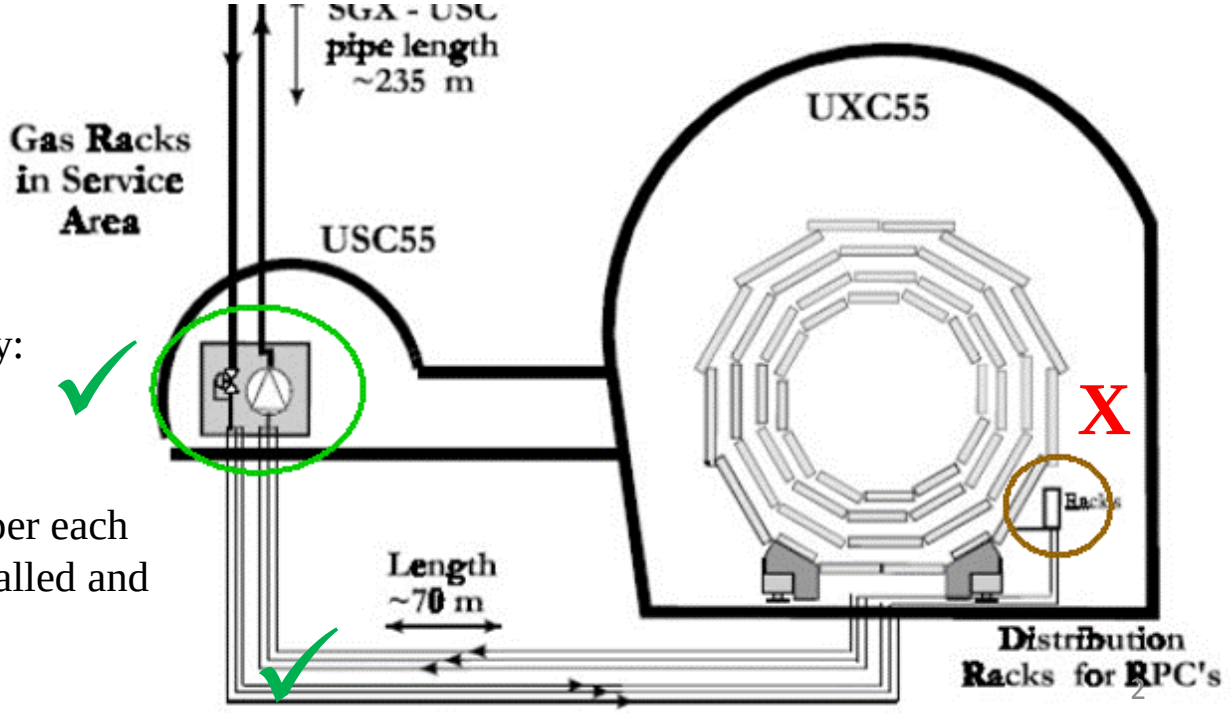



**X** 1 supply and 1 return pipe (per side) are already in the mini-cable chain and they arrive to the X3 balcony level on YE3

**X** 1 supply and 1 return pipe (per side) arrive only to the X2 balcony level on YE1 (i.e. the part from X2 to X3 and the cable chain is missing)

**X** 2 distribution racks need to be built.

**X** the gas distribution on the disks is missing

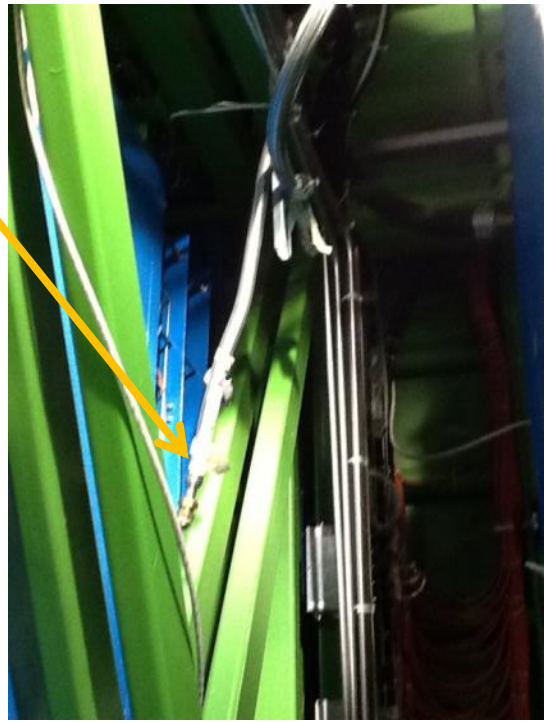



Pre-distribution racks (2) are ready: Installed and partially tested

2 supply and 2 return lines per each side (RE+ and RE-) are installed and ready

# RPC gas system status: few pictures

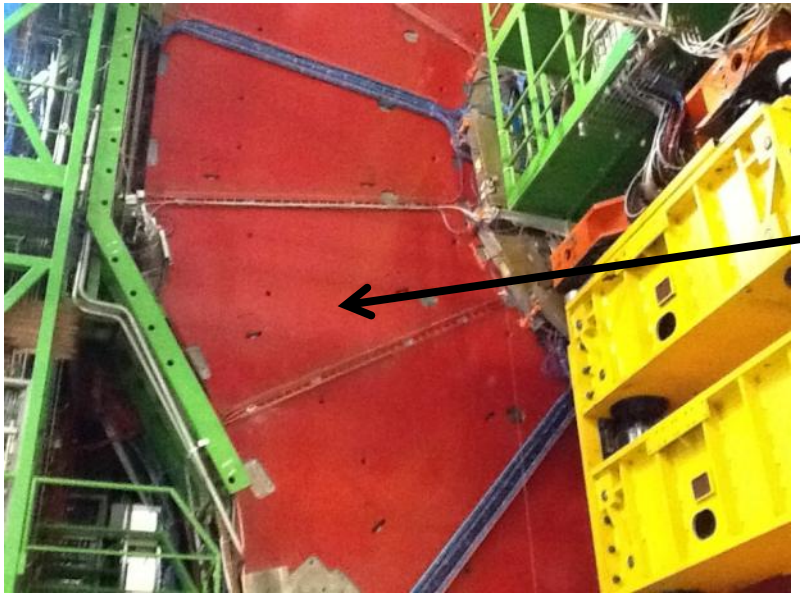
1 supply and 1 return pipe (per side) are already in the mini-cable chain and they arrive to the X3 balcony level on YE3



1 supply and 1 return pipe (per side) arrive only to the X2 balcony level on YE1 (i.e. the part from X2 to X3 and the cable chain is missing)

- **<u>1 supply and 1 return (per side) STOP BEFORE the mini-cable chain</u>**

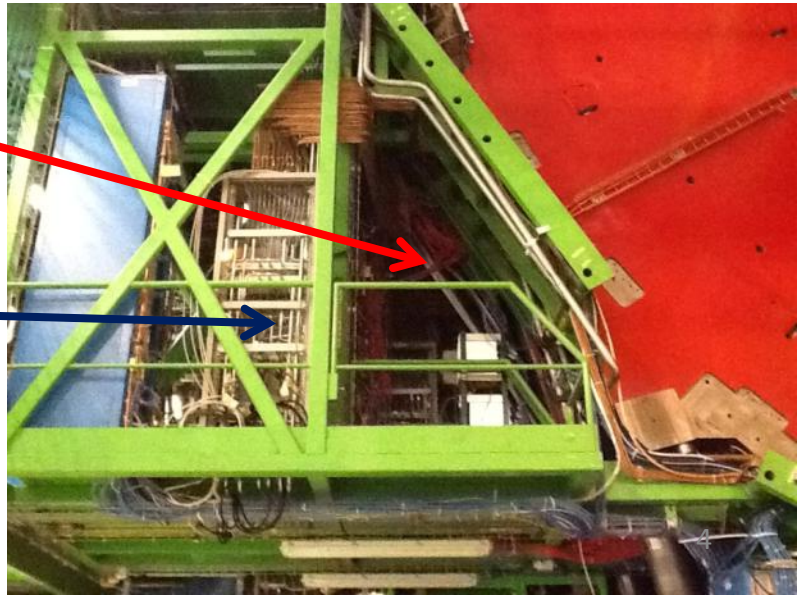
# RPC gas system status: few pictures



the pipes for the gas distribution on the disks are missing

Space available for the installation of the RE4 rack

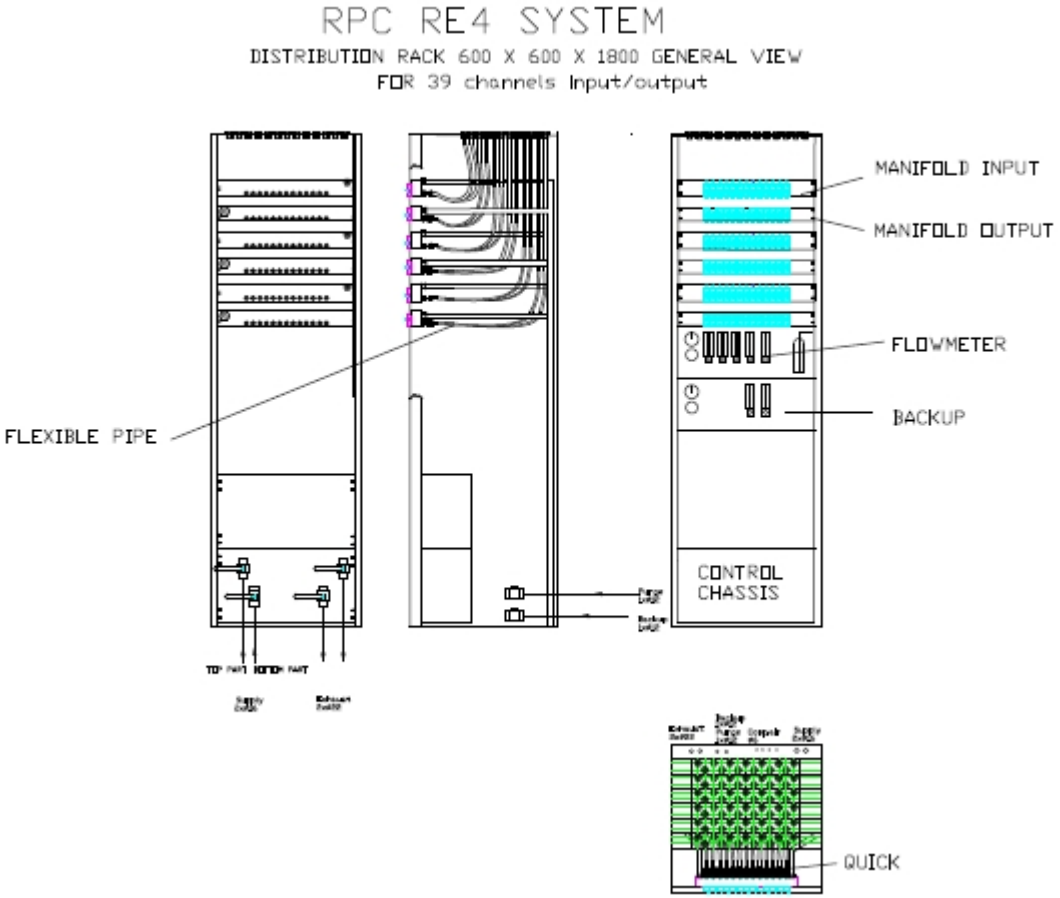
RE3 rack



# RE4 distribution racks

- After several discussion about the number of gas channels, the conclusion was that 36 channels are fine (3 spare channels will be available on each rack)

- Rack size will be 600 mm x 600 mm like normal gas distribution rack in the Endcap



# RE4 distribution racks

Cost estimate:

➢49980 CHF/rack

➢99960 for the 2 racks

Details:

| rack | kCHF |
|---|---|
| Material | 35.38 |
| Manpower | 14.5 |

➢There are expensive components that account already for 75 % of the material cost:

| Material | kCHF |
|---|---|
| Quick connectors | 21.6 |
| Soft pipes | 5.5 |

➢The cost for the 6 distribution manifolds is not charged because they were part of the original production

| Name | Specifications | | RPC 1 rack | RPC 2 racks | Price 1 pce | Tot.price 1 Rack | Tot price 2 racks |
|---|---|---|---|---|---|---|---|
| Nb of rack | Rack 600x600x1800 | SCEM: 06.61.74.003.0 | 1 | 2 | 1174 | 1174 | 2348 |
| Bottom rack | | SCEM: 06.61.74.410.9 | 1 | 2 | 59.5 | 59.5 | 119 |
| Rack square | | SCEM: 06.61.74.120.6 | 1 | 2 | 48 | 48 | 96 |
| Nb of manifolds13 ways Input | Drawing nb 1 | | 3 | 6 | 0 | 0 | 0 |
| Nb manifolds 13 ways Output | Drawing nb 2 | | 3 | 6 | 0 | 0 | 0 |
| Tape for cell | Type M6 x 6 Legris | SCEM: 41.34.26.320.4 | 108 | 216 | 1.1 | 118.8 | 237.6 |
| Tape for manifolds | Type M6 x 6 Legris | SCEM: 41.34.26.320.4 | 108 | 216 | 1.1 | 118.8 | 237.6 |
| Tape for manifolds input | Type 3/8" LEGRIS | SCEM: 41.34.26.328.6 | 3 | 6 | 1.5 | 4.5 | 9 |
| Tape for manifolds Output | Type 1/2" LEGRIS | SCEM: 41.34.26.330.2 | 3 | 6 | 2.05 | 6.15 | 12.3 |
| Joints for cell | O'ring NBR ID 6.07X1.78mm | SCEM: 36.10.30.452.9 | 108 | 216 | 0.06 | 6.48 | 12.96 |
| Joints for quick | Joints plat universel,13x18x2 NBR, | SCEM:36.12.60.405.9 | 108 | 216 | 0.16 | 17.28 | 34.56 |
| Vis de fixation cell | Vis M3x16 | SCEM: 47.62.71.107.5 | 432 | 864 | 0.08 | 34.56 | 69.12 |
| Quick on manifolds input | SERTO Femelle 760I 1/4"Male | SCEM: 41.61.25.130.9 | 54 | 108 | 100 | 5400 | 10800 |
| Quick on manifolds output | SERTO Male 760I 1/4"Male | SCEM: 41.61.25.110.3 | 54 | 108 | 100 | 5400 | 10800 |
| Quick on soft tube input | SERTO Male 760I 1/4"Femelle | SCEM: 41.61.25.120.1 | 54 | 108 | 100 | 5400 | 10800 |
| Quick on soft tube output | SERTO Femelle 760I 1/4"Femelle | SCEM: 41.61.25.140.7 | 54 | 108 | 110 | 5940 | 11880 |
| Soft tube 1 length | Assiwell 400 mm | | 54 | 108 | 52 | 2808 | 5616 |
| | Assiwell 400 mm + 100mm fixe tube | | 54 | 108 | 50 | 2700 | 5400 |
| Joints quick/soft tube | Joints plat universel,13x18x2 NBR, | SCEM: 36.12.60.405.9 | 54 | 108 | 0.16 | 8.64 | 17.28 |
| Bulkhead coupling input | FBO 4/6 to 4/6 LAITON | SCEM: 41.33.20.608.1 | 54 | 108 | 15.5 | 837 | 1674 |
| Bulkhead coupling output | FBO 6/8 to 6/8 LAITON | SCEM: 41.33.20.608.1 | 54 | 108 | 17.5 | 945 | 1890 |
| Adaptator connector union | FBO: diametre 16 laiton 3/8" cyl | SCEM: 41.33.10.216.8 | 4 | 8 | 14 | 56 | 112 |
| Adaptator connector union | FBO: diametre 20 laiton 1/2" cyl | SCEM: 41.33.10.220.2 | 4 | 8 | 17 | 68 | 136 |
| Manual valves 2 ways | Vanne a bille 3/4" | | 2 | 4 | 54 | 108 | 216 |
| Manual valves 2 ways | Vanne a bille 1/2" | | 2 | 4 | 49 | 98 | 196 |
| Raccords vannes | FBO : diametre 16 3/4" | SCEM: 41.33.10.616.6 | 4 | 8 | 14.5 | 58 | 116 |
| Raccords vannes | FBO : diametre 22 1/2" | SCEM: 41.33.10.228.4 | 4 | 8 | 18 | 72 | 144 |
| Bubbler | Protection | | 2 | 4 | 410 | 820 | 1640 |
| Bubbler purge and backup | | | 4 | 8 | 310 | 1240 | 2480 |
| Bubbler purge | | | 1 | 2 | 43.5 | 43.5 | 87 |
| Pneumatique valve backup | Bachofen NO Type:188.15.16.1.4.1R.S0104 | | 2 | 4 | 179 | 358 | 716 |
| Regulation valve backup | tescom | SCEM 59.75.10.100.6 | 2 | 4 | 384 | 768 | 1536 |
| | | | | 0 | | | |
| Pressure sensor input | sensors technic 0+40 mbar | SCEM 22.64.11.030.5 | 2 | 4 | 191 | 382 | 764 |
| Pressure sensor output | sensors technic -10/+10 mbar | SCEM 22.64.11.005.6 | 2 | 4 | 191 | 382 | 764 |
| Manpower | Mecanic part | | 1 | 2 | 12500 | 12500 | 25000 |
| Manpower | Electrical part + material | | 1 | 2 | 2000 | 2000 | 4000 |
| | | | | | | 49980.21 | 99960.42 |

The 2 racks will be ready for September 2012

# Conclusions

- Some pipe work in the cavern is needed
- 2 distribution racks need to be built
- Total cost for the 2 gas distribution racks is 100 kCHF
- The two racks will be ready for September 2012
- The distribution racks will be installed as soon as possible during the long shutdown 2013 (The installation includes also some service cable to operate and control the racks status)
- Andrea d'Auria is the technician in our group responsible for the construction and installation of the racks.