

WP 13
Task 13-2-2

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GOALS

Develop a complete system of large size RPC (single-gap/multi-gap) with timing capability better than few hundreds ps. This includes

- Conception and construction of large detectors**
 - Use of ASIC with small time jitters**
 - Use of TDC (either on FPGA or ASIC built-in) with excellent time resolution**
 - Conception and realization of large PCB**
 - Develop DAQ system**
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- Use different kinds of materials (glass, bakelite, low-resistivity materials) to build the detectors
 - Test the system with cosmic ray and beam conditions.

Detector : Good expertise with large single gap RPC
Work to develop large MRPC is being pursued

ASIC : with time jitters < 25 ps is available (PETIROC)

TDC : with time resolution in the range 5-100 ps exist (Lyon TDC)

Work to build TDC within the ASIC is one of the goals of **WP4**

PCB with pads and strips adapted impedance are being designed

Combination of all pieces to achieve time resolution better than few hundreds ps is the most important challenges

partner	Task/interest
IPNL	Large GRPC, PCB, TDC, TB
LPC	Large MRPC, PCB
GWNU	Large MRPC, TB
OMEGA	ASIC
LIP	Large RPC, TB
INFN-Bari	Large RPC, TB

4-year plan

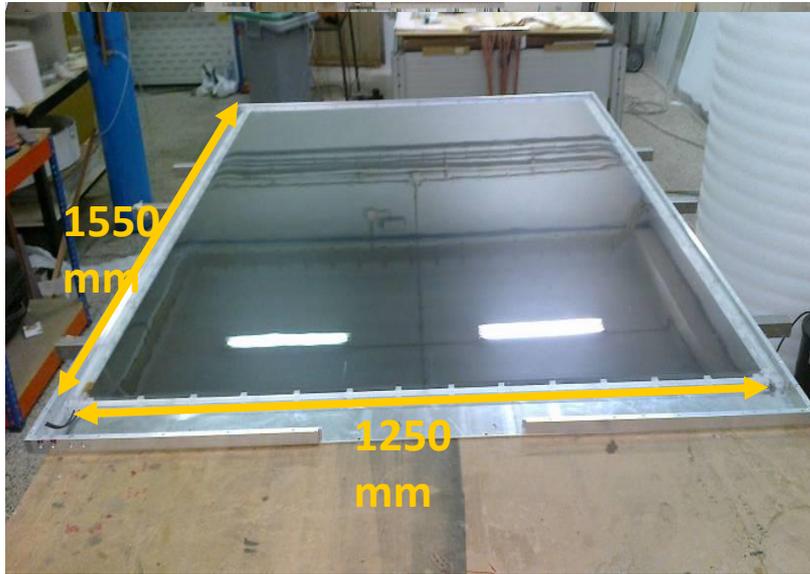
1st year	Conception and construction of large RPC/MRPC, Test of PETIROC, TDC
2d year	Design of optimized PCB for RPC/MRPC, integration of TDC into PETIROC (in collaboration with WP4)
3d year	Realization of a prototype, development of DAQ system (in collaboration with WP5&WP14)
4 th year	Beam test and validation & final report

First year plan

- Construction of large size RPC and MRPC
Single RPC with large size (1-2 m²) **IPNL**
MRPC (1 m²) **GWNU&LPC&IPNL**
- Tests of PETIROC (32 channels) **OMEGA&IPNL**
A test board is conceived and will be used for this purpose
- Test of new TDC **IPNL**
Preliminary tests have been done. Improvement on the TDC performance is expected this year
- Study of an optimal PCB for timing **LPC&IPNL**
medium-size PCB were already produced and are under study to obtain better understanding for larger PCB

IPNL	IN2P3(CMS upgrade) + WP4
GWNU	NRF
OMEGA	IN2P3+WP4
LPC	IN2P3
LIP	?
BARI	INFN (CMs upgrade)

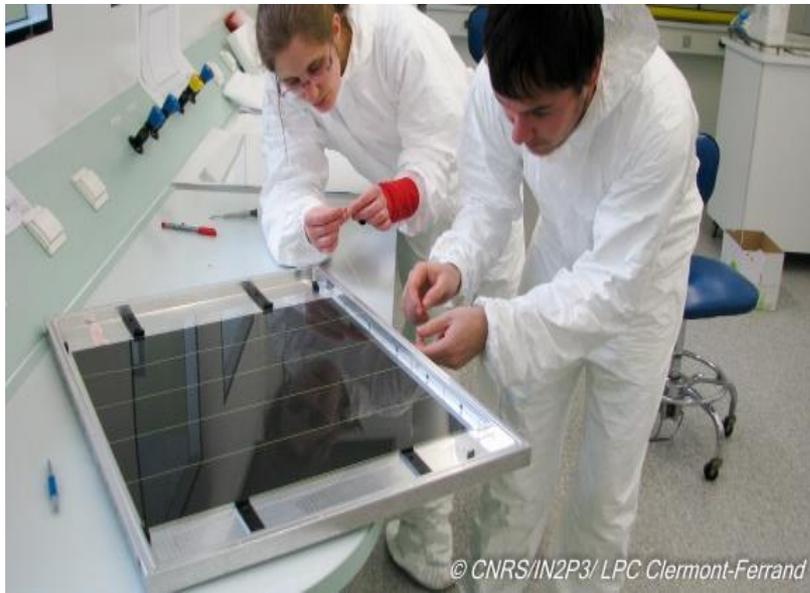
LIP



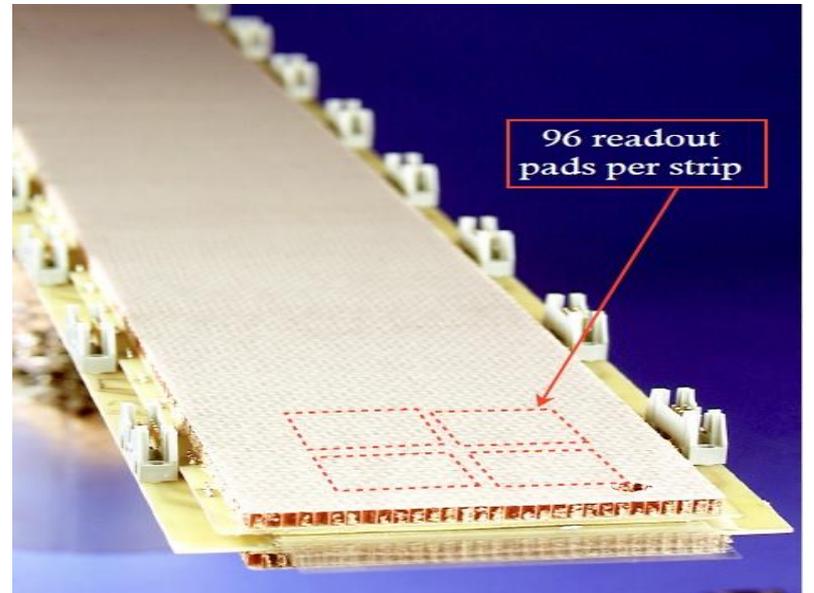
IPNL

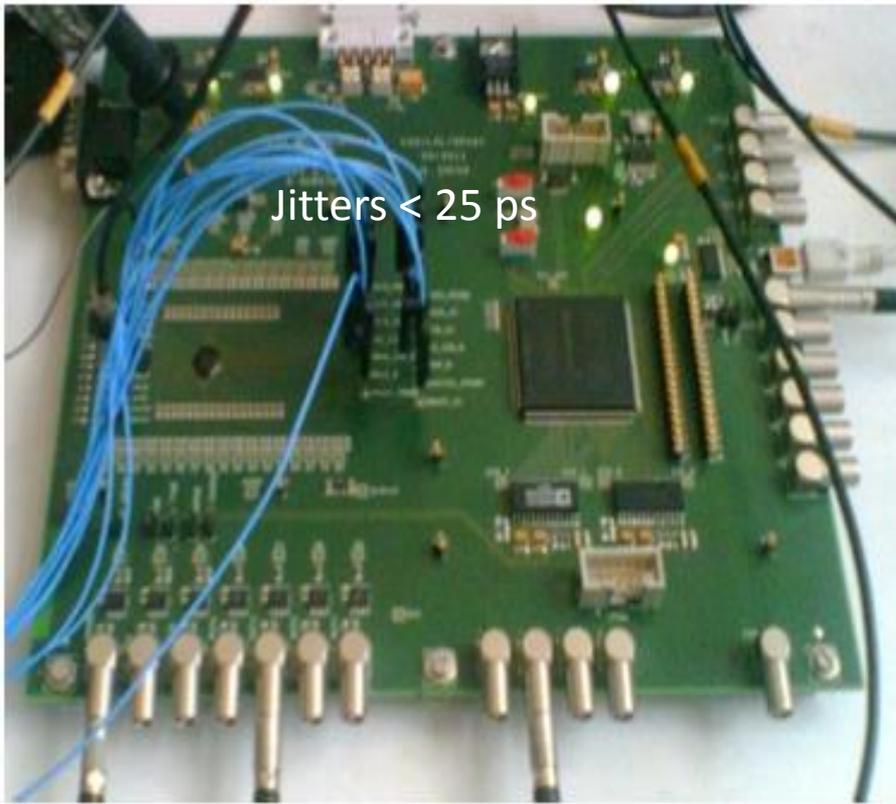


LPC



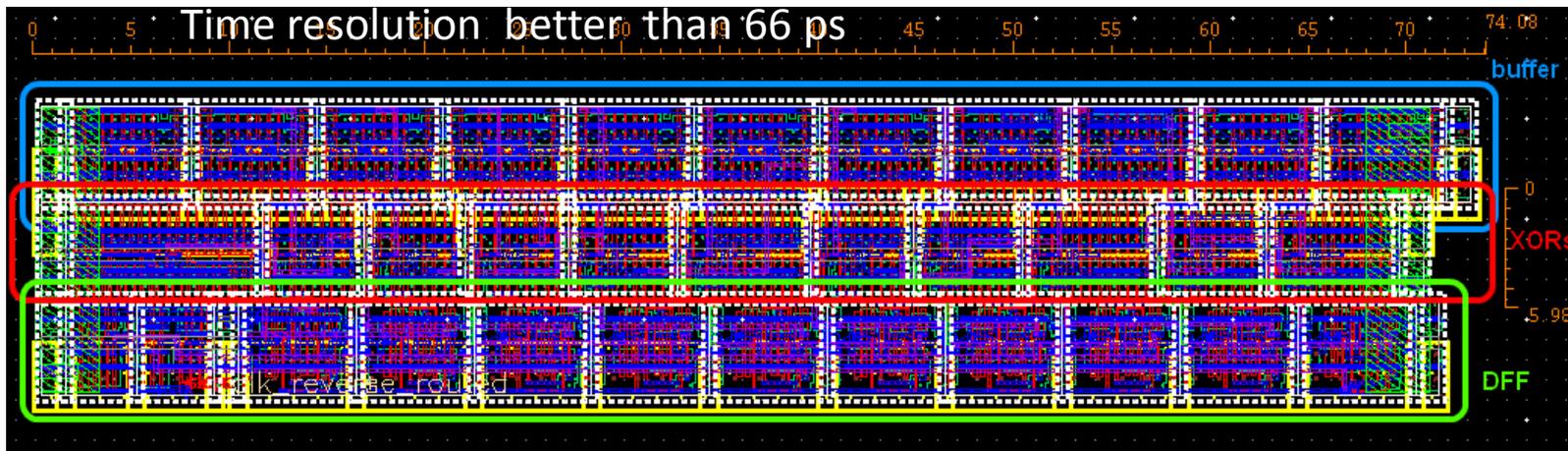
GWNU

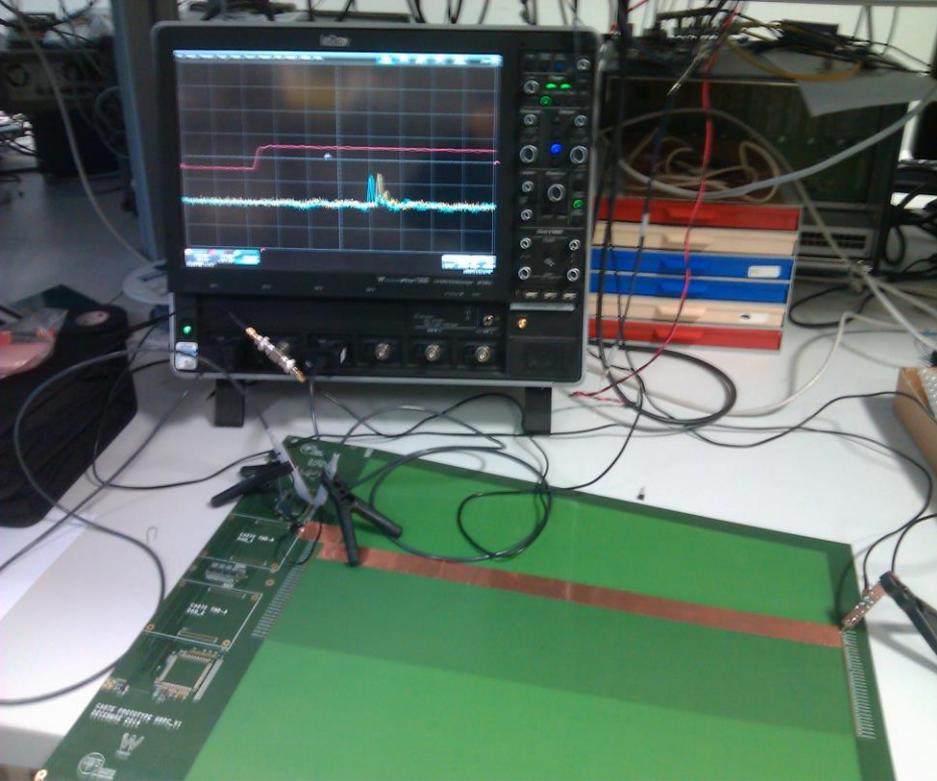




OMEGA

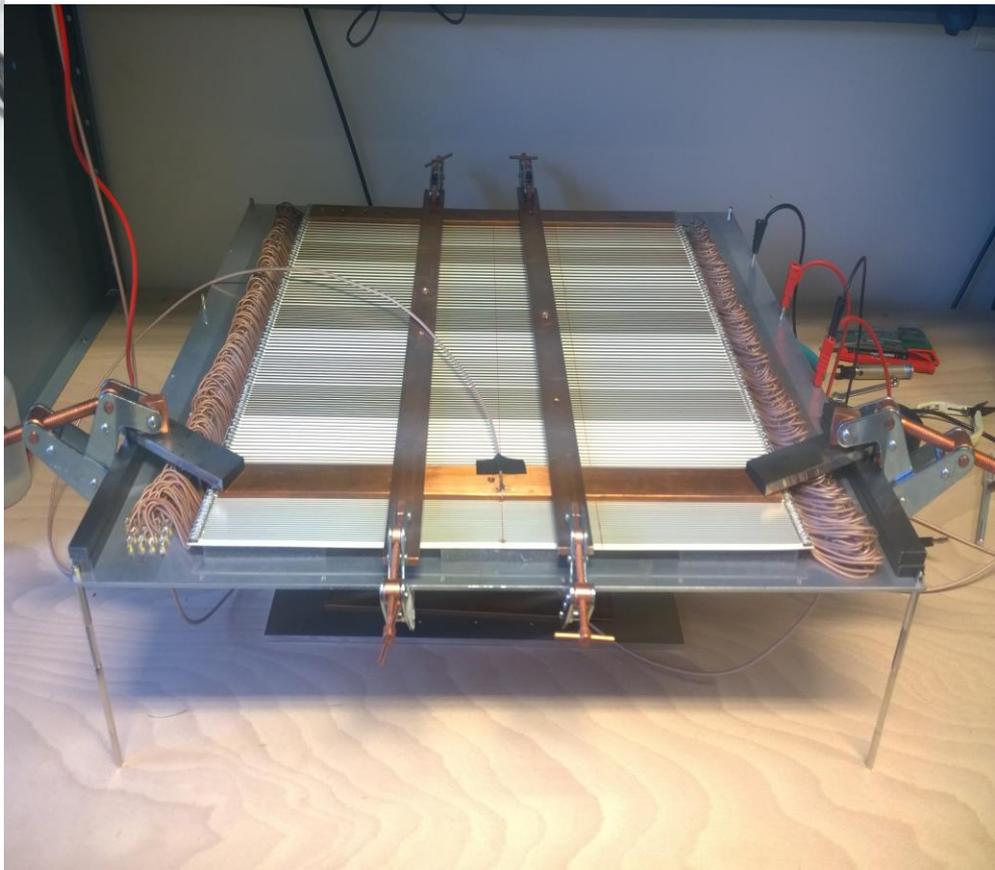
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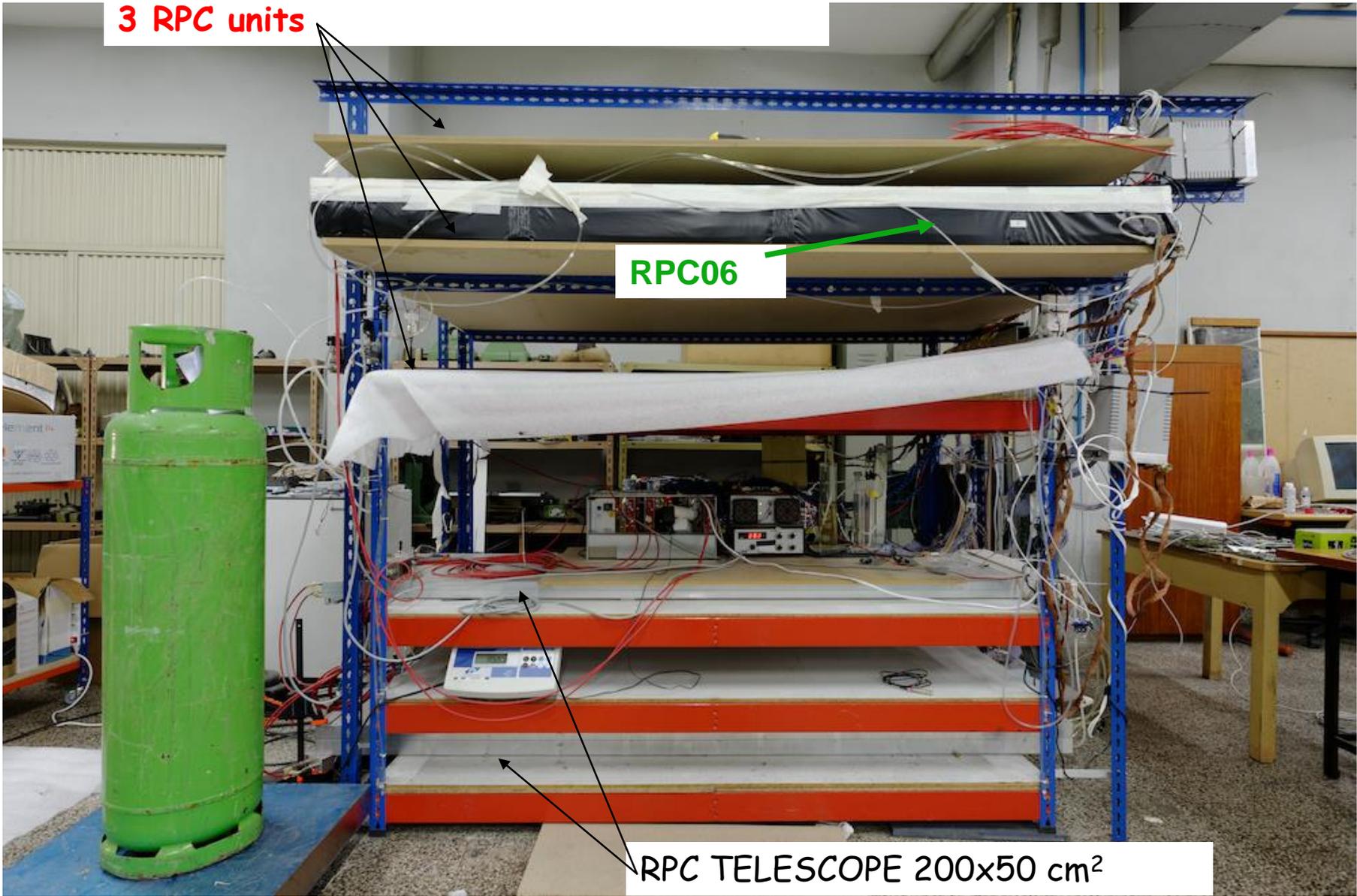




IPNL

LPC





Telescope time resolution $\sim 50\text{ps}$

LIP