
Preliminary tests of MRPC in Catania

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Arrival of MRPC detectors in Catania

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The laboratory

The chambers are presently installed in a lab at the Physics Department in Catania



Experimental activities in view of using the telescope

- * Arrangement of a cosmic trigger system
- * Test of a "nice and ready" gas mixture
- * Power supply with a DC/DC converter
- * First (very preliminary!) tests of MRPC
- * Development of the trigger coincidence card
- * Measurement of the GPS timing resolution

Cosmic trigger system

In order to study the local efficiency of the chambers, two trigger systems have been arranged:

Scintillators + PMs

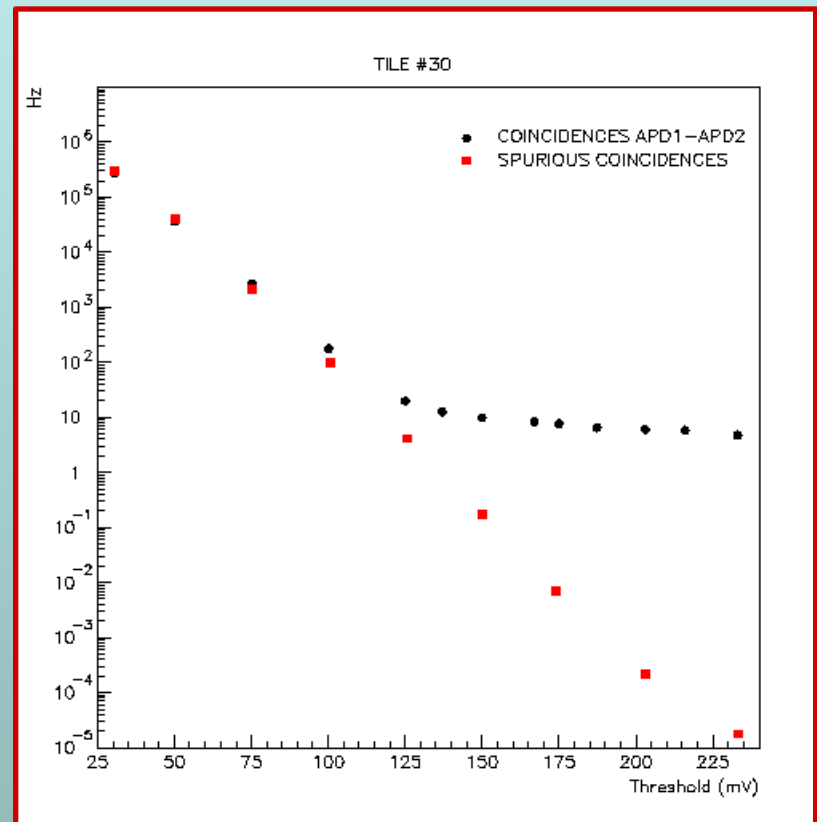
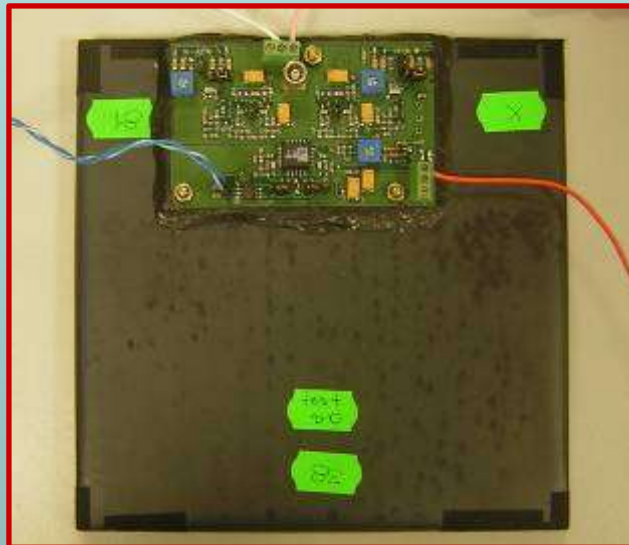
Size	20 x 8 cm ²
Distance	~ 50 cm
Coincidence Rate	~ 0.1 Hz



Cosmic trigger system

Scintillator tiles + APDs (provided by ITEP group, Alice TOF)

Size $15 \times 15 \text{ cm}^2$
Distance $\sim 45 \text{ cm}$
Coincidence Rate $\sim 0.3 \text{ Hz}$



Cosmic trigger system

Groups of high-school students have been involved in the tests of the trigger detectors and in simple experiments



Gas mixture



We tried to use a single bottle containing an already prepared gas mixture.

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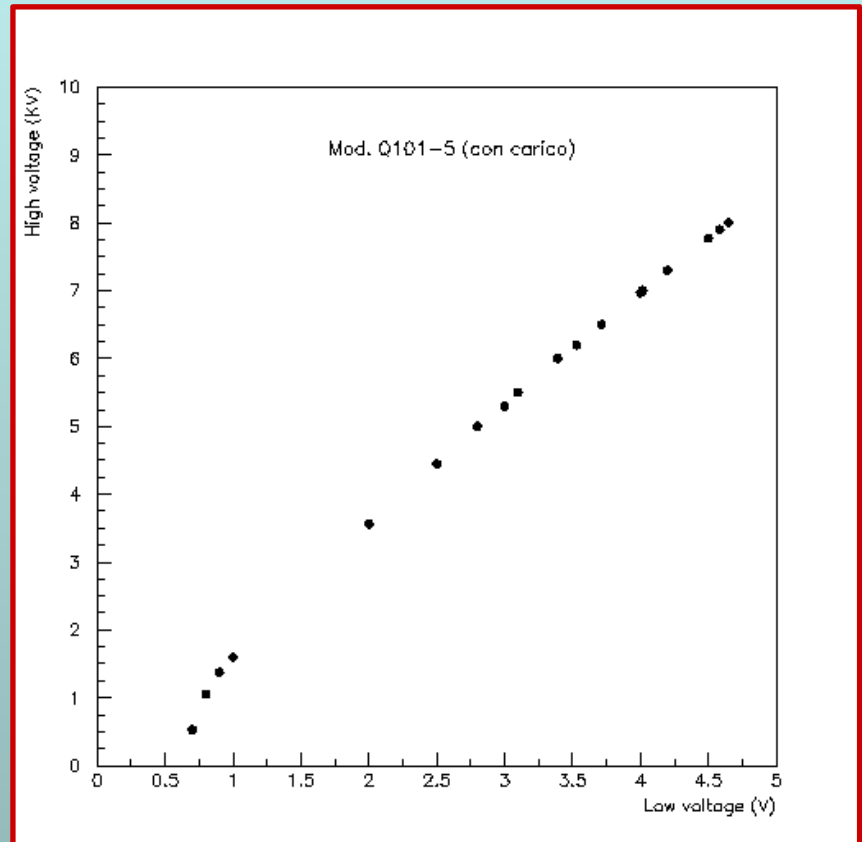
- Nominal composition (tolerance $\pm 5\%$):
 $C_2H_2F_4$ 93% SF_6 7%
- Analyzed composition (precision 2%):
 $C_2H_2F_4$ 93.9% SF_6 6.1%
- Mixture stability: 24 months
- Gas volume: 50 l at 2.5 bar

Since the desired composition is assured only in the gaseous form, this solution has been chosen in view of using the chambers in a static mode (without gas flowing).

High-voltage power supply

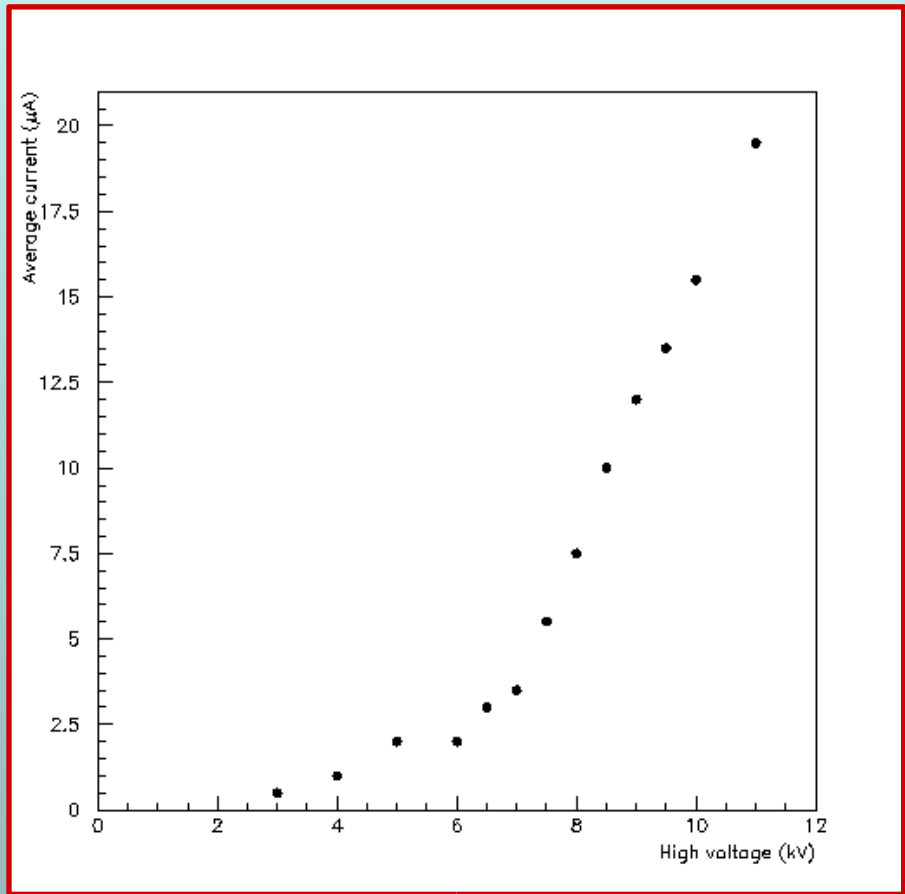
High-voltages to the chambers were supplied by a standard CAEN system (two channels, $HV_{\max} = \pm 15$ kV).

For the future we have already tested two DC-DC converters (Emco, mod. Q101-5 and Q101n-5) in order to use only low-voltage supply



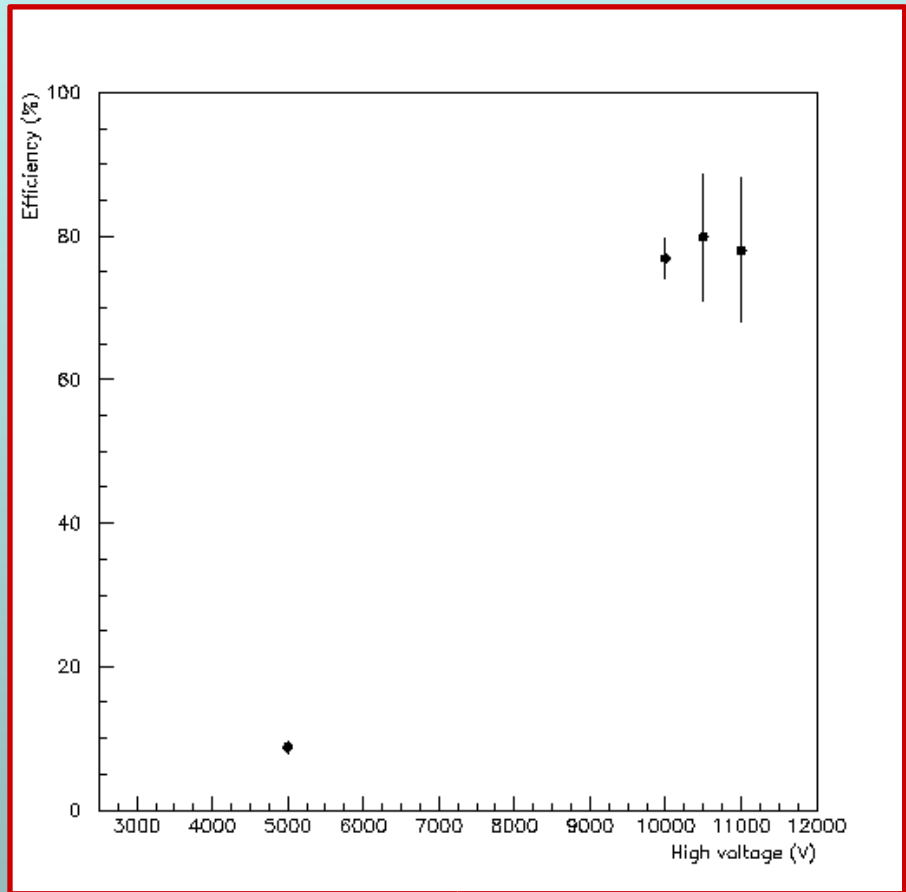
Very preliminary results

Average current after
few hours of gas flow



Very preliminary results

Efficiency after few hours
of gas flow



Trigger Card

Technical specification:

Input channel = 8, maskable, LVDS level

Output channel = 1, TTL level

Input impedance = 100 ohm

Output source or sink current = -/+ 25 mA (10 LSTTL load)

Power supply = 5-20 V, DC 125 mA max

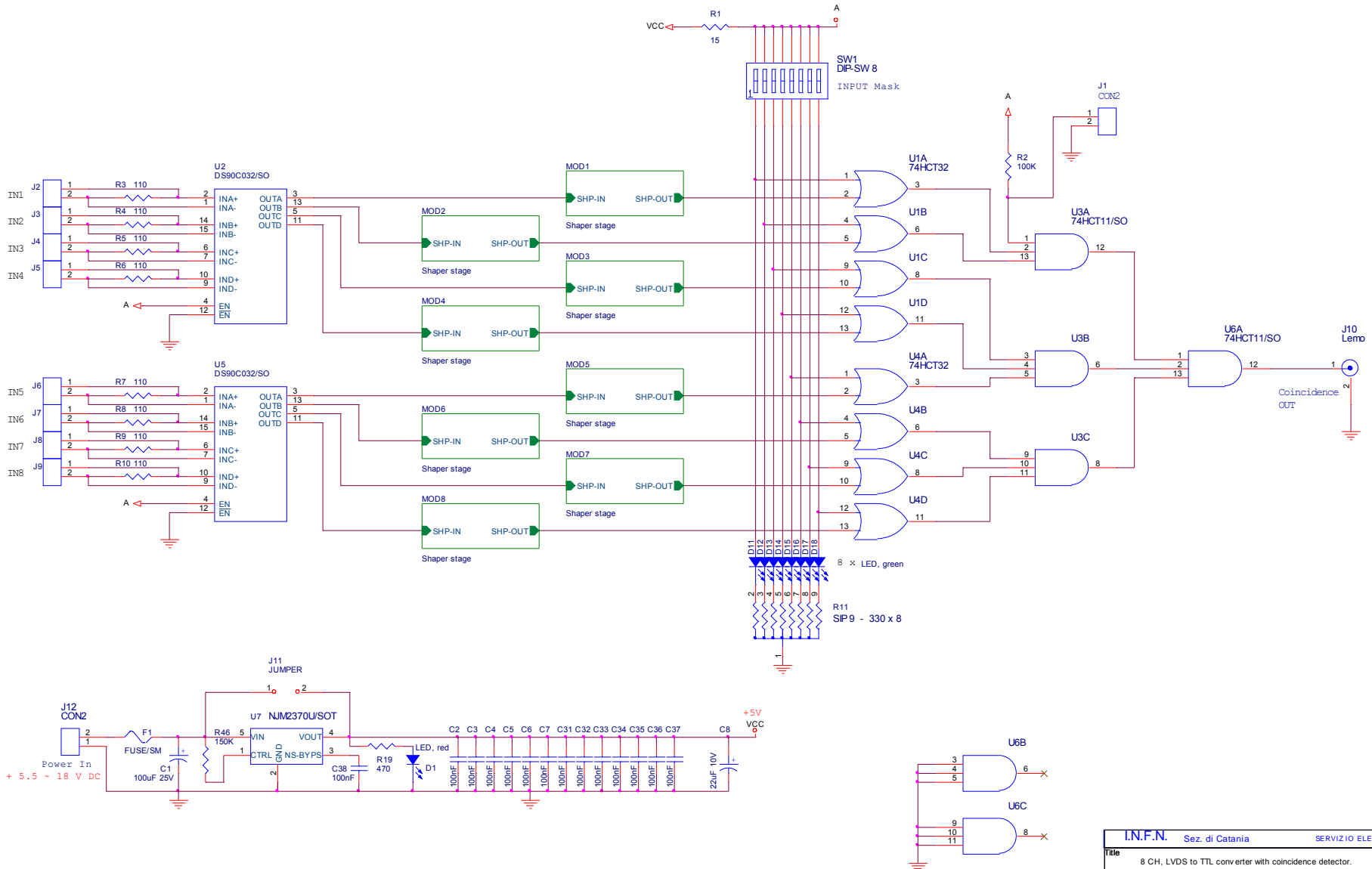
Input signal characteristic = min 8 ns width, min 6 ns rise/fall time
impulse/channel

Propagation delay = 36 ns

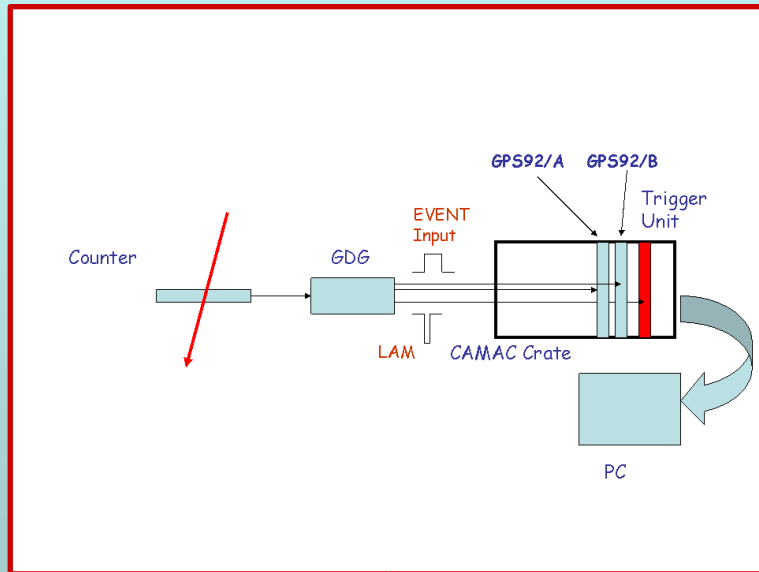
Output signal characteristic = 30 ns width, max 19 ns rise/fall time
impulse

Coincidence window = 50 ns approximately (1.2Kohm / 22 pF RC net)

Prototype ver. 1.11, Main schematic

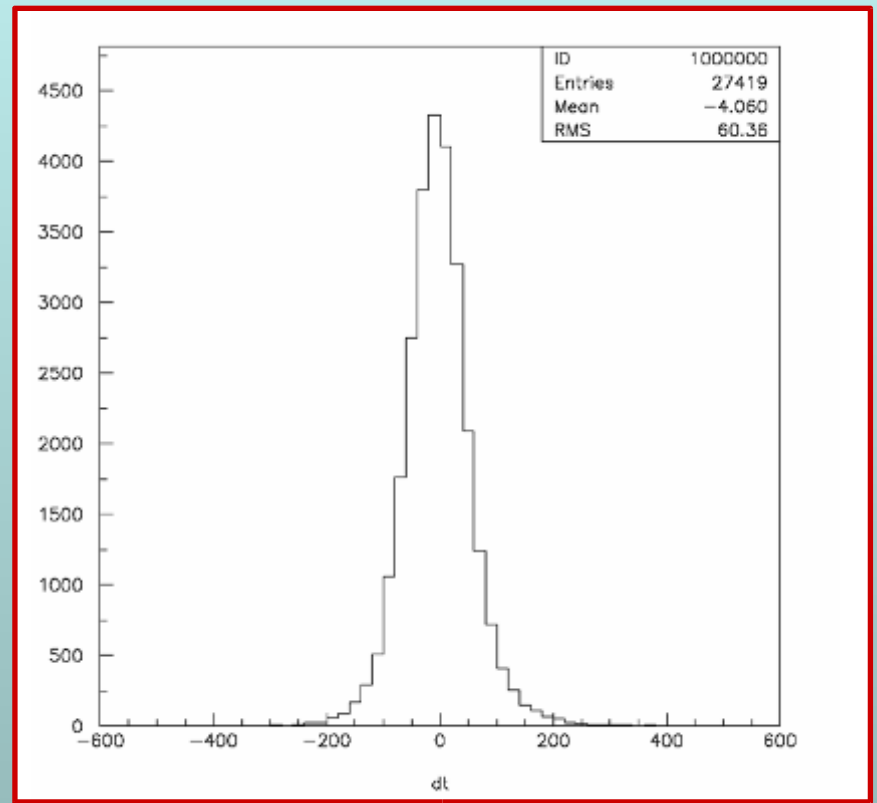


GPS timing resolution



Timing resolution for the individual GPS unit ~ 40 ns

(For details, see Report INFN/TC-06/04)



Theoretical activities in progress

- Study of the photodisintegration of cosmic ray nuclei by solar photons
- Simulation and reconstruction of extensive air showers by *COSMOS*