MUON CHERENKOV LIGHT TELESCOPE

(a system of cherenkov detectors, designed to register continuously the intensity of the cosmic rays muons in certain directions)

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Primary Cosmic Rays *- mainly protons, arriving to our planet from outer space.*

After multiple nuclear interactions of the primary particles with the atmosphere, the secondary cosmic rays are produced :

- hadron component ;

- electron-photon component ;

- **muon component .**

Main characteristics of the muons :

mass : *207 times the electron mass*
decay time : *~ 2.2 microseconds*
electrical charge : *-1*
spin : *½*

Muons can reach the Earth's surface, because:

- they are weak ineracting particles ;

- they have large mass, and don't lose energy in breaking radiation ;

- they are produced with high velocities, and because of relativistic effects can travel large distances in spite of the decay .

Measuring the variations in the intensity of the muon component, we can calculate the variations in the intensity of the primary cosmic rays.

Importance of the measurement of the CR intensity

- CR are closely related with the SPACE WEATHER

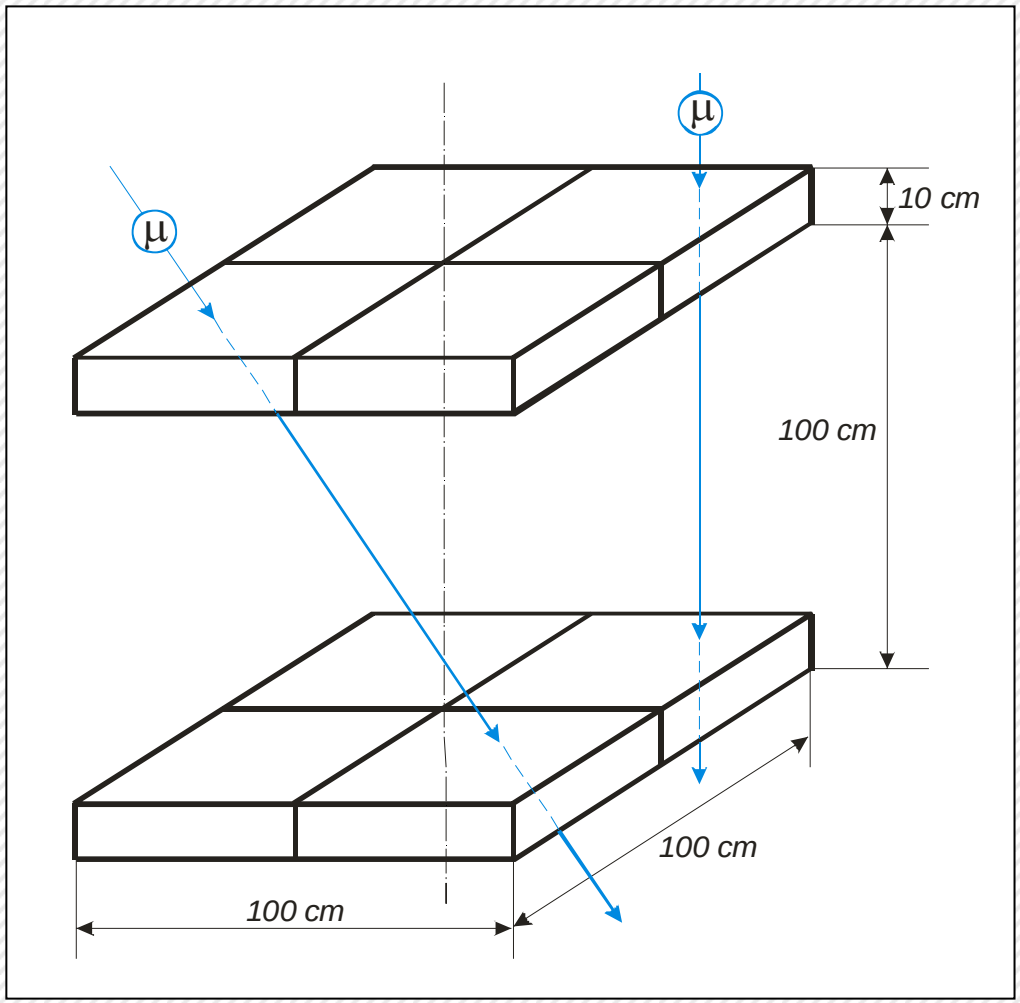
Definition of SPACE WEATHER :

Conditions on the sun and in the solar wind, magnetosphere, ionosphere, and thermosphere that can influence the performance and reliability of space-borne and ground-based technological systems and can endanger human life or health. Adverse conditions in the space envirnoment can cause disruption of satellite operations, communications, navigation, and electric power distribution grids, leading to a variety of socioeconomic losses.

- Correlations between the intensity of the CR and the Earth weather and climate are established

Cosmic rays are an integral part of the environment.

The Telescope

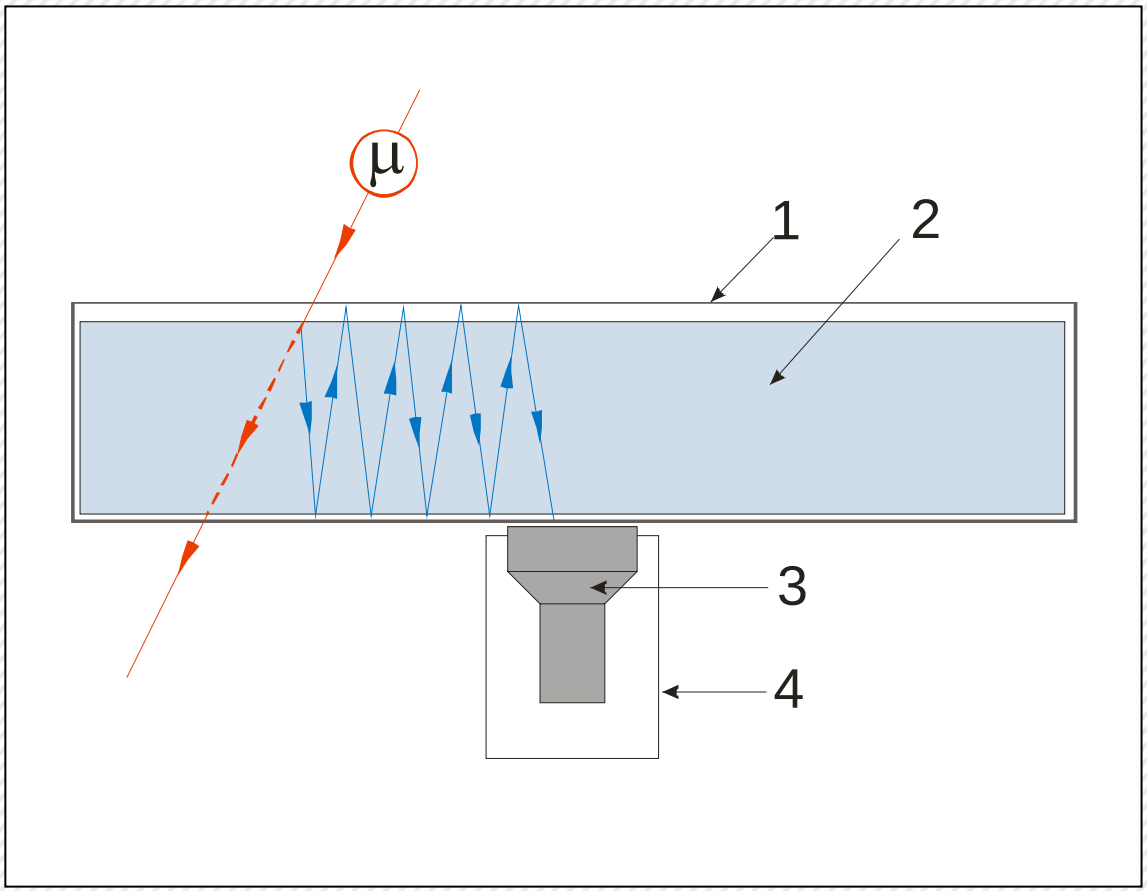


The telescope is a system of 8 water cherenkov detectors, designed to register the intensity of the muon component of cosmic rays

The detectors are placed in two planes, 4 in each.

Between the detector planes a 5 cm thick lead absorber is mounted for rejection the electron-photon component of CR.

The Detectors



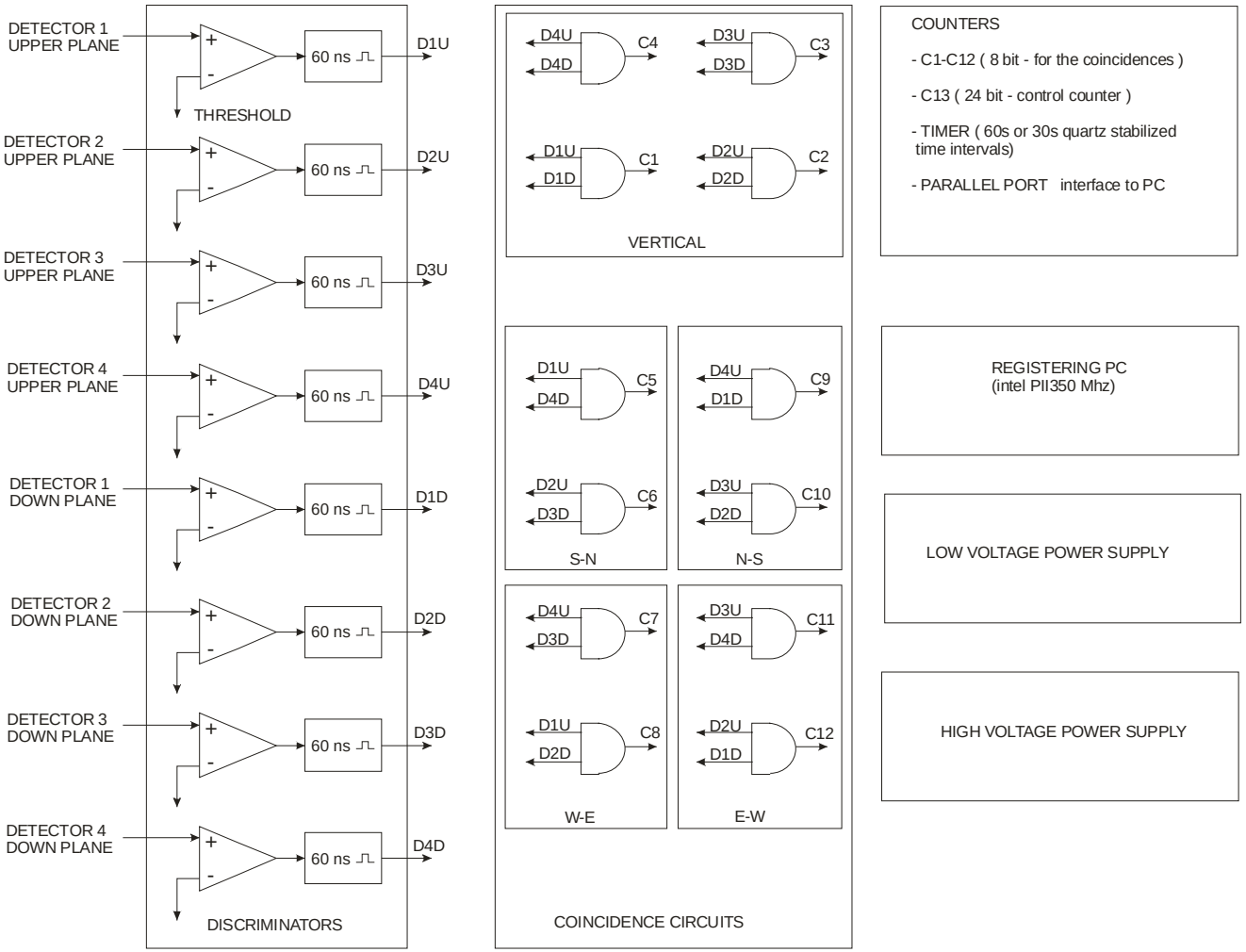
1 – mirror containers

2 – cherenkov light radiator – 10cm layer destilled water

3 - photomultiplier tube

4 – housing for the PMT. HV divider and preamplifier are mounted in it as well.

The Data acquisition system



Main Characteristics of the Telescope

Energy threshold: *~ 0.5 GeV*

Counting rate: *> 200 min^{-1}*

Statistical error: *< 0.5 % for 1h intervals of measurement and VERTICAL component*

< 0.7 % for 30 min. intervals of measurement and VERTICAL component

Presefnt status of the Telescope

PMTs, housings, preamplifiers, Pb absorber, 200 liters destiled water, stand for the detectors are delivered at BEO - Moussala