



## Cosmic ray Erzions search

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**Abstract:** In 1999 on a telescope «Doch-4» the first results on detection in Cosmic Rays of new stable heavy charged particles - Erzions have been received. After that, for the examination of the fact of discovery of new particles in Cosmic Rays the telescope has been automated, modernized and has worked continuously on line with the personal computer already on the territory RRC Kurchatov Institute as a telescope «Doch-4M». There was fulfilled the long search of optimal matter converted neutral Erzions into charged Erzion in order to receive confirmation of previous «Doch-4» results, which have received success only after 9 years. These results are presented.

**Keywords:** new stable heavy charged particle.

## 1 Introduction

In 1999 in MADI Technical University on a telescope "Doch-4" it was received the first results on possible discovery of new stable heavy charged particle (Erzion) in cosmic rays [1-4]. The hypothesis of such particles existence first had been proposed in 1982 to explain abnormal vertical cosmic ray muon energy spectrum [5]. After that to check the fact of detection of new particles in cosmic rays the telescope has been automated & modernized by addition to it of an environment from plastic scintillators detector (PSD) and has worked continuously in a PC line already on the territory of Russian Science Center «Kurchatov Institute», as a telescope "Doch-4M" since July 2001 till August 2010 [6].

Thus, for 9 years of continuous operation of a telescope «Doch-4M» in the personal computer it is saved up the richest peak material ( $>7,000,000$  events with the digitized shape of impulses from crystals CsI and NaI) from charged components of Cosmic Rays with total "alive" time -  $T_{\Sigma}>2,000$  days for various corners of their arrival ( $0^{\circ} < \theta < 60^{\circ}$ ) from a vertical for the south.

## 2 Installation

The design of the telescope «Doch-4M» (Fig.1) is vertical coaxial scintillation telescope consisting of thin crystal CsI ( $\varnothing 63 \times 0.35 \text{ mm}^2$ ) from above and thick crystal NaI ( $\varnothing 150 \times 100 \text{ mm}^2$ ) from below a telescope with automatic registration of synchronizing of signals amplitudes of

crystals CsI and NaI, by their numbering and a conclusion to a personal computer (PC) by means of a 2 channel ADC - LA-n10, built in the PC. So it is the alone cosmic ray telescope in the world which accumulates the detectors amplitudes data in digital form and it provides to select events from high ionization component for different ionization level.

In the subsequent operating modes of installation «Doch-4m» the "shirt" from standard polystyrene plastic scintillation detectors (PSD) has been added to 2 crystal telescope: from above a telescope (a label-K), from below (a label-D) and around of it (a label-P). The label is developed at simultaneous occurrence of a signal in a telescope and any of PSD (time of coincidence  $T_c=1 \mu \text{ s}$ ) and summarized with a corresponding delay on a signal from crystal NaI. Thresholds of discrimination at all 3 PSD are set such effectively to select signals from passage through a crystal of a single relativistic charged particle of Cosmic Rays (muon- $\mu$ , as a rule).

Amplitudes in crystals of telescope CsI and NaI also are normalized to the amplitude corresponding  $\mu$  signal ( $1\mu$ ) and measured at processing in these normalized values ( $1\mu$ ). For this purpose both at preliminary adjustment and at the subsequent regular control over stability of work of a telescope spectrums of amplitudes from cosmic  $\mu$  in crystals CsI and NaI in the chosen area of channels of the analyzer of amplitudes (AA) by their change by means of a high voltage of a feed of photomultipliers of corresponding crystals are removed.

Besides, the control over stability of the crystals CsI and NaI work was provided by the constant control over the crystals intensity. For this purpose thresholds of their

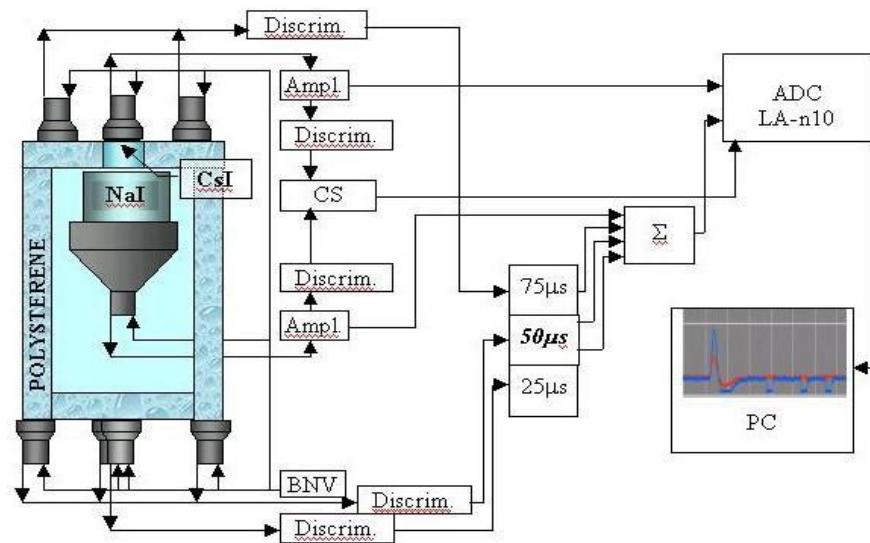
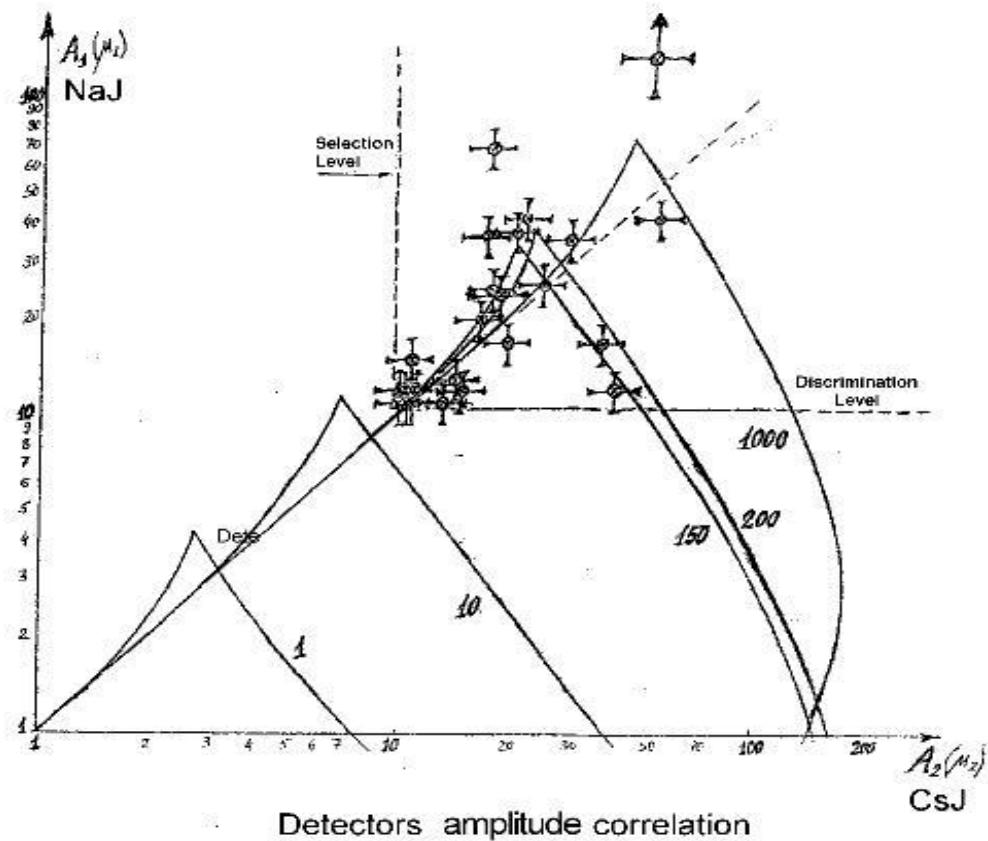


Figure 1. The block scheme of installations «Doch-4m»

Figure 2. Correlation dependence of amplitudes CsI and NaI detectors of a telescope «Doch-4m» for selected ( $>10\mu$ ) events

discriminators were established at a level  $\sim 1.5\mu$  on sharp parts of a amplitude spectrum of the crystals that at 10% change of operating intensity of the crystals to feel change of amplification of its path at a level of 3%.

### 3 Results

For such long time telescope «Doch-4M» monitoring it was received some new interest results for high ionization cosmic ray component: season & day variation, abnormal absorption dependence and etc. [7, 8]. But the main purpose for us was to repeat the discovery of new stable heavy charged particle (Erzion) in cosmic rays in 1999 in MADI (see Fig.2).

On the Fig.2. there are presented expectation curves, calculated for single charged elementary particles with different masses ( $\text{GeV}/c^2$ ). As you can see, previous experimental results corresponded for existence of new stable charged elementary particles with mass equal to 150-200  $\text{GeV}/c^2$ .

On Fig.3 also amplitude correlation dependence is presented, where on an abscissa axis the amplitude of crystal CsI is postponed, and on an axis of ordinates - amplitude of crystal NaI in terms of channels ADC - LA-n10, normalized to the amplitude corresponding  $\mu$  signal ( $1\mu$ ).

For this purpose we have changed the telescope axes and convertor material above the telescope to convert neutral Erzion to negative one according to Erzion Mirror model [9-12]. So we have received first small confirmation (11 events) in 2008 for one month by using of graphite & Aluminium as convertor materials (Fig.3).

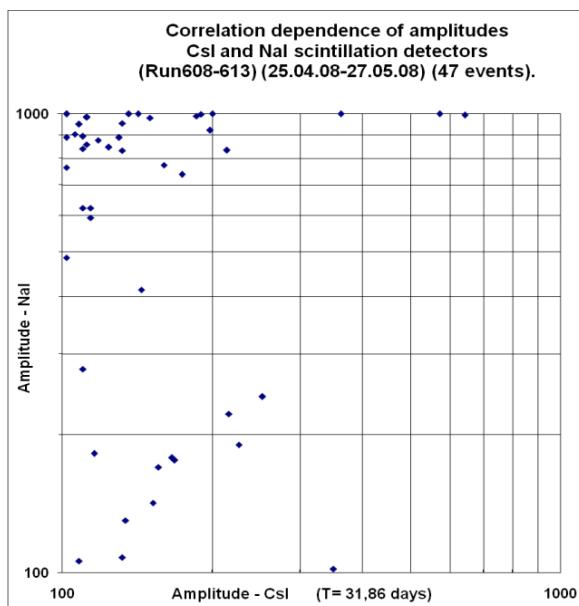


Figure 3. Correlation dependence of amplitudes CsI and NaI detectors of a telescope «Doch-4m» for selected ( $10\mu$  equal to 100 canal) events

As you can see the background in this case was (38 events) more than 3 times more than affect (11 events). To strengthen this results we have modernized our telescope again by liquidation of the "shirt" from 6 standard polystyrene plastic scintillation detectors (PSD) and by changing of small CsI detector ( $\text{Ø}63 \times 0.35 \text{ mm}^2$ ) by 10 time larger one ( $\text{Ø}200 \times 10 \text{ mm}^2$ ), named already as telescope «Doch-4S» (Fig.4).

So for installations «Doch-4S» we have used new Beryllium & Aluminium convertor materials. These new results from telescope «Doch-4S» are only receiving just now and will be analyzed later.

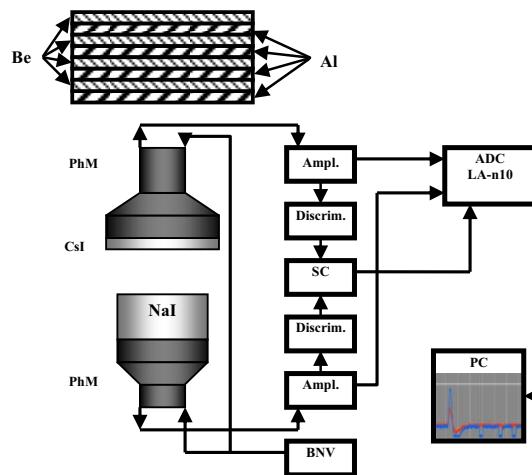


Figure 4. The block scheme of installations «Doch-4S»

### Conclusion

Thus, to published before the information [6-7] about observation large daily variations ( $A \sim 50\%$ ) for high ionizing component of Cosmic Rays now for 5 years of continuous operation of the telescope «Doch-4m» we may enough convincingly ( $7.3\sigma$ ) to add the same great ( $A \sim 30\%$ ) it's season variation [8]. Both daily and season variations of Cosmic Rays on neutron monitors or muon's telescopes as much as possible reach amplitude of variations (1-2) %, but not (30-50) % as in our case. Therefore these new results, including also the received dependence of absorption in lead for these components, can't be explained within orthodox physics of Cosmic Rays and it demands the introduction of new hypotheses for their interpretation [9-12].

However, all these received results easily and naturally can be explained by presence in primary space radiation of solar negative Erzions ( $J_E \sim 10^{-6} \text{ C M}^{-2} \text{ c}^{-1} \text{ C}^{-1} \text{ e}^{-} \text{ p}^{-1}$ ) and neutral Erzions ( $J_E \sim 10^{-6} \text{ C M}^{-2} \text{ c}^{-1} \text{ C}^{-1} \text{ e}^{-} \text{ p}^{-1}$ ) of the Jupiter or galactic origin directed mainly from the Virgin constellation (the center of a conglomeration of the nearest galaxies). Negative Erzions with impulse  $P_E \sim 50 \text{ GeV/C}$  and energy  $E_E \sim 6 \text{ GeV}$  traveling from the Sun are deviated by magnetic field of the Earth on a angle close to  $90^\circ$  and come in near vertical direction on

a telescope in the evening in Spring for 56° parallels of an arrangement of Moscow [5,6]. For neutral Erzions also spring position of an orbit of the Earth is optimum for a direction to the Virgin constellation, the most active area of the Universe in the field of the nearest galaxies conglomeration for sources of radiations in radio, x-ray and γ - ray ranges. In other season probably more significant influence on Cosmic Ray neutral Erzions by solar wind or others unknown while factors of Solar influence, stronger inside of an orbit of the Earth. The first indications on an opportunity of existence of 2 natures of Erzions sources (solar origin and Jupiter or galactic), for the first time have been received on installation «Doch-4a » at registration in the winter daily distribution of events from high ionization components of Cosmic Rays of 2 peaks (evening - a solar origin and morning - galactic) [6-7].

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