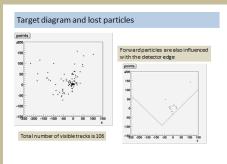
HE stratosphere event of 1975 revisited: astroparticle interaction vs. LHC nucleus-nucleus collision

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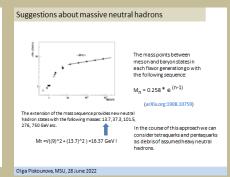
Outline

- Introduction: contemporary experiments in stratosphere
- II. Introduction into the event analysis
- Target diagram and lost tracks
- Rapidity distribution => interacting nucleus, energy of collision, multiplicity at Y=0
- Transverse mass distributions => hadron multiplicity at central rapidity and particles in the forward region
- VI. Stratosphere event differs from LHC nuclei collision
- VII. Heavy neutral hadron states and baryonium (B=0) DM VIII. Conclusion

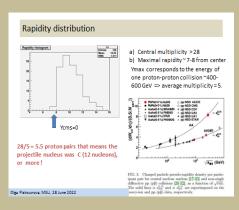
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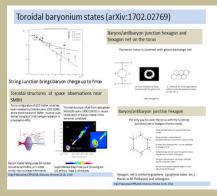


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HE event in balloon flight 1975

The high energy interaction event was detected at 30km in stratosphere The size of detector, was 400mmX500mm and 260mm high Detector consisted of three cameras: upper target block, space and calorimeter.

The total thickness of calorimeter corresponds to 0,26 of free pass without hadron raction that means the efficiency of particle track detecting is of order 40%

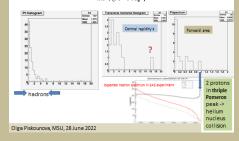
The electron-photon cascades from secondary hadrons have been developed in the lead layers of calorimeter and detected in the x-ray films as the dark spots.

The spots with the certain darkness give us the energy of secondary particles. The data are: x,y coordinates and E soot for 106 particles

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Transverse mass distributions

We can not distinguish between Pt and mass of hadrons $Mt = \sqrt{(Pt^2 + M_0^2)}$



Why the interaction is not nucleus-nucleus collision?

Suggestion: heavy astroparticle decays in 3 parts. Two parts went to similar heavy

particles of ~ 14 GeV mass and last one interacts like a helium+lithium nucle

Conclusions

- I. The hadroproduction event (Elab>100TeV) in stratosphere has been analyzed in the framework of up-to-date conventions about HE p-p and A-A interactions at colliders, see arXiv/1907.00176.
- The inclusive distributions have been compared with the spectra at LHC: a) rapidity distribution show high density of secondary particles in central region that corresponds at least to carbon - air collision. The target nucleus fragmentation is not seen due to small detector, maximal rapidity corresponds to vs = 400-600 GeV per proton: b) transverse mass distribution for forward particles shows 2 protons that corresponds to three pomeron peak. The distribution in the central region gives typical hadron masses and one particle with Mt=16 GeV.
- Few disagreements with theoretical expectations give a room for the suggestions on new physics: baryonium DM (B=0) from space.
- The improved experiment on high level in atmosphere is desirable, as well as the LHC FP experiment with carbon-carbon collision of high energy.

- At least three particles were discovered unpredictably in cosmic rays; positron - 1929 (Dmitri Skobeltsyn), muon -1932 (Carl Amerson and Seth Neadermeyer) and kaon -
- II. Impressing event of the energy E_lab > 100TeV was detected in 1975 at the balloon flight in stratosphere. It was re-analyzed with the methods of LHC collider
- Two possibilities are examined. Event is similar to nucleusnucleus collision at LHC (we know only about central kinematical region) or it is unknown astroparticle interaction in atmosphere (we afford some suggestions).

In this case second peak should bring 8 protons.

Mt distribution

Introduction: event analysis

- experiments and knowledge obtained with QGSM.

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