

Investigation of the spectrum of protons emitted by the C^{12} nucleus at 90° angle when bombarded by $1\text{-GeV}/c$ negative pions

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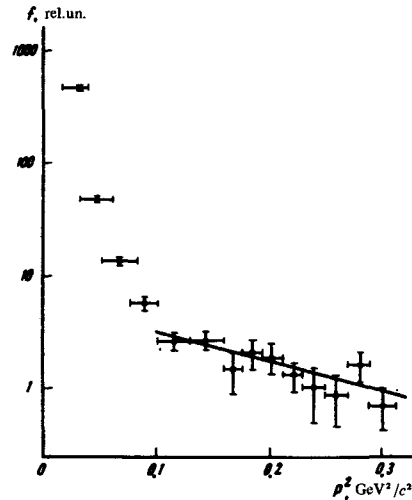
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A spark chamber with thin electrodes, in which the particles were stopped, was used to measure the spectrum of the protons emitted from a C^{12} nucleus in the angle range $95^\circ \pm 20^\circ$ under the influence of π^- mesons with momentum $1.06 \text{ GeV}/c$.

The dependence of the experimental values of the invariant function $f = (E/p^2)(\Delta N/\Delta p \Delta \Omega)$ on p^2 , where E is the total energy and p is the momentum of the registered particle, is shown in the figure. We see that at low values of p^2 , i. e., in the region where the evaporation process is traditionally considered, the experimental points decrease rapidly, and starting with $p^2 \gtrsim 0.1 (\text{GeV}/c)^2$ they are well described by the relation $c \cdot \exp(-Bp^2)$, where $B = 6.0 \pm 1.6 (\text{GeV}/c)^{-2}$.

In^{11,21} we observed the phenomenon of nuclear scaling. In particular, it was shown that the spectra of fast protons with $p^2 > 0.1 (\text{GeV}/c)^2$, emitted by nuclei at angles $\theta \geq 120^\circ$, which are kinematically forbidden in interactions between the incident particles and a free proton, are described by functions of the type $c \cdot \exp(-Bp^2)$, where $B \approx 11 (\text{GeV}/c)^{-2}$ and is independent, within the limits of errors, of the form and initial



Reference	Target nucleus	Incident particle	Initial energy E_0 , GeV	Proton emission angle θ , deg	Slope parameter B , (GeV/c) ²
[3]	Be	p	2.90	93	6.7 ± 0.8
[3]	Pt	p	2.90	93	6.2 ± 0.7
[4]	Be	p	29.10	90	5.7 ± 0.7
Present work	C	π^-	0.93	95	6.0 ± 1.6

energy of the incident particle, and also of the sort of target nucleus.

The value of the parameter $-B$ obtained in the present study agrees well with the values of analogous parameters that can be obtained by suitable reduction of the data of^[2,3].

In^[3] we measured the spectra of fast protons obtained when beryllium and platinum targets are bombarded by protons with initial energy $E_0 = 2.90$, i. e., in the reactions $p\text{Be} \rightarrow pX$ and $p\text{Pt} \rightarrow pX$, with the registered proton emitted at an angle $\theta \sim 93^\circ$. In^[4] they obtained

the spectrum of the protons emitted at $\theta \sim 90^\circ$ in the reaction $p\text{Be} \rightarrow pX$ at an initial energy $E_0 = 29.1$ GeV. The table lists the main characteristics of the reactions and the corresponding values of the parameter B .

The presented data allow us to state that at proton emission angles close to 90° there is likewise, within the limits of errors, no dependence of the parameter B on the initial energy in the range 1–30 GeV and on the sort of the target nucleus. The parameter B is the same when the target is bombarded with protons or negative pions. This parameter assumes different values at other angles.^[5]

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