EXPLANATION OF UNUSUAL $np \rightarrow np\pi^+\pi^-$ AND $np \rightarrow npK^+K^-$ REACTIONS AT P_n=5.2GeV/c BY MODEL OF ROTARY TWO-NUCLEONS SYSTEM

G.M.Amalsky (PNPI, Gatchina)

np →$np\pi^+\pi^-$ and npK^+K^- at P_n=5.2 GeV/c

(**JINR**) Yu.A.Troyan, A.V.Beljaev, A.Yu.Troyan, E.B.Plekhanov, A.P.Jerusalimow, S.G.Arakelian

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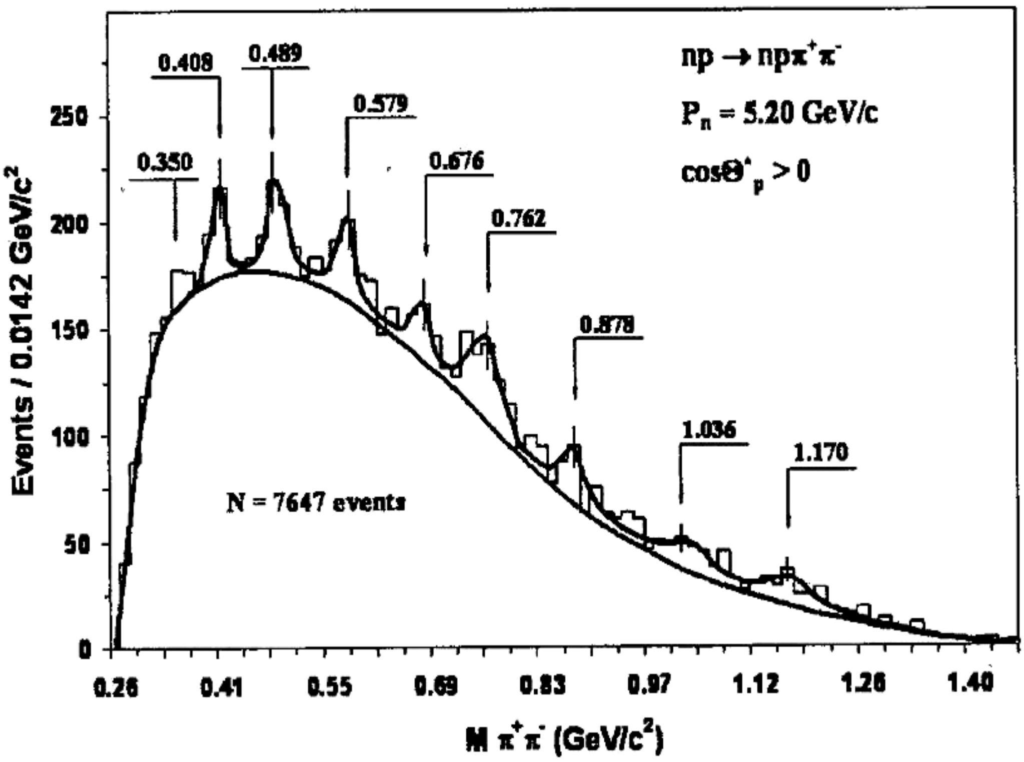
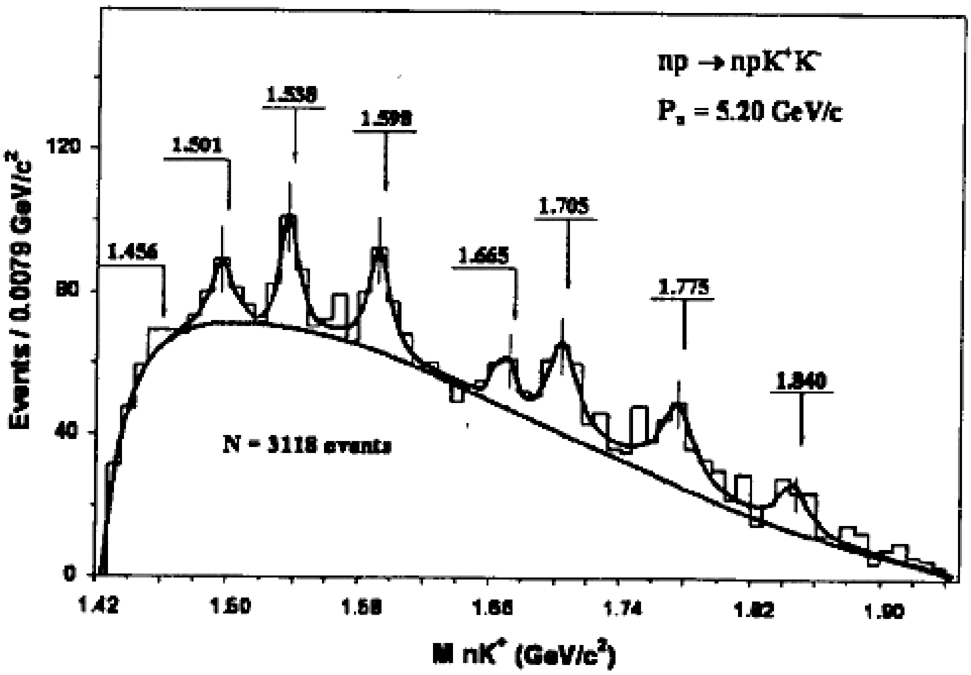


$np\pi^+\pi^-$ channel

$\tau = 0$



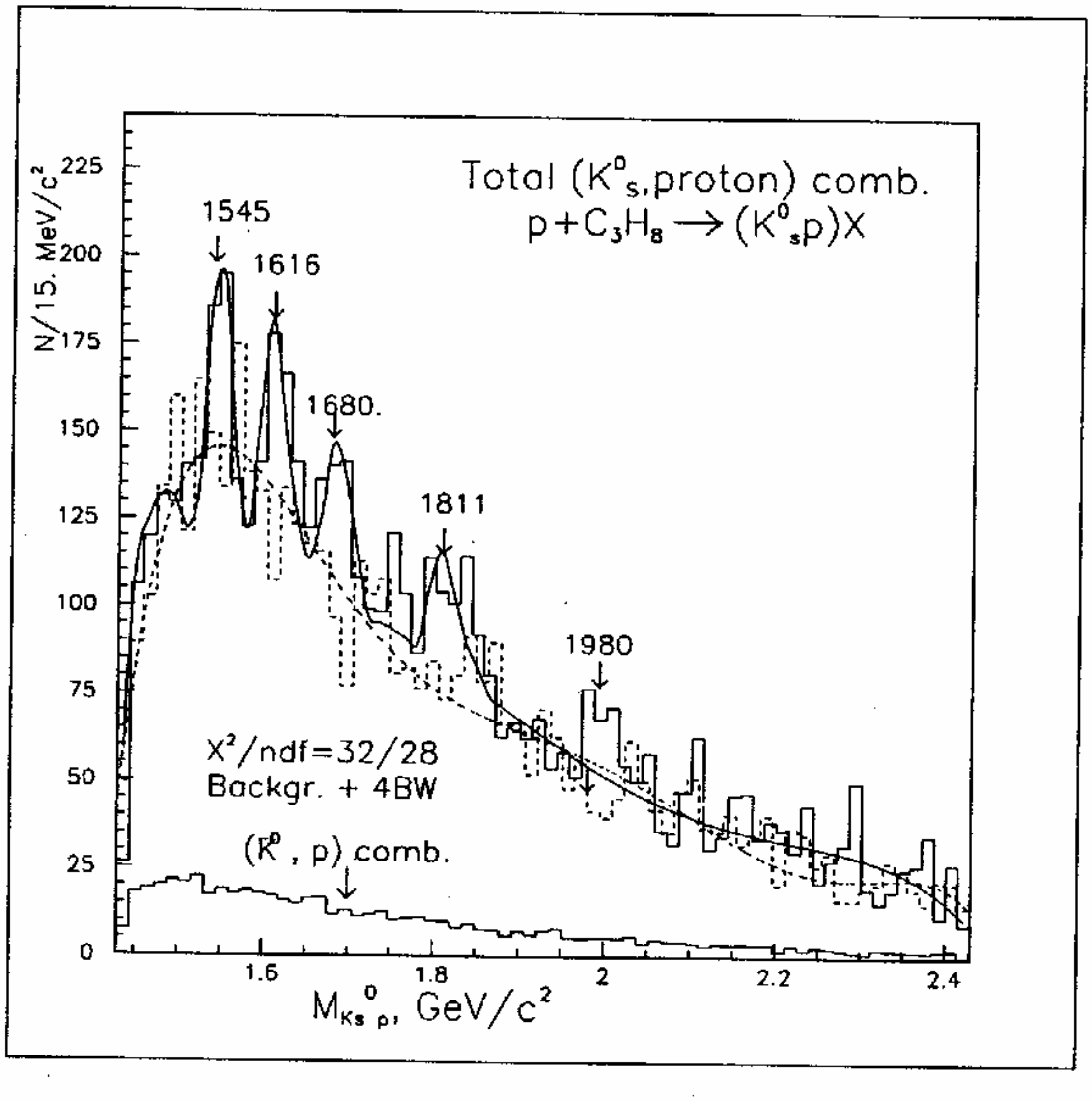
npK^+K^- channel

$\tau = 0$

$p + C_3H_8 \rightarrow pK^0_S + X$ at P_P=10.0 GeV/c

P.Zh.AsLanyan, V.N.Emelyanenko,
G.G.Rikhkvitskaya, **(JINR)**

Proc. XVII ISHEPP, 2005, v.II, p. 26.

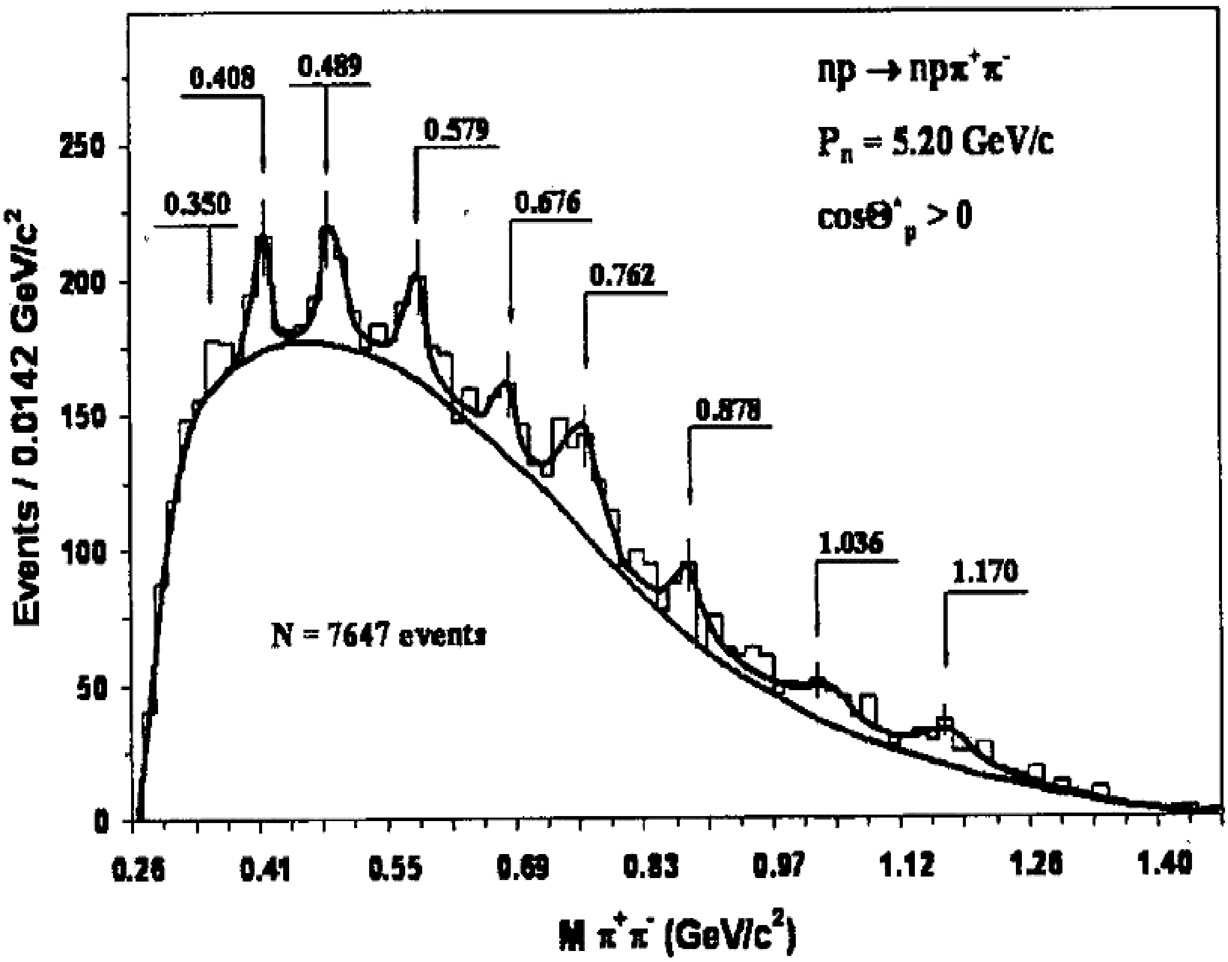


Similar peaks, looks as **$pp \rightarrow pK^0_S + X$**

8 free protons and 18 from 3 nuclei C^{12}.

$N_p^{(eff)} = 8 + k^{(i)}18$; for i=1-3 $k^{(i)} \sim 2/3$

PROPERTIES OF SELECTED EVENTS $np\pi^+\pi^-$



events $|\mathbf{P'}_{\pi+} + \mathbf{P'}_{\pi-}| \ll P'_{\pi+} + P'_{\pi-}$ are selected.

$\Delta \mathbf{P'}_n >$ 1.5 GeV/c : isospin (n+p) $\tau = 0$.

Peaks $\pi^+\pi^-$ $J^{PC}=0^{++}$ are not resonances

Data have nothing explanation ~10 years.

PROPERTIES OF $np\pi^+\pi^-$ EVENTS

Isotropic distribution: $\pi^+\pi^-$ pairs are not emitted by moving nucleons.

$L_{\pi\pi}=0$ limited sphere **Δr < h/ΔP$_{\pi\pi}$~ 0.2fm**

and time **Δt < h/cΔP$_{\pi\pi}$ $\sim 10^{-25}$ sec**

of formation of pairs with **ΔP$_{\pi\pi}$**~ GeV/c**.**

Mean cross-section of peaks

$<\sigma_{\pi\pi}^{(i)}>$ = 124 (18) mkb**/**8 = 16 (3) mkb

and $\sigma_{\pi\pi}$ **~1 mb of all npπ+π- 0^{++} events**

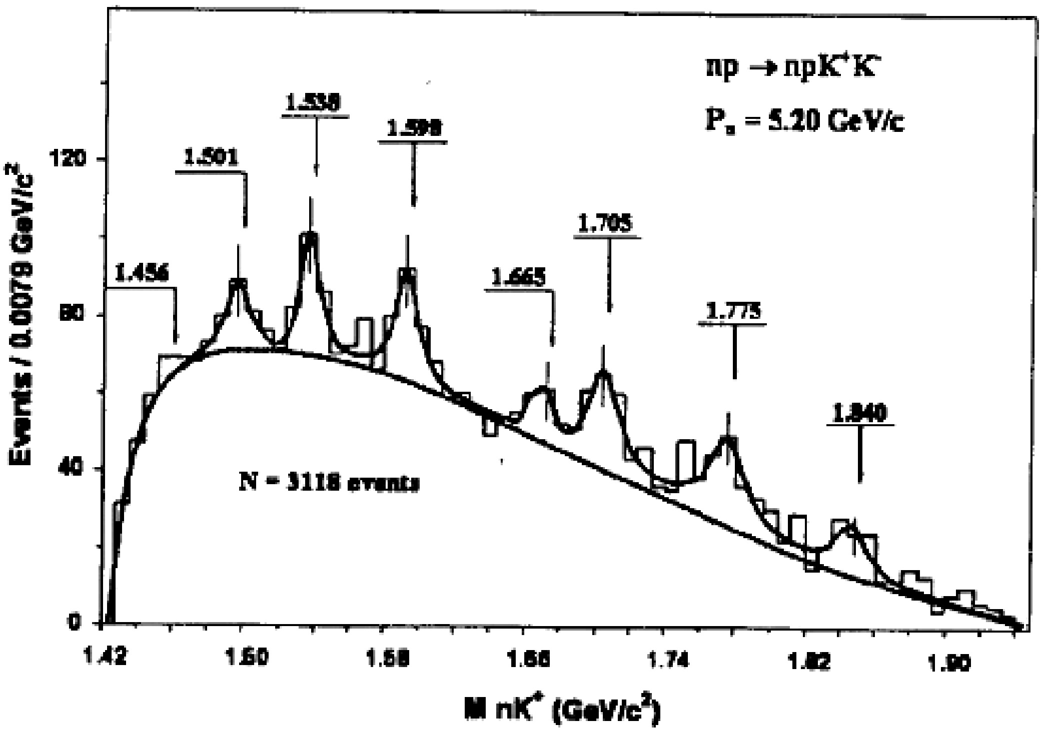
is more 3 % of all inelastic events np,

despite of limited **Δr** and **Δt** of formation.

$np\pi^+\pi^-$ with $L_{\pi\pi}$**>**0 are suppressed**: all**

inel. event $np\pi^+\pi^-$ **happen in small Δr.**

Np → npK^+K^- at P_n=5.2 GeV/c



Mean difference of neighbor masses

$<M_{nK}^{(i+1)}-M_{nK}^{(i)}> = 56.5\ (1.2)\ MeV/c^2$

is near to half of mean difference

$<M_{\pi\pi}^{(i+1)}-M_{\pi\pi}^{(i)}> = 109\ (2)\ MeV/c^2$

in first spectrum: the same origin of peaks may be assumed --- quantization of angle momentum J=L+S of short state of two-nucleons system, formed in collision.

Short rotary states of (np) system

Peaks $\mathbf{M}_{\pi\pi}^{(i)}$ can be explained by quantization of energy

$$\Delta E(J)=(2J+1)V,$$ emitted

at transition (n+p) system from

$L_1=J+1$, $S_Z=-1$ to $L_2=J-1$, $S_Z=1$,

and transformed into $\pi^+\pi^-$ mass

(or divided between nK^+ and pK^-)

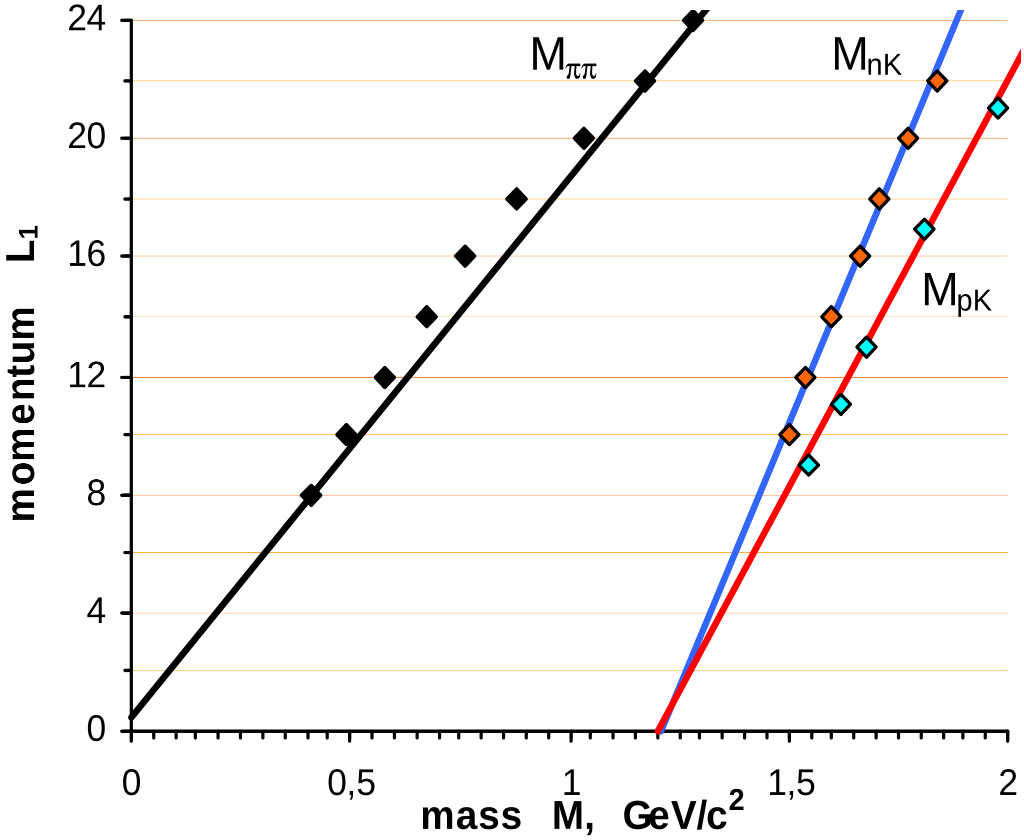
In states with S=1 and $\tau=0$

moments $L^{(i)}$ must be even, so

$$L_1^{(i+1)} - L_1^{(i)} = 2.$$

Short state with moment $L_1=bP_n$ **forms in laboratory system.**

EXP. SPECTRA AND ITS DESCRIPTION



(black line) $\mathbf{M}_{\pi\pi}^{(\mathbf{i})} = \boldsymbol{2V\ (L_1^{(i)}-1/2)/c^2}$,

(blue line) $\mathbf{M}_{nK}^{(\mathbf{k})} = \boldsymbol{V\ (L_1^{(k)}-1/2)/c^2+m+2m_\pi}$

(red line) $\mathbf{M}_{pK}^{(\mathbf{i})} = \boldsymbol{V'\ (L_1^{(i)}-1/2)/c^2+m+2m_\pi}$

$$V = \frac{h^2}{6mR_0^2}, \quad V' = \frac{h^2}{2mR_0^2}\frac{(m+4m_\pi)}{(3m+4m_\pi)}$$

$R_0 = 0.50$ fm, $m=\mathbf{m}$ is nucleon mass

DATA CAN NOT BE DESCRIBED AS COLLISIONS IN S.C.M.

P_n=5.2 GeV/c and E=6.22 GeV in lab.sys. correspond to E'=3.42 GeV and

P'_n =P'_P =1.43 GeV/c in s.c.m. (np)'.

Transitions with ΔL=2 and emitted ΔE(J) in s.c.m. are impossible.

Spectra confirm to momentum

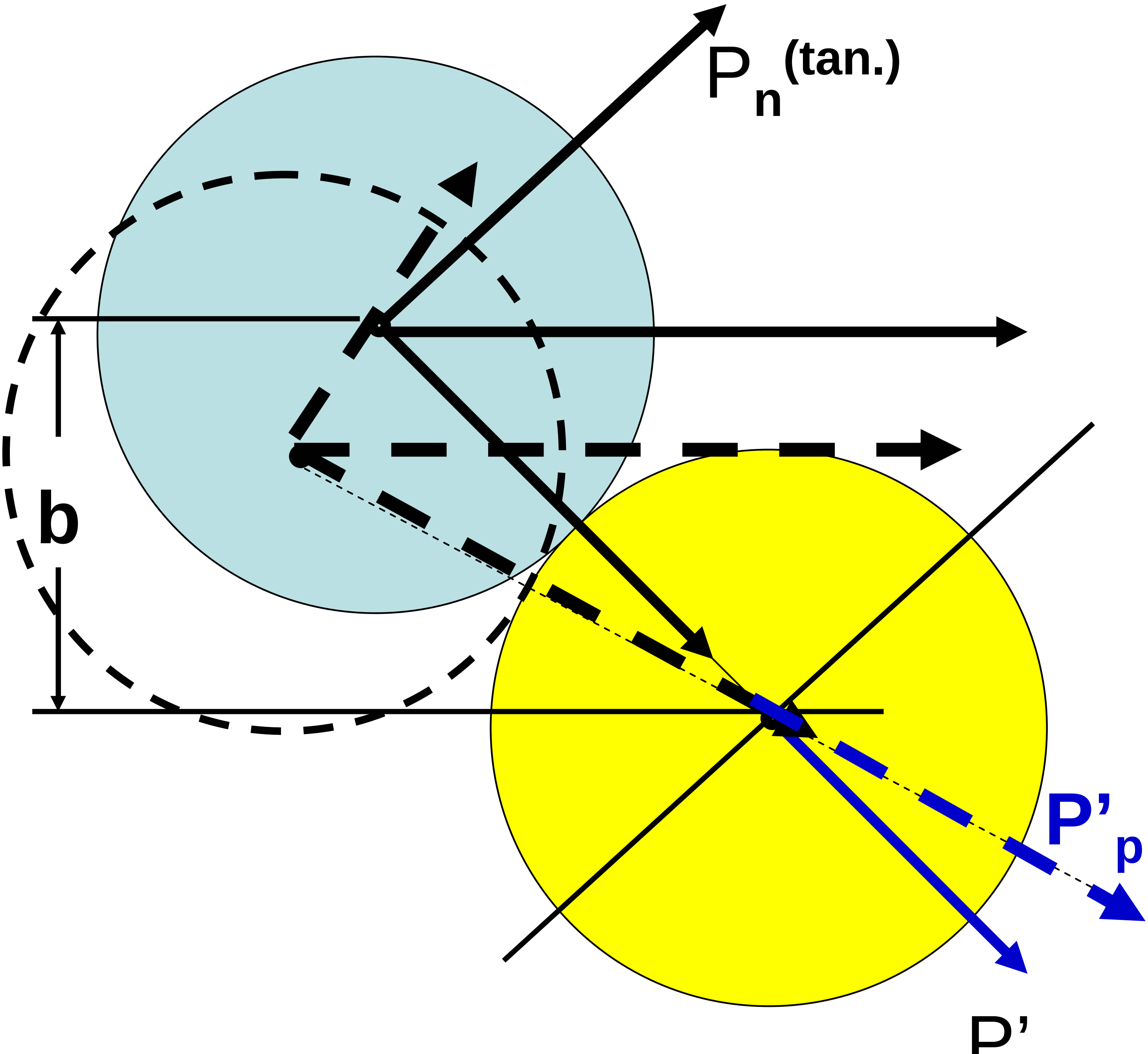
L= bP_n **in fixed laboratory system.**

Next sequence of events may be:

1) collision with L= bP_n → **2)** rotation with J=L+S, transition ΔL=2 and definition of energy ΔE(J) →**3)** decay of rotation and formation of observed finite particles with ΣL_f = L-2 in laboratory system.

Condition ΣL_f=L-2 and energy ΔE(J)define observed correlation of finite particles.

HARD BALLS SCATTERING IN LAB.S.



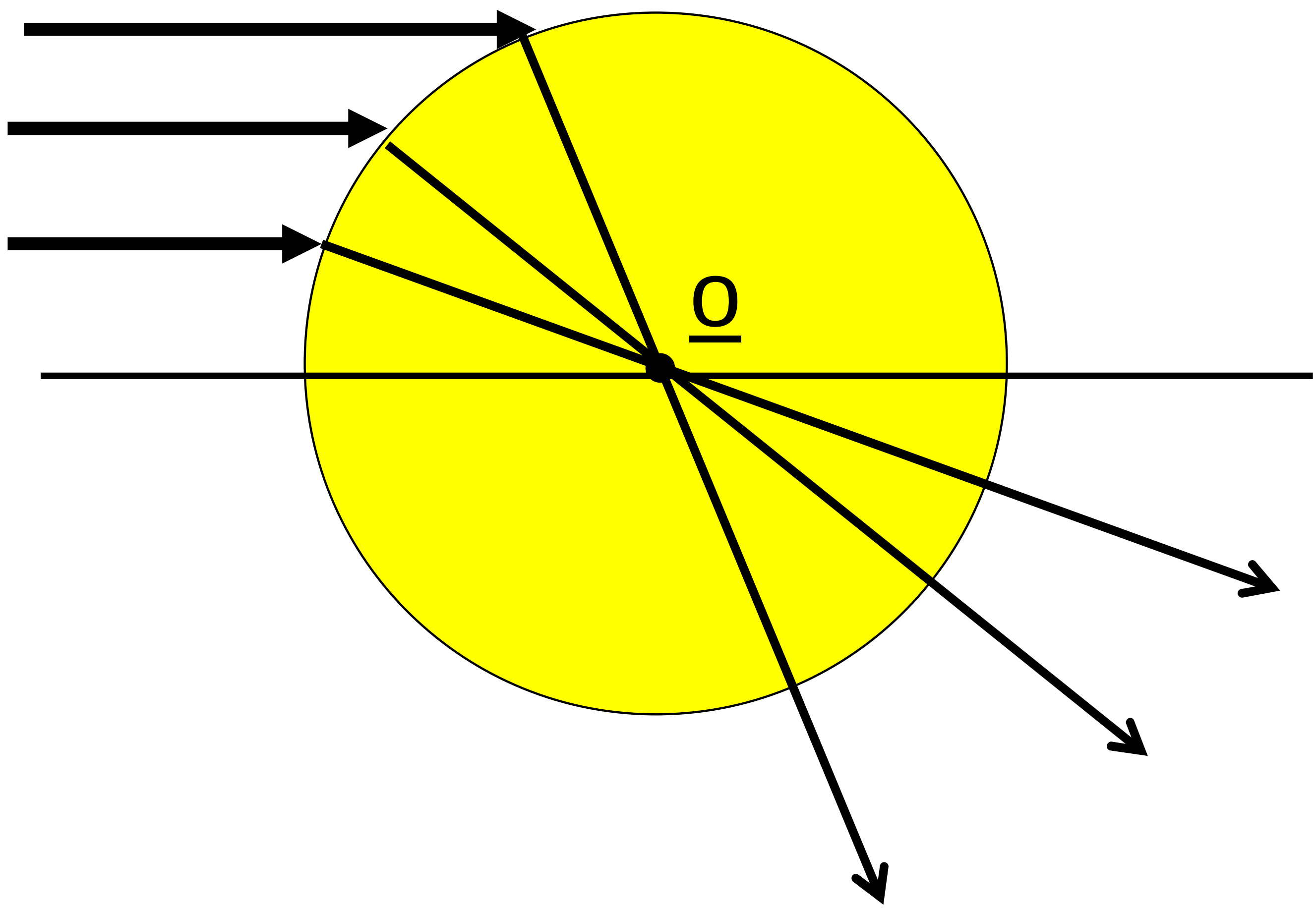
In laboratory system: $L_z = bP_n = 26$ may be,

hard balls: explanation $L'_z = L_z = 2R_0 P_n^{(tan.)}$,

observed in spectra.

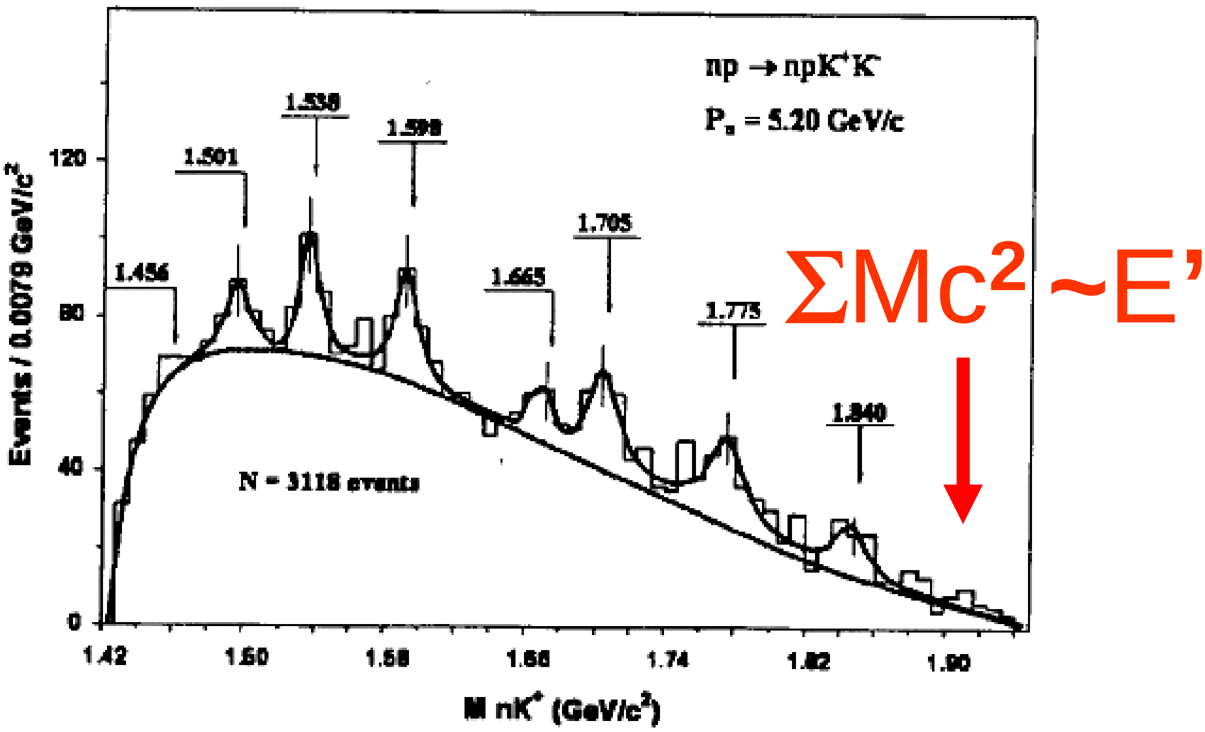
in lab.system: moment J=L+S can be kept

QUANTIZAYION OF P'$_p$ DIRECTION (IN LAB. SYSTEM) EXPLAINS L'=L



Radial movement of center of masses gives zero contribution in momentum of system L relative to point O in lab. sys., so L keeps as moment of rotation of two-nucleons system L'=L in its s.c.m..

Np → npK^+K^- at P_n=5.2 GeV/c



Data are incompatible with invariance:

in events $c^2(M_{nK}+m_p+m_K)$~E'=3.42GeV

momentum in s.c.m. L' ~0 and L~0 in such events of oncoming n and p

n ⟶ (E') ⟵ p

with energy E=E' in laboratory system.

Remarks of invariance

Events $\mathbf{np}\pi^{+}\pi^{-}$ with large L>20 and

$c^2(M_{\pi\pi}+m_{\mathbf{p}}+m_{\mathbf{n}})$~E'=3.42GeV

are impossible in collisions of oncoming n and p with total energy E' too because of law of conservation of momentum L.

Absence of **invariance** of s.c.m. and of laboratory system means: **relativity,** which claims existence of invariance, is mistaken.

It may be proved straight.

QUANTIZATION J=L+S AND PROPOSED DESCRIPTION OF DATA ARE INCOMPATIBLE WITH RELATIVITY TOO

Relativistic Lorentz ratio

$$J'_Z = J_Z(1-v^2/c^2)^{1/2}$$

of transverse moments in moving and in fixed systems means

nonconservation of momentum $L_Z = bP_n$ and forbids quantization of angle momentum in general.

Useful for description of data model with quantized L'=L must be incompatible with relativity.

(Relativity is incompatible and with other laws of nature.)

Further plan

1. PHENOMENOGICAL ANALISYS:

hypothesis of nonequilibrium interaction

+ “hard ball” assumption of nucleons,

definition of empirical parameters,

opposition to well-known conceptions.

2. SOLID-BODY ROTATION MODEL:

gives ratio $\mathbf{V_{SL} = (I_S / I_L) h^2 / (I_S + I_L)}$ for

potential energy $\Delta U^{(s\text{-}b)}_{12} = V_{SL}(2L_1 - 1)$,

emitted at transition $L_1 \rightarrow L_1 - 2$.

3. IMPERATIV SLOWING-DOWN OF NONEQUILIBRIUM ROTATION:

explanation of 100% transition probability

and preliminary transition $S_0=0$ into $S_Z=-1$

4. CONCLUSIONS:

conservation of moment J in lab. system defines impulses of final particles and mesons formation.

in free time:other grounds for model assumptions

NUCLEONS AS “BLACK BALLS”

Near equidistant peaks show that momentum of inertia ***I*** is **independent of momentum L**

It treats**:** in short state with momentum J=L+S nucleons interact as hard balls with radius R_0 **,** independent of L and *b*.

Nucleon is stable distribution of probabilities of possible events with any particles, which form it.

ABSENCE
OF RETARDING EFFECT

Nucleon is probability distribution of some unknown possible inner events in its volume.

Probability of possible event **are non-material abstract possibility** to detect it with using other events.

Therefore all **probabilities of possible (in future!) events** may be changed **simultaneously** in agree with changing conditions, which can be defined in point of contact of distributions (nucleons).

DEFINITION OF EMPIRUCAL PARAMETRS OF SPECTRA

Ratio $c^2 M_{\pi\pi}^{(i)} = 2V_{\pi\pi}(L_1^{(i)} - 1/2)$ and $\tau = 0$

define values $L_1^{(i)}$ and $L_1^{(max)}$ by using

$$V_{\pi\pi} = c^2 (M_{\pi\pi}^{(8)} - M_{\pi\pi}^{(1)})/28 = 27.2(0.5)\,\mathrm{MeV}$$

Values $V_{nK} = 28.2(0.6)$ MeV in emp.

ratio $c^2 M_{nK}^{(k)} = V_{nK}(L_1^{(k)} - 1/2) + M_0$

defined as $V_{nK} = c^2 (M_{\pi\pi}^{(7)} - M_{\pi\pi}^{(1)})/12.$

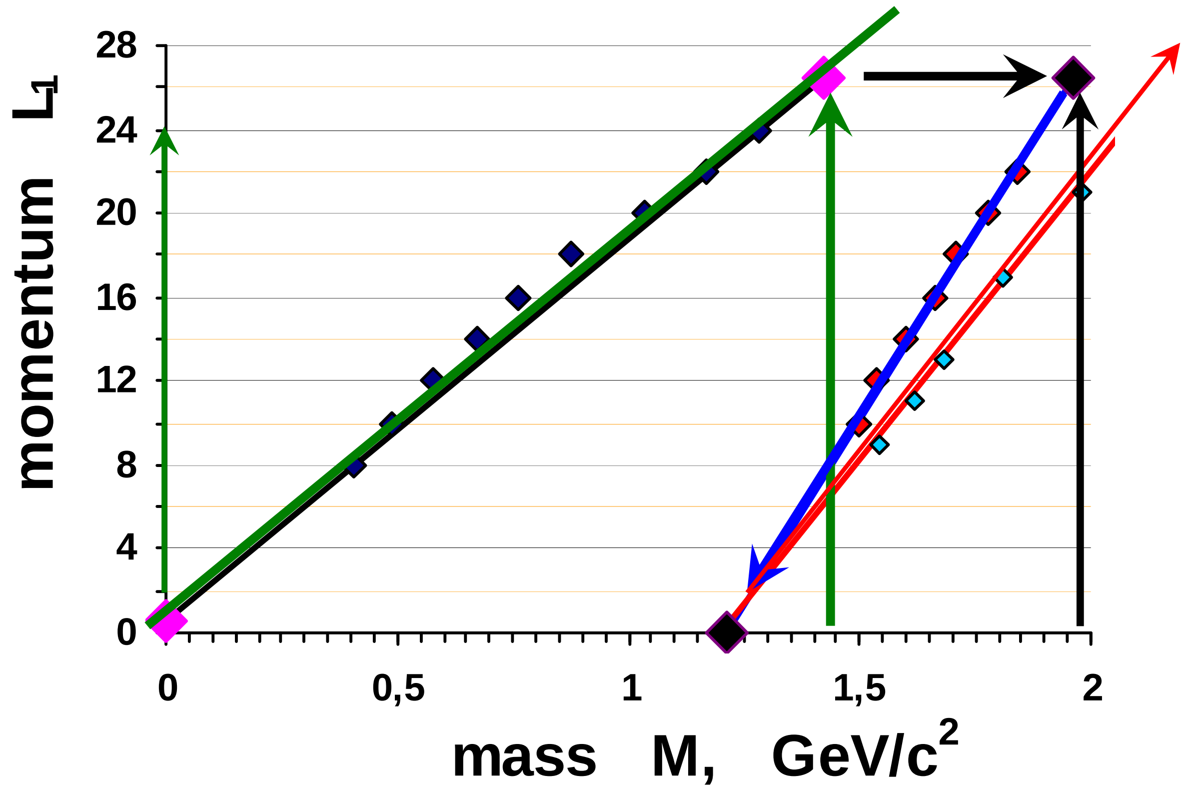
Using of V_{nK}, $M_{nK}^{(max)}$ and $L_1^{(max)}$ gives values of $L_1^{(k)}$ and

$$M_0 = M_{nK}^{(max)} - V_{nK}(L_1^{(max)} - 1/2)/c^2 =$$

$$= 1230\ (20)\ \mathrm{MeV}/c^2 \cong m + 2m_\pi\ .$$

Data define all parameters in ratios.

SCHEME OF DEFINITION OF EMPIRICAL PARAMETRS



- $M_{\pi\pi}^{(8)}$,…, $M_{\pi\pi}^{(1)}$ fix green line, slope $V_{\pi\pi}$
- Its crossing with green line $M_{\pi\pi}^{(max)}$ gives $L_1^{(max)}$=26.4 and fixes blue line with slope V_{nK} in point $(L_1^{(max)}, M_{nK}^{(max)})$.
- Crossing of blue line with axis **M** gives M_0=1230 (20)MeV/c^2= $m+2m_\pi$.

Here red line M_{PK} begins with slope V_{PK0}.

DIFFERENT INITIAL MOMENTS
IN npK^+K^- AND np$\pi^+\pi^-$ CHANNELS

In npK^+K^- events initial moments:

odd $L_0^{(i)} = L_1^{(i)}-1$ and $S_0=0$.

Preliminary transition happens

$L_0^{(i)} \rightarrow L_1^{(i)}$, $S_0 \rightarrow S_1=1$

with observed in data increase of masses: $\boldsymbol{m_n \rightarrow m_n + 2m_\pi}$.

At second transition

$L_1^{(i)} \rightarrow L_2^{(i)}$, $S_1 \rightarrow S_2$

reactions must happen

$(n+2\pi)+(p+2\pi) \rightarrow (n+K^+) + (p+K^-)$.

with transformation of

2 pairs $\pi^+\pi^-$ into $K^+ K^-$.

PROBABILITIES OF PEAKS

Mean cross-section of peaks

$<\sigma_{nK}>$ = 63 (9) mkb/ 7 = 9 (1.5) mkb

is ~ 1/2 of $<\sigma_{\pi\pi}>$=16 (2) mkb **:**

it agrees with ratio of statistical

weighs $$\frac{g(S=0)g(S_Z=-1)}{g(S_Z=-1)}=\frac{1/4\times 1/2}{1/4}=\frac{1}{2}$$

Reduced probability of peak

$W^{(i)} = <\sigma^{(i)}>/(\sigma_{(inel.)}\, g(S)g(L^{(i)})) \sim \mathbf{0.06}$,

with $\sigma_{(inel)}$=30mb, $(L^{(i)})=1/L^{(max)} \sim 0.04$.

NONEQUILIBRIUM NN INTERACTION

With momentum L~20 and momentum of inertia $I_L = 2mR_0^2$ rotation energy

$$E = h^2 L(L+1)/(2I_L) \sim 20 \text{ GeV} \gg E_0$$

For conservation energy during

$$\Delta t \sim h/\Delta E \sim 0.01 \text{ fm/c} \sim 3 \cdot 10^{-26} \text{ sec}$$

potential energy of nucleons interaction must be decreased according to ΔE :

$$\Delta U^{(neq)} = -\Delta E .$$

Here system (np) with momentum L at once is created in such states with large probability~100% of suitable (np) events.

Short existence Δt of rotary system can explain small Δr of formation $\pi^+\pi^-$.

Interaction is nonequilibrium even in stationary states

In stationary state with energy E of particle in equilibrium potential $U(r)$ nonequilibrium interaction $U(r)^{(neq)}$ arises always when

$$E - U(r) < 0:$$

$E - U(r)^{(neq)} = T(r) > 0$ keeps positive sign of kinetic energy.

This is shown in quantum theory (without wave properties of particles) **"Statistical physics of undistinguishable events (formalism and examples of use)** preprint **PNPI-2005 2628,** 2005, Gatchina

WHAT'S NECESSORY TO EXPLAIN

It is desirable to explain:

1) how energy $\Delta E(J) = M_{\pi\pi}c^2$ reveals of accident kinetic energies of nucleons ;

2) what properties of nucleons define empirical parameter

$V^{(emp)} = (V_{\pi\pi}+V_{nk})/2 = 27.7\ (0.5)$ MeV;

3) what mechanism can give ~100% probability of $\Delta L=2$ transition at short time $\Delta t \sim 10^{-26}$ sec;

4) why preliminary transition to S=1 in npK^+K^- events happens with ~100% probability and with formation of 2 pairs $\pi\pi$.

TRANSITION TO SOLID-BODY ROTATION

Formed in moment of collision orbital movement with momentum

L, $\Omega = Lh / I_L$, $E = \Omega^2 I_L / 2$

is unstable and at once reduces to solid-body rotation with momentum of inertia $I_{s\text{-}b} = I_L + I_S$, $\Omega_{s\text{-}b} = Lh/(I_L + I_S)$ and $E_{s\text{-}b} = \Omega^2_{s\text{-}b}(I_L + I_S)/2$.

$$E - E_{s\text{-}b} = E\, I_S / (I_L + I_S) = U_{s\text{-}b}$$

is potential energy of interaction of $hL_{s\text{-}b} = \Omega_{s\text{-}b} I_L$ and $hS_{s\text{-}b} = \Omega_{s\text{-}b} I_S$ at the time Δt of solid-body rotation with momentum $L = L_{s\text{-}b} + S_{s\text{-}b}$.

DIFFERENCE OF POTENTIAL ENERGIES IN STATES WITH ΔL=2

At transition $L_1^{(i)} \rightarrow L_2^{(i)}$, $S_1 \rightarrow S_2$

$$\Delta U^{(h\text{-}b)}_{12} = U_{h\text{-}b}(L_1) - U_{h\text{-}b}(L_2) =$$

$$= \frac{(2L_1-1)\, h^2\, \boldsymbol{I}_S}{\boldsymbol{I}_L\,(\boldsymbol{I}_L + \boldsymbol{I}_S)} = (2L_1-1)\, V_{SL}.$$

With parameter $\boldsymbol{I}_S = mR^2$

$$V_{SL} = \frac{h^2\, \boldsymbol{I}_S}{\boldsymbol{I}_L\,(\boldsymbol{I}_L + \boldsymbol{I}_S)} = 27.6 \text{ MeV}$$

coincides with

$$V^{(emp)} = (V_{\pi\pi} + V_{nk})/2 = 27.7\ (0.5) \text{ MeV}$$

ENERGY $\Delta U^{(s-b)}_{12}$ LIBERATION

At decay of rotary system excess energy $\Delta U^{(s-b)}_{12}$ keeps as inner energy of nucleons, which end interaction, and can be emitted in this moment in form of $\pi^{+}\pi^{-}$ energy (or in form energy of reaction

$$2 \ \pi^{+}\pi^{-} \rightarrow K^{+} K^{-}$$)

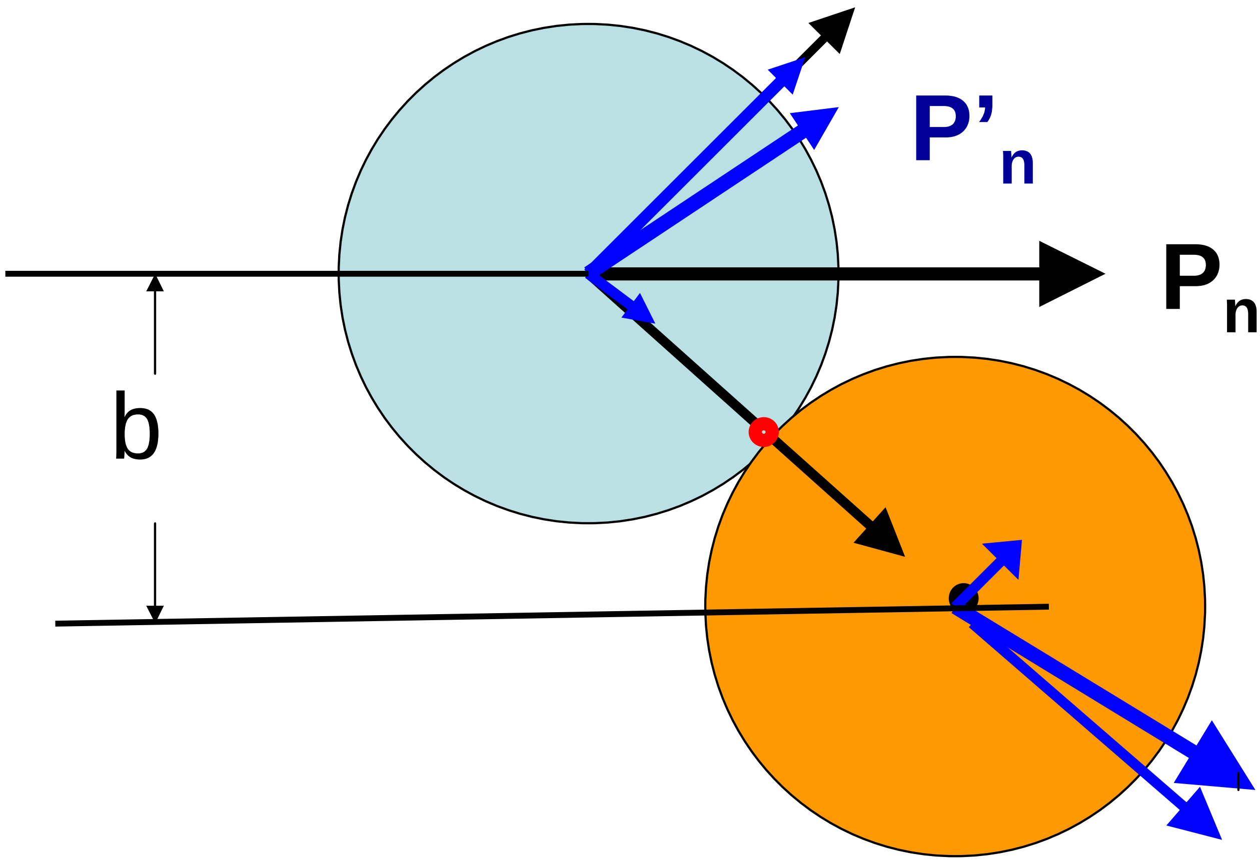
“FORSED” STRONG DELAY OF NONEQUILIBRIUM ROTATION

Law Δ**B**=0 means: “black balls” must safe for description of nucleons.

Together with exchange of radial impulses of nucleons exchange of tangential impulses is going on, so orbital moment must decrease.

Therefore only reducing rotation may be exist Δt, where contribution of spin S=1 in moment J=L+S replaces a decrease of momentum $L=\Omega(I_L+I_S)$ of rotation with decreasing of Ω.

DECREASE OF ORBITAL MOMENTUM



At nonequilibrium rotation:

$L=P_n b$ as in lab.sys.: transfer of radial impulse --- as hard balls.

$L_1=2R_0P_n^{(tan.)}$ can not be kept

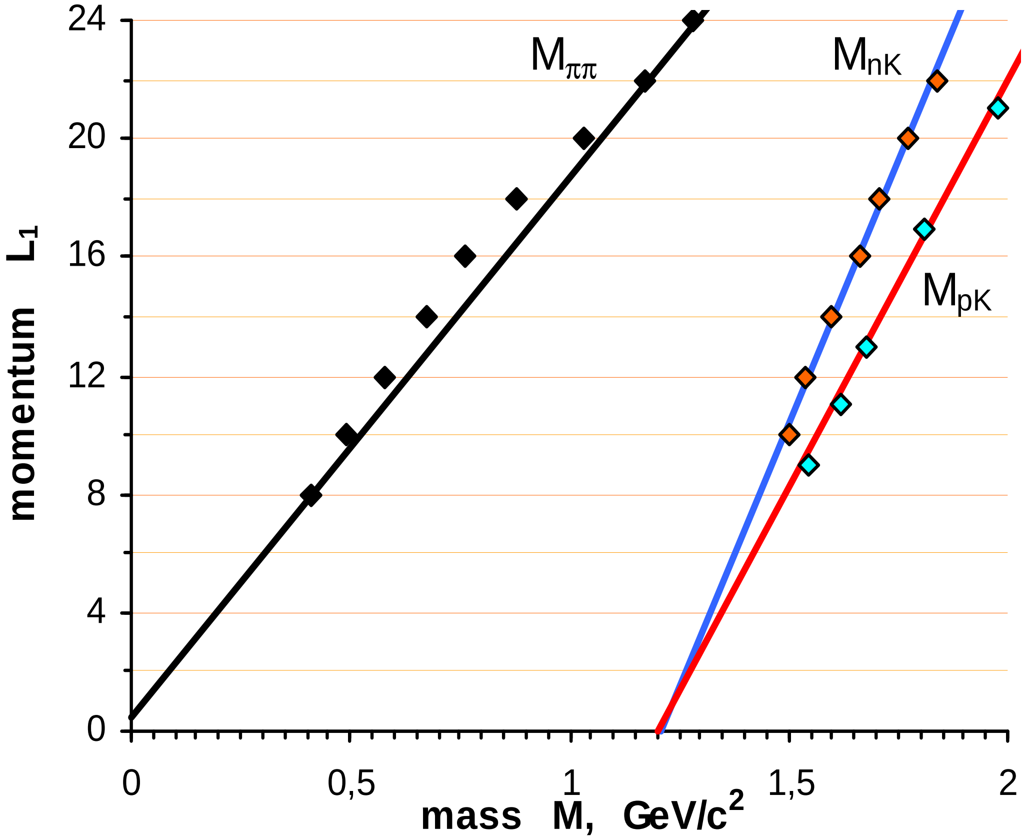
$L_2=2R_0(P'^{(tan)}_n - P'^{(tan)}_p) = L_1 - 2$

CAUSAL EVENTS IN NONEQUILIBRIUM NN SYSTEM

Law $\Delta B=0$ for nucleon (impenetrable distributions --- “black balls”), **law of conservation J +L+S** and **law of conservation energy** lead to formation of short delay rotation state with **causal evolution and replacing of** $\Delta L=2$ by $\Delta S=2$.

For short Δt probabilities of any accidental events is negligible small. Energy $\Delta U^{(h\text{-}b)}_{12}$ is additional inner energy of nucleons in moment of disintegration of two-nucleon system

EXP. SPECTRA AND ITS DESCRIPTION



(black line) $M_{\pi\pi}^{(i)}=2V\,(L_1^{(i)}-1/2)/c^2$,

(blue line) $M_{nK}^{(k)}=V\,(L_1^{(k)}-1/2)/c^2+m+2m_\pi$

(red line) $M_{pK}^{(i)}=V'\,(L_1^{(i)}-1/2)/c^2+m+2m_\pi$

$$V = \frac{h^2}{6mR_0^2}, \quad V' = \frac{h^2}{2mR_0^2}\frac{(m+4m_\pi)}{(3m+4m_\pi)}$$

$R_0 = 0.50$ *fm*, m=**m** is nucleon mass

DATA OF $p + C_3H_8 \rightarrow pK^0_S + X$ at $P_P = 10.0$ GeV/c

Spectrum M_{pK0} may be described the same ratio as M_{nK+} spectrum; increasing of value V' can be explained by contribution of 4 π^- mesons in inner momentum inertia I_S

Value $\sigma^{(i)} \sim 90$ mkb for one peak corresponds the same reduced probability $W^{(i)} \sim 0.06$ at effective number $N_p = 20$ in C_3H_8, or weight 2/3 of nuclear protons

COMMENTARY

These data can not be described by present quantum theory, which made for calculation of probabilities of possible accident events from them distributions.

Crude model of solid-body rotation of two hard balls system with laws of conservation energy and momentum well describes data and explains main properties of unusual causal events with whole nucleons.

SOME PREDICTIONS OF MODEL

Momentum S'_p of inner rotation of protons with energy of this rotation must be transmitted to neutrons at decay of rotary system since can not be kept at free proton formation.

Free movement of finite proton gives zero contribution in momentum ΣL_f relative to point O ---center of proton.

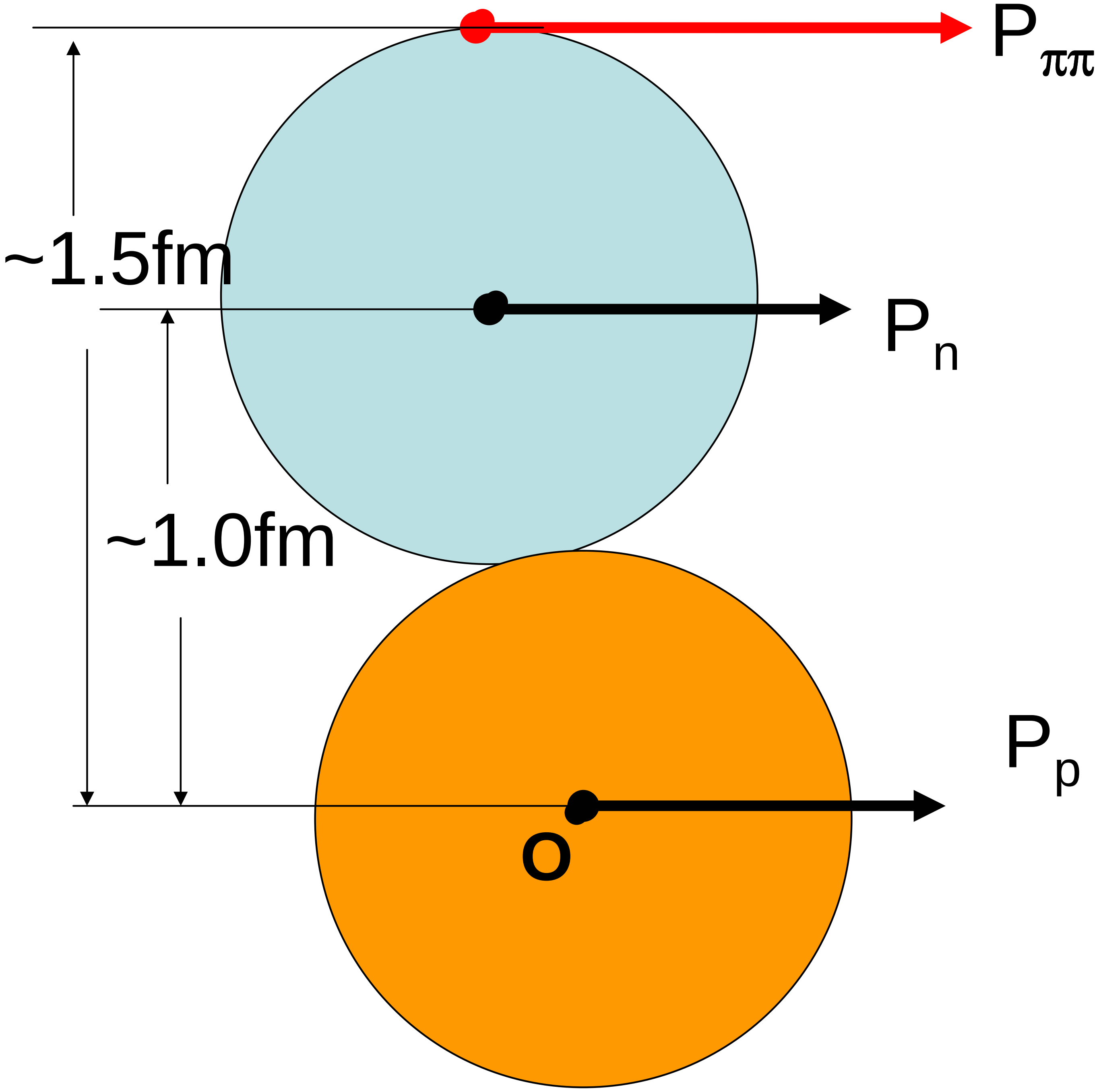
Therefore pairs $\pi^+\pi^-$ or K^+K^- mesons form at decay of excited state of neutron.

In the end of distribution $M_{\pi\pi}$~1.4GeV/c^2 and kinetic energy of relative movement of n,p and pair mesons in s.c.m. is small: $E'-(m_n-m_p-M_{\pi\pi})c^2<100$ MeV.

Value L=26 and condition ΣL_f = L-2 lead to next conclusions:

SOME PREDICTIONS OF MODEL

Point of formation $\pi^+\pi^-$



P_n=1.5 GeV/c, L_n=7.5

$P_{\pi\pi}$=2.2 GeV/c, $L_{\pi\pi}$=16.5

$L_n+L_{\pi\pi}$=24 =26-2

PREDICTIONS OF MODEL FOR npK^+K^-

The end of distribution M_{nK} ~1.98GeV/c^2 corresponds to small kinetic energy of relative movement of nK^+ and p, K^- mesons: $E'-(m_n-m_p-M_{\pi\pi})c^2 \sim 0$.

Impulse $P'_n=P'_{K+}$=0.66 GeV/c of n and K^+ in s.c.m. and them energies E'_n=1.15GeV, E'_{K+}=0.83 GeV, moved with s.c.m., give impulses P_n=1.75GeV/c, P_{K+}=1.26GeV/c.

Contribution of proton L_p=0 here too.

With impulse of K^- P_{K-}= 0.76 GeV/c summary impulse of mesons 2.02GeV/c can create moment $\mathbf{L_{K+K-}=15}$, if K+K- form as pairs π**+**π .

Together with moment $\mathbf{L_n=9}$ of neutron it gives model value $\mathbf{\Sigma L_f = 24 = L^{(max)} -2}$.

Some prediction for the end of distribution M_{pK0} of reaction $ppK^0_S K^0_L$ at P_p=10GeV/c

With R_0=0.50 fm $L^{(max)}=2R_0P_p/h = 50$ and $M_{pK0}^{(max)}=M_0+V'_{SL}L^{(max)})/c^2$=3.06 GeV/$c^2$.

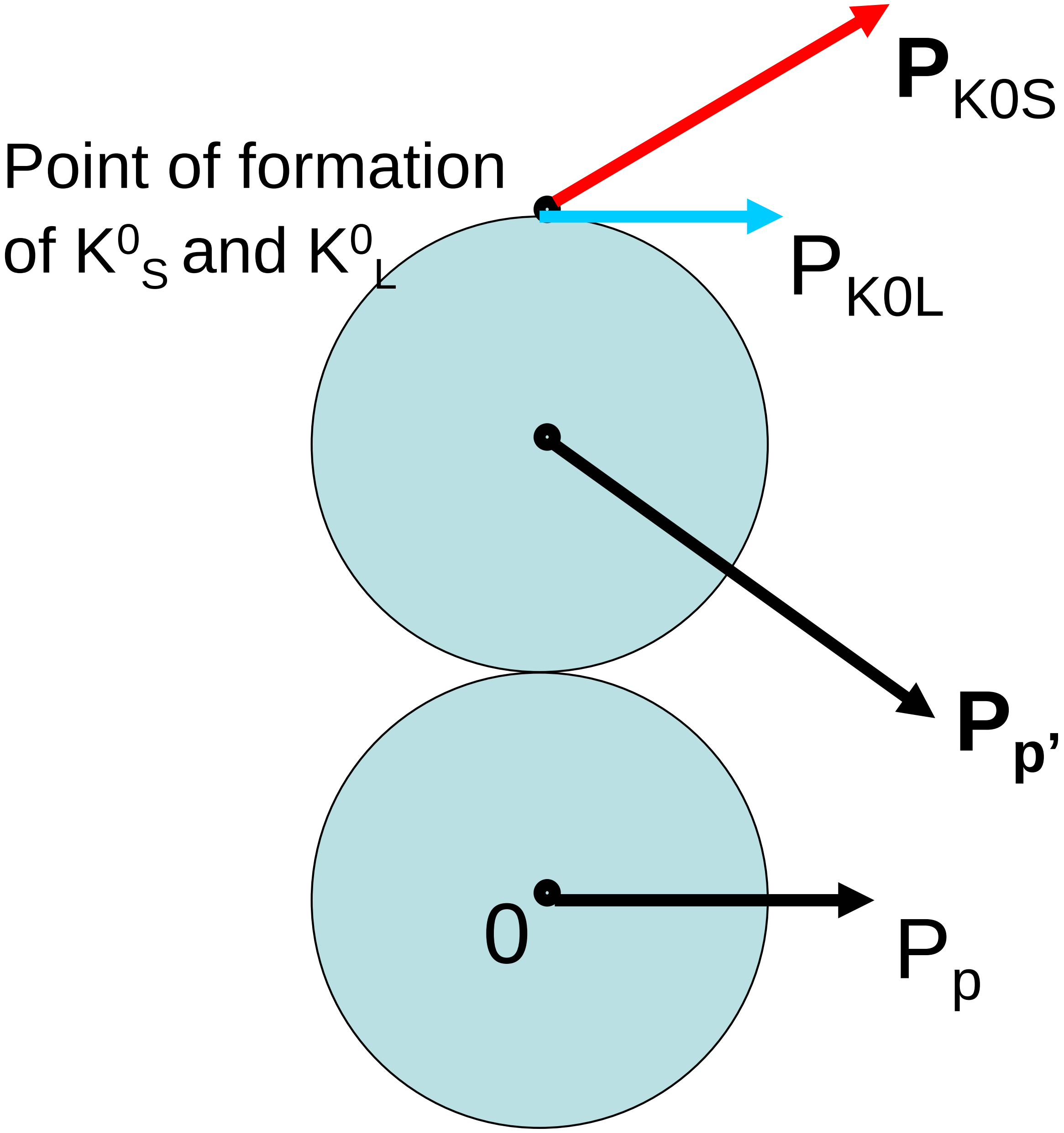
It confirm with maximum contribution of pK^0_S in $E'=(E_0^2-P_0^2c^2)^{1/2}$ =4.54 GeV : $M_{pK0}^{(max)}=E'/c^2-m_p-m_K$ =3.10 GeV/c^2.

If impulses $P'_p=P'_{K0}$=1.36GeV/c relative movement p and K^0_S in s.c.m. are transverse, energies E'_p and E'_{K0} in s.c.m. give longitudinal impulses P_p=3.63 GeV/c and P_{K0}=3.19 GeV/c in lab. system.

With contribution of proton $L_p=2R_0P_p/h=18$ summary moment of two K-mesons $L_{KK}=3R_0(3.19+1.10)$GeV/(hc)=32 gives $\mathbf{L_p+L_{KK}=50=L^{(max)}}$, if pair of K-mesons forms in the same point as $\pi^+\pi^-$ mesons.

It confirms that model is consistent.

Probable positions of final particles in events $ppK^0_SK^0_L$ with maximum L_f=50



Model of hard balls and keeping of moment L (relative point 0 in lab. system) $L_f = L_{p'} + L_{K0s} + L_{K0L}$ (here for $L_f^{(max)}$=50) define spatial positions of formation of final particles and them impulses

COMMON CONQLUSIONS

Inelastic NN interaction is like as collision of black balls with radius $R_0 = 0.50$ fm.

With large probability (possibly, 100%) short rotation states form in laboratory system with quantized momentum J=L+S.

These facts are beyond question and must be taken into account.

Data prove absence of “invariance”.

Short strong interaction can explain origin all events, which are treated as observation of small “partons”.

SEPARATELY OF PAIRS $\pi\pi$ ON SURFISE OF NUCLEONS

These data give unique chance: here all characteristics of two-nucleonic system are defined and it is known, that formation of pairs $\pi\pi$ with 100 % probability happens in defined point in result of nonequilibrium interaction with known value.

But without right electrodynamics it is impossible to use this to gain a better insight of observed events.

THANK YOU

FOR ATTENTION !

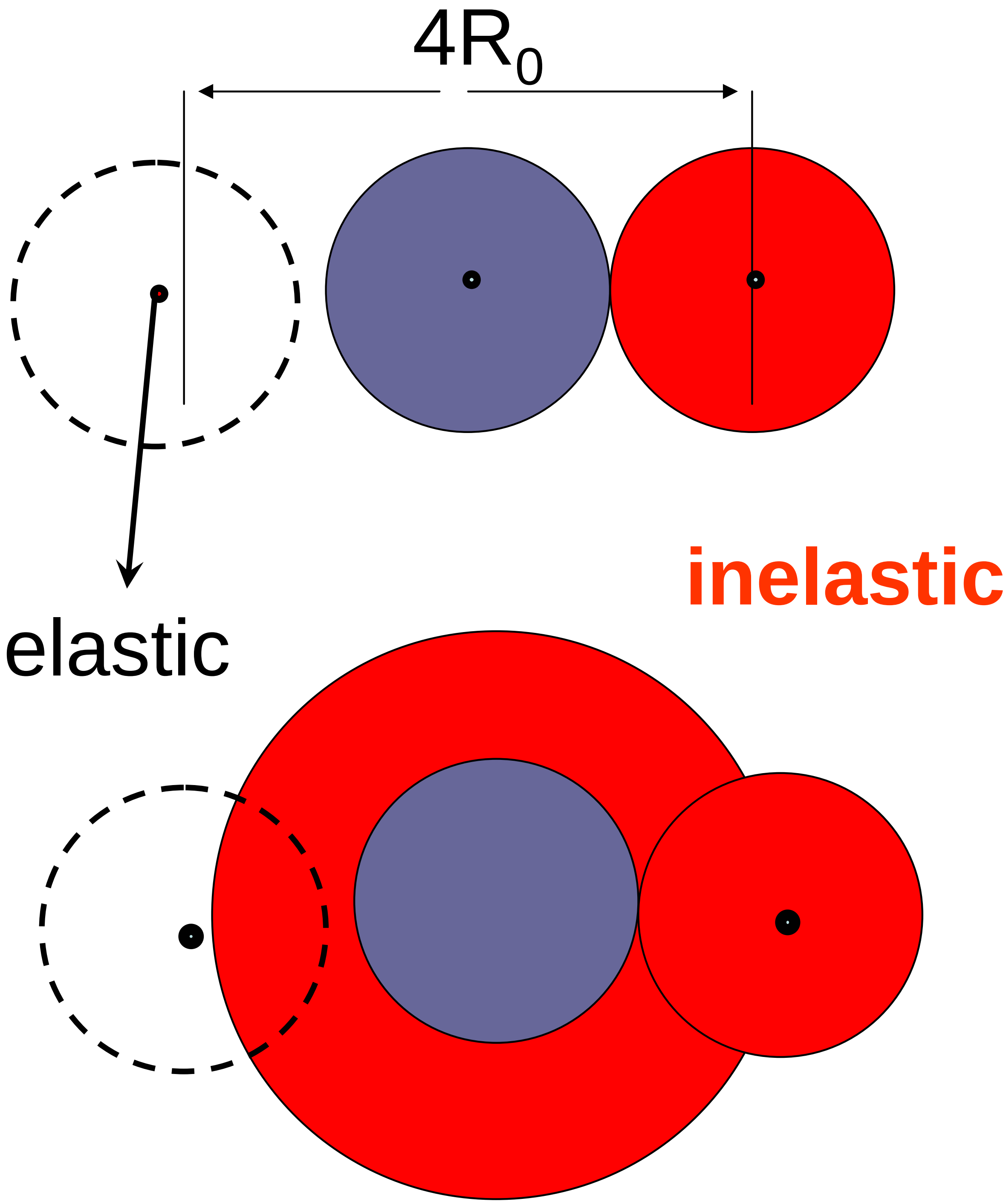
CONFIRMATION OF “BLACK BALL” MODEL BY **NN** SCATTERING DATA

Independent of energy in wide interval 10-1000 GeV cross-sections of elastic and inelastic NN scattering $\sigma_{\mathbf{el}} \cong 8$ mb and $\sigma_{\mathbf{inel}} \cong 32$ mb have geometrical sense $\sigma_{\mathbf{inel}} \cong \pi(R_{\mathbf{0}})^{\mathbf{2}}$, $\sigma_{\mathbf{inel}} \cong \pi(2R_{\mathbf{0}})^{\mathbf{2}}$ and correspond to collisions of black balls with radius $R_{\mathbf{0}} \cong 0.50$ fm.

It explains ratio $\sigma_{\mathbf{inel}} / \sigma_{\mathbf{el}} \cong 4$, which is fulfilled at energy E **>**$10^{\mathbf{6}}$ GeV.

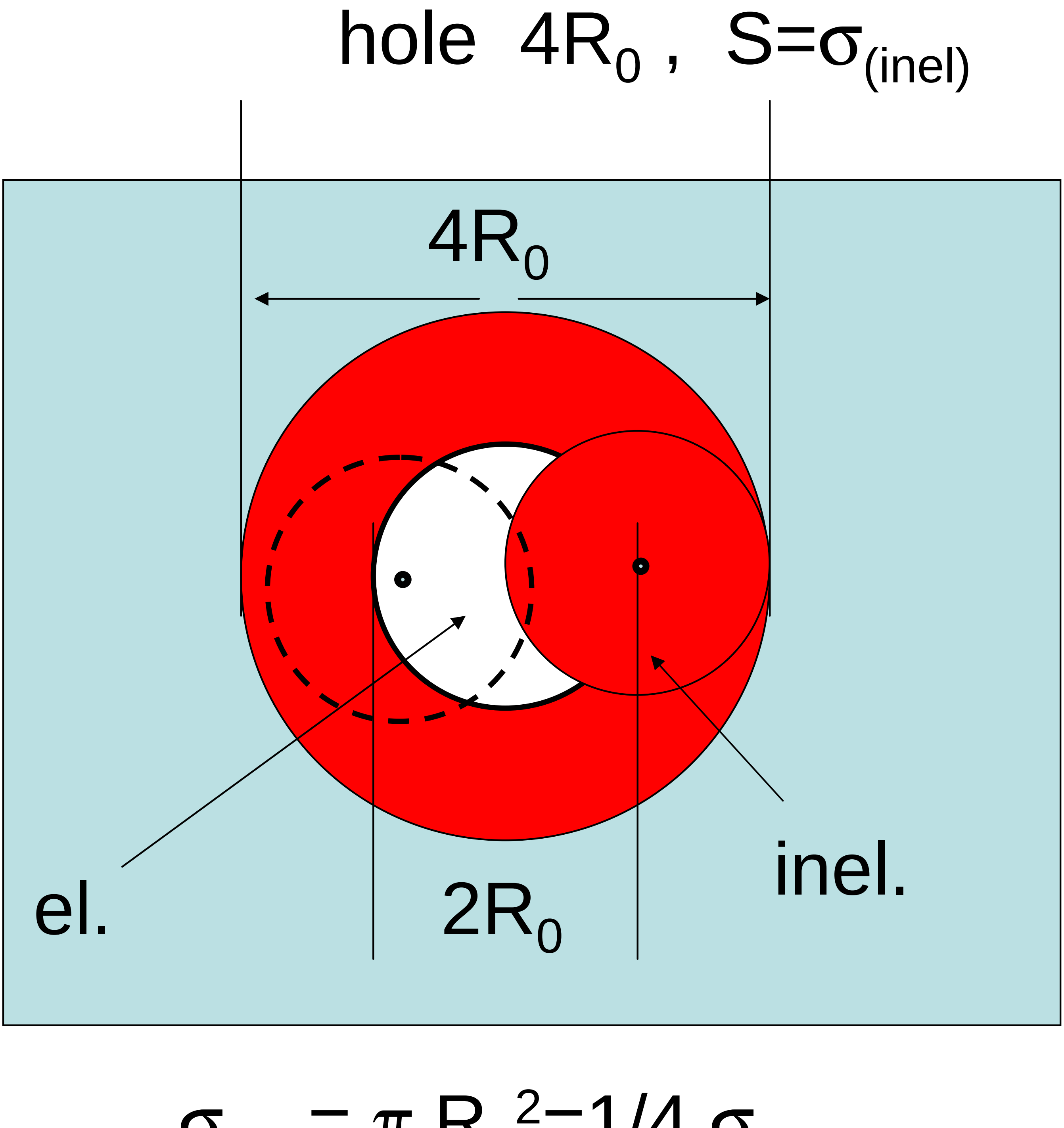
(Generally accepted theory of scattering of plane wave $\psi = e^{ikz}$ is useless for description of black balls scattering.)

GEOMETRICAL TREATMENT OF NN SCATTERING CROSS-SECTIONS



$$\sigma_{(inel.)} = \pi (2R_0)^2$$

RATIO $\sigma_{(inel.)}/\,\sigma_{(el.)}=4$ FOR BLACK BALLS SCATTERING



$$\sigma_{(el.)}= \pi R_0^2=1/4\ \sigma_{(inel.)}$$

RELATIVITY IS INCOMPATIBLE WITH MAXWELL EQUATIONS

div **E**=ρ **and relativistic ratio** c**H**=[**vE**] **for magnetic field of moving point charge** *e* **with field** **E**(**r**-**v**t) **gives**

$$c\,rot\,\mathbf{H} = div\,\mathbf{E} - (\mathbf{v}\,grad)\mathbf{E} = \mathbf{v}e = \mathbf{j},$$

where only conduction current j is, instead of Maxwell equation

$$c\,rot\,\boldsymbol{H} = \boldsymbol{j} + \partial \boldsymbol{E}/\partial t$$

with displacement current $\partial \boldsymbol{E}/\partial t$.

Right equation $\mathbf{P} = (P^2 + m^2c^2)^{1/2}\mathbf{v}/c$ **for impulse of moving object is empirical law, independent of any theories.**

RIGHT SOLUTION OF MAXWELL EQUATIONS

$\partial \mathbf{E}(\mathbf{r}-\mathbf{v}t)/\partial t=\partial \mathbf{E}(\mathbf{r}-\mathbf{v}t_0)/\partial \mathbf{r}_\mathbf{v}$ with $d\mathbf{r}_\mathbf{v}=-\mathbf{v}dt$.

$d\mathbf{r}=d_r\mathbf{r}_\mathbf{v}- d_{(perp)}\mathbf{r}_\mathbf{v}$ and $\partial \mathbf{r}/\partial \mathbf{r}_\mathbf{v} =1$;

(t_0 **is essential !)** The placing of next ratio

$\partial \mathbf{E}/\partial t= \partial \mathbf{E}(\mathbf{r}-\mathbf{v}t_0)/\partial \mathbf{r}\ (\partial \mathbf{r}/\partial \mathbf{r}_\mathbf{v})\ \partial \mathbf{r}_\mathbf{v}/\partial t =$

$= -\mathbf{v}\ \partial \mathbf{E}(\mathbf{r}-\mathbf{v}t_0)/\partial \mathbf{r} = -\mathbf{v}\,\mathrm{div}\,\mathbf{E} = -\mathbf{v}e = -\mathbf{j}$

in Maxwell equations

$c\ \mathrm{rot}\ \mathbf{E} = -\ \partial \mathbf{H}/\partial t,\qquad \mathrm{div}\ \mathbf{H} = 0,\quad (1,2)$

$c\ \mathrm{rot}\ \mathbf{H} = \partial \mathbf{E}/\partial t +\mathbf{j}\ ,\qquad \mathrm{div}\ \mathbf{E} = \rho\ .\quad (3,4)$

gives equation $c\ \mathrm{rot}\ \mathbf{H} = \mathbf{j} - \mathbf{j}=0$ for free point charge with velocity $\mathbf{v}$ and solution $\mathbf{H}=0$, which is incompatible with relativity.