PENTAQUARKS?

the staus of art

BRIEF OVERVIEW of EXPERIMENTS

LEPS@SPring-8

Laser Electron Photon on plastic scintillator, OSAKA

$\gamma\ ^{12}C \to K^+K^-X, \qquad E_\gamma < 2.4GeV$

believe they can isolate and correct for fermimotion

$\gamma n \to K^+K^-n$

missing mass

$\gamma n \to K^-\Theta^+ \hookrightarrow K^+n$

DIANA@ITEP

Xenon Bubble Chamber, K beam. MOSKOW

$K^+Xe \to K^0pXe', \qquad E_{K^+} < 850MeV$

believe they can isolate

$K^+n \to K^0p,$

invariant mass

$K^+n \to \Theta^+ \hookrightarrow K^0_s p$

CLAS@JLAB

photoproduction on deuterium. CEBAF

$\gamma d \to K^+K^-pX, \qquad E_e = 2.474,\ 3.115GeV$

believe they can isolate, with a spectator p

$\gamma d \to K^+K^-pn$

missing mass

$\gamma d \to K^-p\Theta^+ \hookrightarrow K^+n$

SAPHIR@ELSA

photoproduction on hydrogen BONN

$\gamma p \to 2h^+\pi^-X, \qquad h^+ \equiv p,\pi^+,K^+ \qquad E_e = 2.8GeV$

believe they can isolate, with kinematical fit

$\gamma p \to n\pi^+\pi^-K^+$

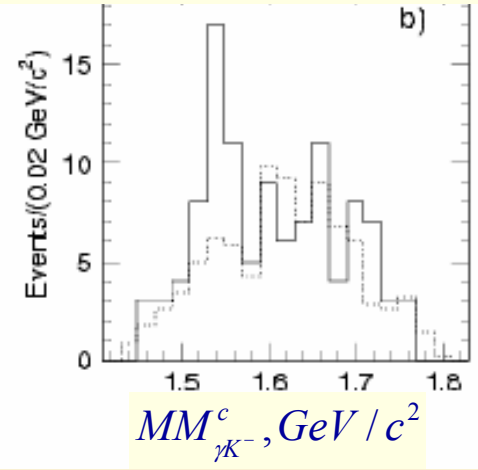
invariant mass

$\gamma p \to \Theta^+K^0_s \hookrightarrow K^+n$

EXPERIMENTAL EVIDENCE

$\gamma n \to nK^+K^-$

LEPS, JAPAN



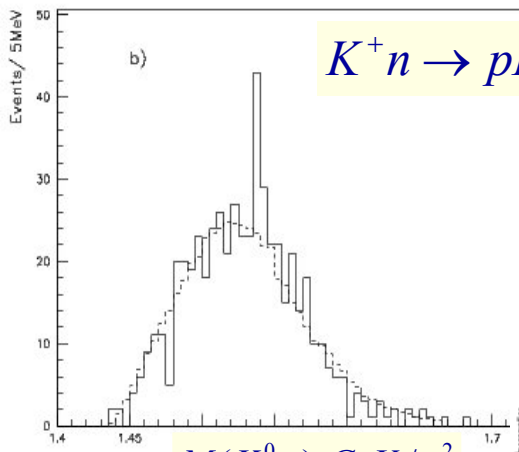
$MM^c_{\gamma K^-}, GeV/c^2$

$M = 1540 \pm 10 MeV/c^2$

$\Gamma < 25 MeV/c^2 \quad 4{,}6\sigma$

$K^+n \to pK^0$

DIANA, RUSSIA



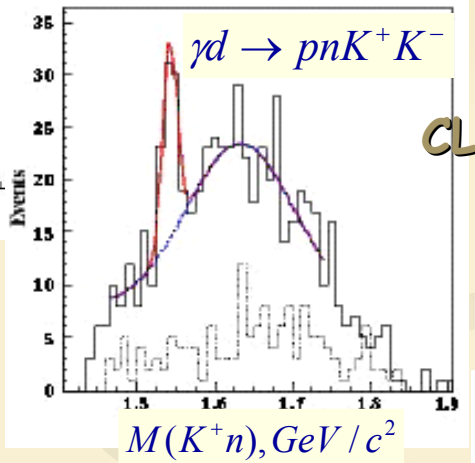
$M(K^0p), GeV/c^2$

$M = 1539 \pm 2 MeV/c^2$

$\Gamma \leq 9 \ MeV/c^2 \quad 4{,}4\sigma$

$\gamma d \to pnK^+K^-$

CLAS, USA

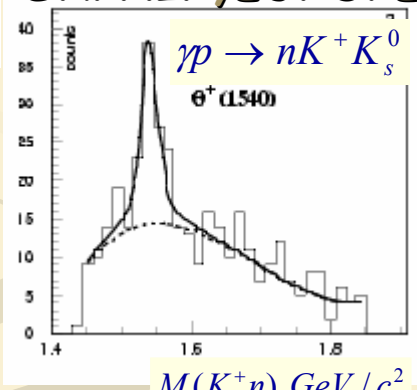


$M(K^+n), GeV/c^2$

$M = 1542 \pm 5 MeV/c^2$

$\Gamma = 21 MeV/c^2 \quad 5.3\sigma$

SAPHIR, EUROPE



$M(K^+n), GeV/c^2$

$M = 1540 \pm 4 \pm 2 MeV/c^2$

$\Gamma < 20 MeV/c^2 \quad 4{,}8\sigma$

Θ^+ $uudd\bar{s}$

Mass ~1540MeV

Width < 20MeV

S=1, Y=2, I_3=0

I=0 (?) No evidence for K^+p partner

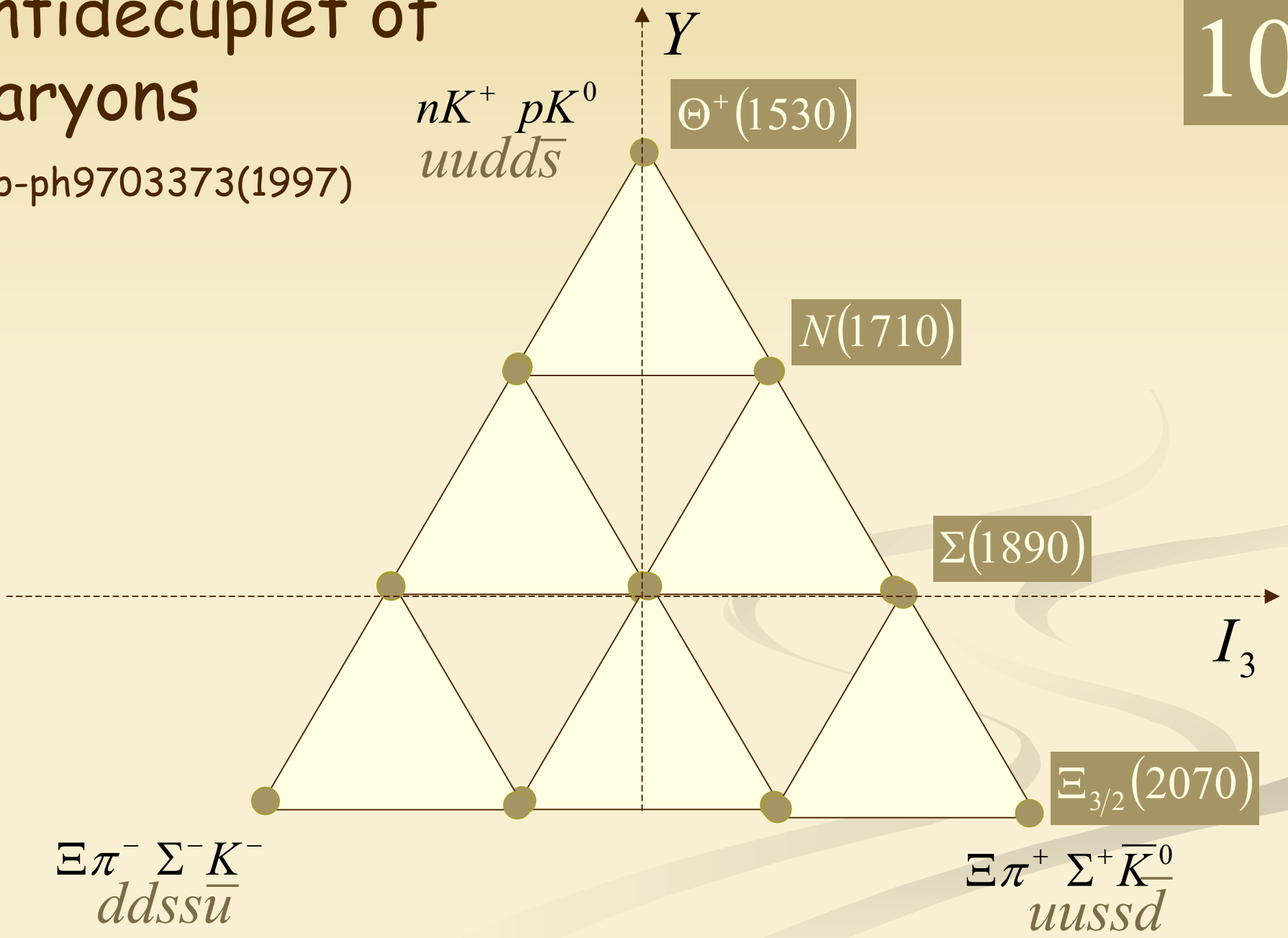
references

LEPS@SPRING8	(JAPAN)	0301020
DIANA@ITEP	(RUSSIA)	0304040
CLAS@JLAB	(USA)	0307018
SAPHIR@ELSA	(EUROPE)	0307083

PENTAQUARKS!

antidecuplet of baryons

hep-ph9703373(1997)



SUDDEN EXPLOSION OF EVIDENCE FOR

NARROW K^+n, K^0p RESONANCE

- **MASS ~1540 MeV**
- **WIDTH <25 MeV**
- **S=+1, Y=2, I_3=0**
- **REPORTED BY FOUR (!) EXPERIMENTS:**

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LEPS@SPring-8

- Laser-Electron Photon facility LEPS,designed to study ϕ-mesons produced forward at threshold, detecting the K^+K^- using a liq.H_2 target
- Photon by Compton back-scattering of laser photons from 8GeV/c electrons in the SPring-8 storage ring
- Using a 351-nm Ar laser, photons with a maximum energy of 2.4 GeV were produced
- electrons partecipating to the back-scattering were momentum-analyzed by a bending magnet of SPring-8 and detected with a tagging counter inside the ring to have the γ energy with 15 MeV resolution
- Target: 5cm thick plastic scintillator (SC)
- Silicon strip vertex detector SSD. Drift Chambers. Forward tracks bended by a dipole od 0.7 T. Lead bars to eliminate electrons. Aereogel Cerenkov to eliminate forward electrons and pions.
- recoil proton detected by SSD. eliminate photonuclear reaction $\gamma p \rightarrow K^+K^-p$
- **The tecnique to reveale the reaction $\gamma n \rightarrow K^+K^-n$ has been probed studing reactions $\gamma n \rightarrow K^+\Sigma^- \rightarrow K^+\pi^-n$, $\gamma p \rightarrow K^+\Lambda^- \rightarrow K^+\pi^-p$**

DIANA@ITEP

- $70 \cdot 70 \cdot 140 cm^3$ Xenon bubble chamber, no magnetic field
- 850MeV/c K^+ beam from ITEP PS.
- particles identified by ionization, momentum measured from range

CLAS@ITEP

- CLAS detector and photon tagging system in HALL B
- photon produced by bremsstrahlung from electrons at 2.474 and 3.115GeV
- liquid deuterium 10cm long target
- trigger
- events with detected p,K^+K^-. n selected with MM
- not observed pK^+.

SAPHIR@ELSA

- magnetic spectrometer, full polar range $0 \leq \theta \leq \pi$, and a solid angle ~$0.6 \bullet 4\pi$
- photon produced from bremsstrahlung from ELSA 2.8 electrons with a copper radiator
- cylindrical liquid hydrogen target , 3cm diameter, 8cm lenght, in the center of the cylindrical detector
- experiment designed to determine cross sections for photoproduction of strange mesons and barions and ω, ϕ, η'.