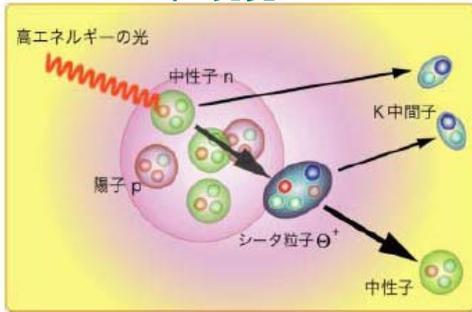


# S=+1 Pentaquark Baryon

2003年 発見?

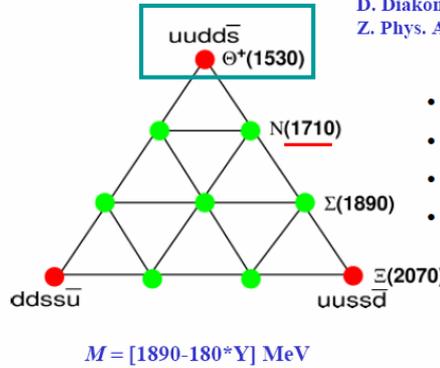


ペンタクォーク

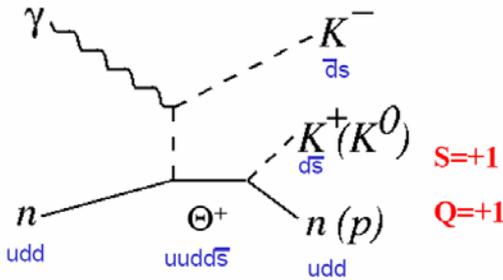
- クォーク5個.
- qqqqQ: Qは重い (strange) クォーク.
- バリオン数=1 and ストレンジネス=1

$\Theta^+$  Baryon

D. Diakonov, V. Petrov, and M. Polyakov, Z. Phys. A 359 (1997) 305.



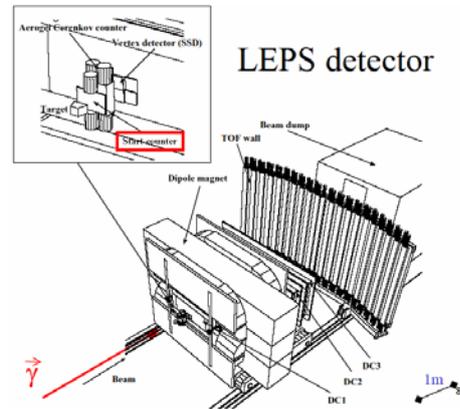
- Exotic: S=+1
  - Low mass: 1530 MeV
  - **Narrow width: ~ 15 MeV**
  - JP=1/2+
- Accident?**



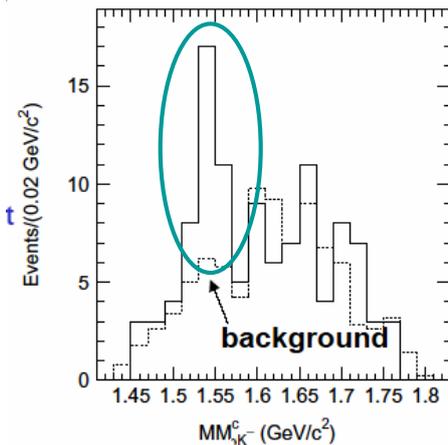
$\gamma + n \rightarrow K^- \Theta^+ \rightarrow K^- K^+ n$   
 始状態と終状態から消失質量を探す。  
 $MM_{\gamma K^+}^C = MM_{\gamma K^+} - (MM_{\gamma K^+ K^-} + M_n)$



$M = 1.54 \pm 0.01$  MeV  
 $\Gamma < 25$  MeV  
 Gaussian significance  $4.6\sigma$



## Summary of positive results



Experiment	$\Theta^+$ Mass (MeV)	$\Gamma$ (MeV)
LEPS/SPring-8	$1540 \pm 10 \pm 5$	: 25
DIANA	$1539 \pm 2 \pm \text{few}$	: 9
CLAS(d)	$1542 \pm 2 \pm 5$	: 21
SAPHIR	$1540 \pm 4 \pm 2$	: 25
ITEP(v)	$1533 \pm 5$	: 20
CLAS(p)	$1555 \pm 1 \pm 10$	: $26 \pm 7$
<b>HERMES</b>	<b><math>1528 \pm 2.6 \pm 2.1</math></b>	<b>: <math>19 \pm 5 \pm 2</math></b>
ITEP(p)	$1526 \pm 3 \pm 3$	: 24
<b>ZEUS</b>	<b>: ?</b>	<b>: ?</b>