

Search for exotic meson in $\phi\pi$ system with LEPS2

Workshop on LEPS/SPring-8 new beamline

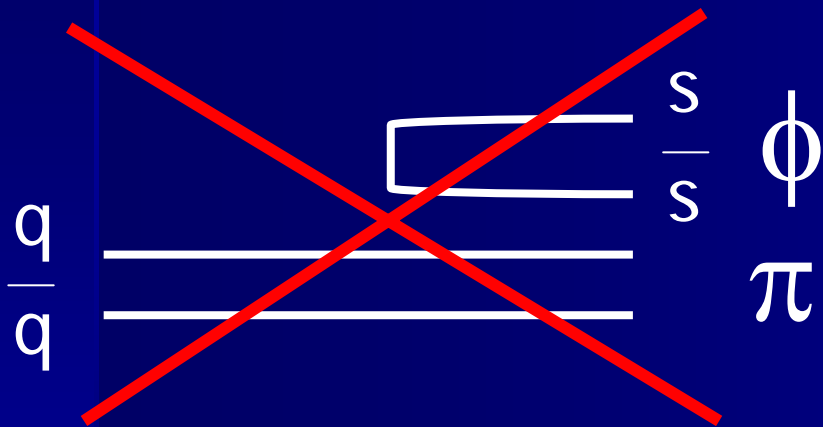
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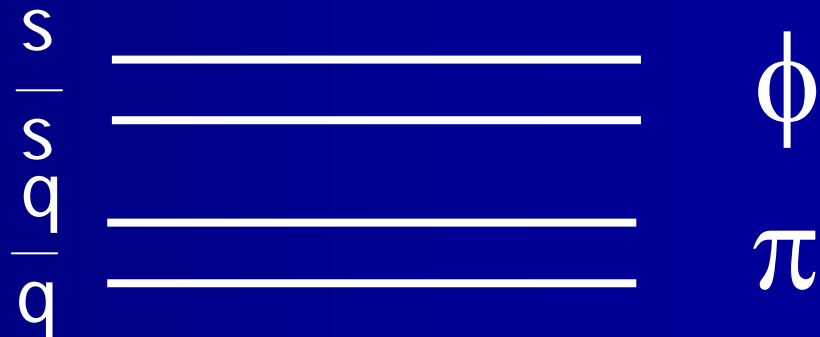
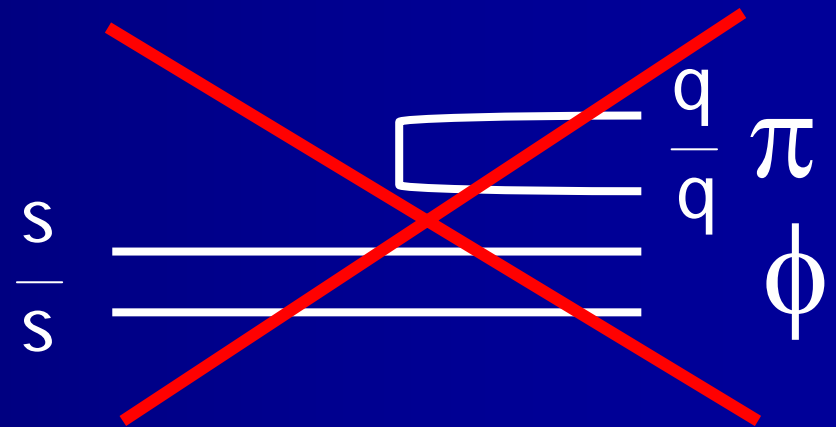
exotic meson in $\phi\pi$ system

$$X \rightarrow \phi \pi$$



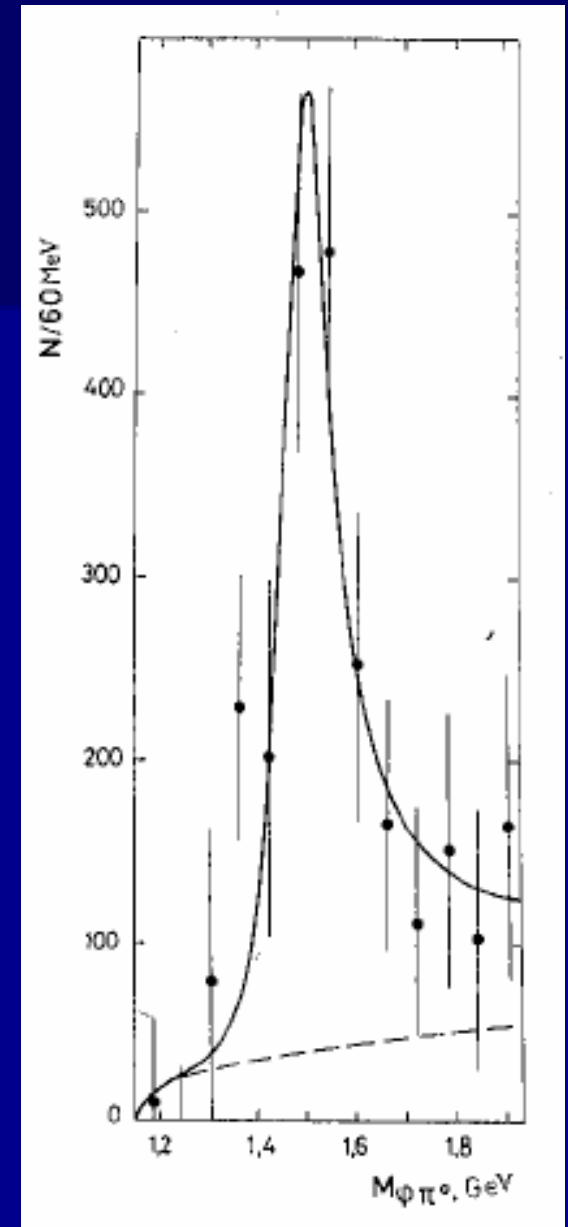
$\phi\pi$ decay from $q\bar{q}$ -meson is suppressed by OZI rule

Decay into $\phi\pi$ channel with non suppressed branching ratio would be a signature of exotic 4 quark state



C(1480)

- Bityukov, PLB188,383 (1987)
- $\pi^-p \rightarrow \phi\pi^0n$, $p_{\pi^-} = 32.5$ GeV/c
- $M = 1480 \pm 40$ MeV
- $\Gamma = 130 \pm 60$ MeV
- $I^G = 1^+, J^{PC} = 1^-$
- No signal in $\omega\pi^0$ system
 - $BR(C \rightarrow \phi\pi^0) / BR(C \rightarrow \omega\pi^0) > 0.5$ (95%CL)
 - 2 orders of magnitude larger than expectation from OZI rule



$M(\phi\pi^0)$ (GeV)

$\rho(1450)$

$$I^G(J^{PC}) = 1^+(1^{--})$$

See the mini-review under the $\rho(1700)$.

$\phi\pi$ MODE

<u>VALUE (MeV)</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>CHG</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1480 ± 40	15,16 BITYUKOV	87	SPEC 0	32.5 $\pi^- p \rightarrow \phi\pi^0 n$

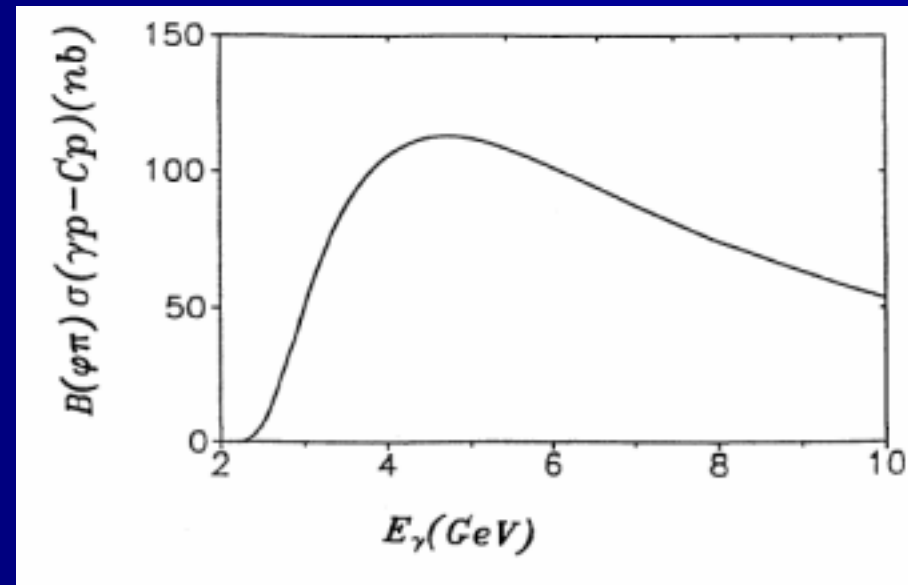
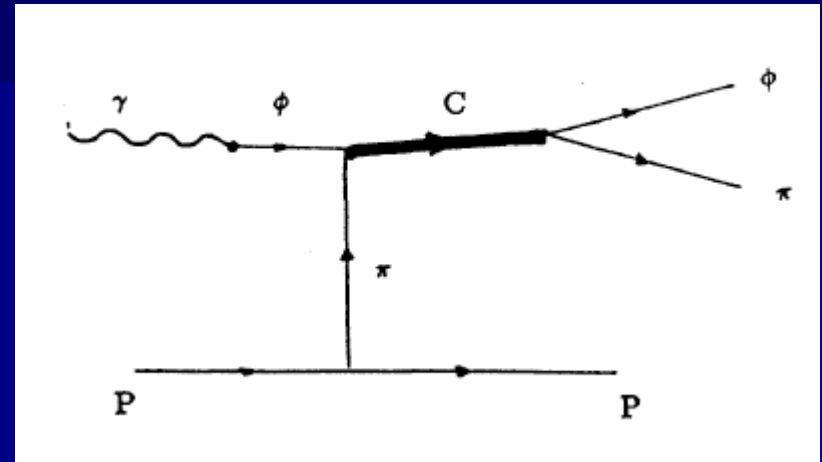
¹⁵ DONNACHIE 91 suggests this is a different particle.

¹⁶ Not seen by ABELE 97H.

We also list the $\phi\pi$ state with $J^{PC} = 1^{--}$ or $C(1480)$ observed by BITYUKOV 87 under the $\rho(1450)$. While ACHASOV 96B shows that it may be a threshold effect, CLEGG 88 and LANDSBERG 92 suggest two independent vector states with this decay mode. Note, however, that $C(1480)$ in its $\phi\pi$ decay mode was not confirmed by e^+e^- (DOLINSKY 91, BISELLO 91C) and $\bar{p}p$ (ABELE 97H) experiments.

photoproduction of C(1480)

- $\gamma p \rightarrow \phi \pi^0 p, \phi \pi^+ n$
- $\gamma n \rightarrow \phi \pi^- p$
- VMD + π exchange
 - Forward peak
 - Linear polarization may help to reduce BG processes (e.x. $\phi\Delta$)
- Cross section estimated by Z. Kopeliovich and Predazzi (PRD51,2114 (1995)) peaks at $E_\gamma=5$ GeV



Summary

- Possible meson C(1480) is a candidate for 4-quark state which strongly couple to $\phi\pi$
- Search for C(1480) with linearly polarized photons and forward angle spectrometer has several advantage.
- New LEPS beam line would be ideal place to search for C(1480)