$K^{*\pm}(892)K^{\mp}$ in GlueX

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12/2/2020

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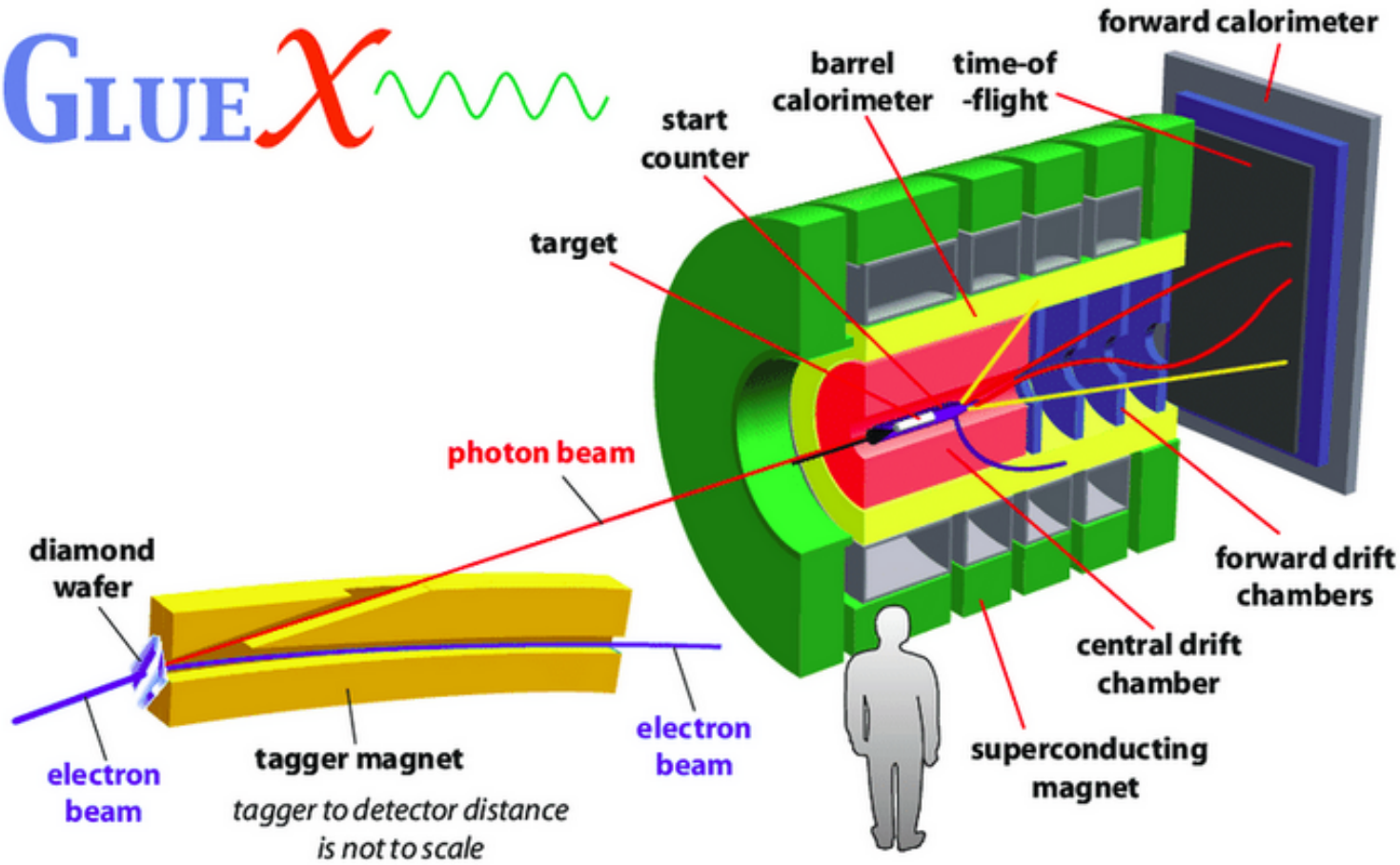
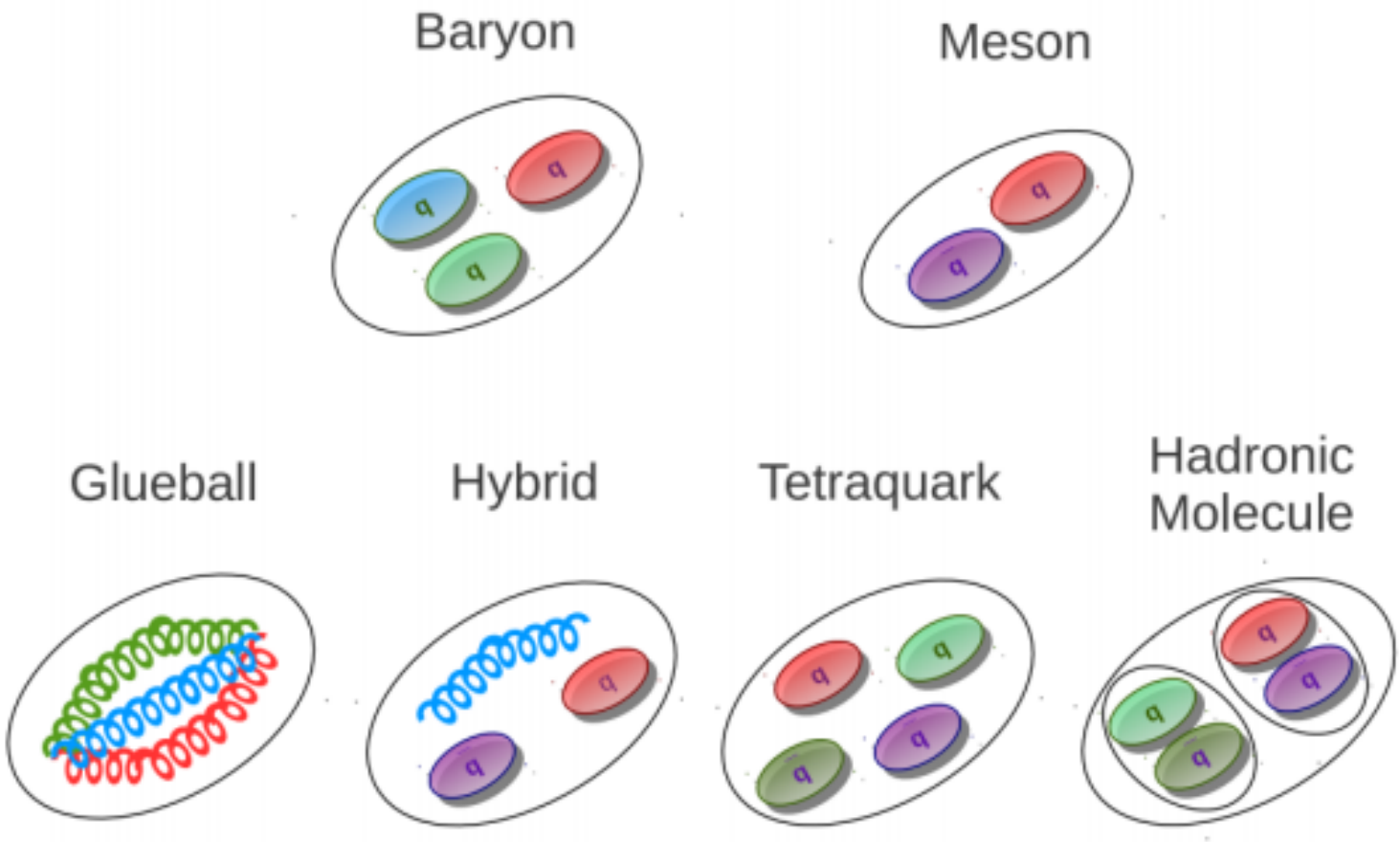
The GlueX experiment

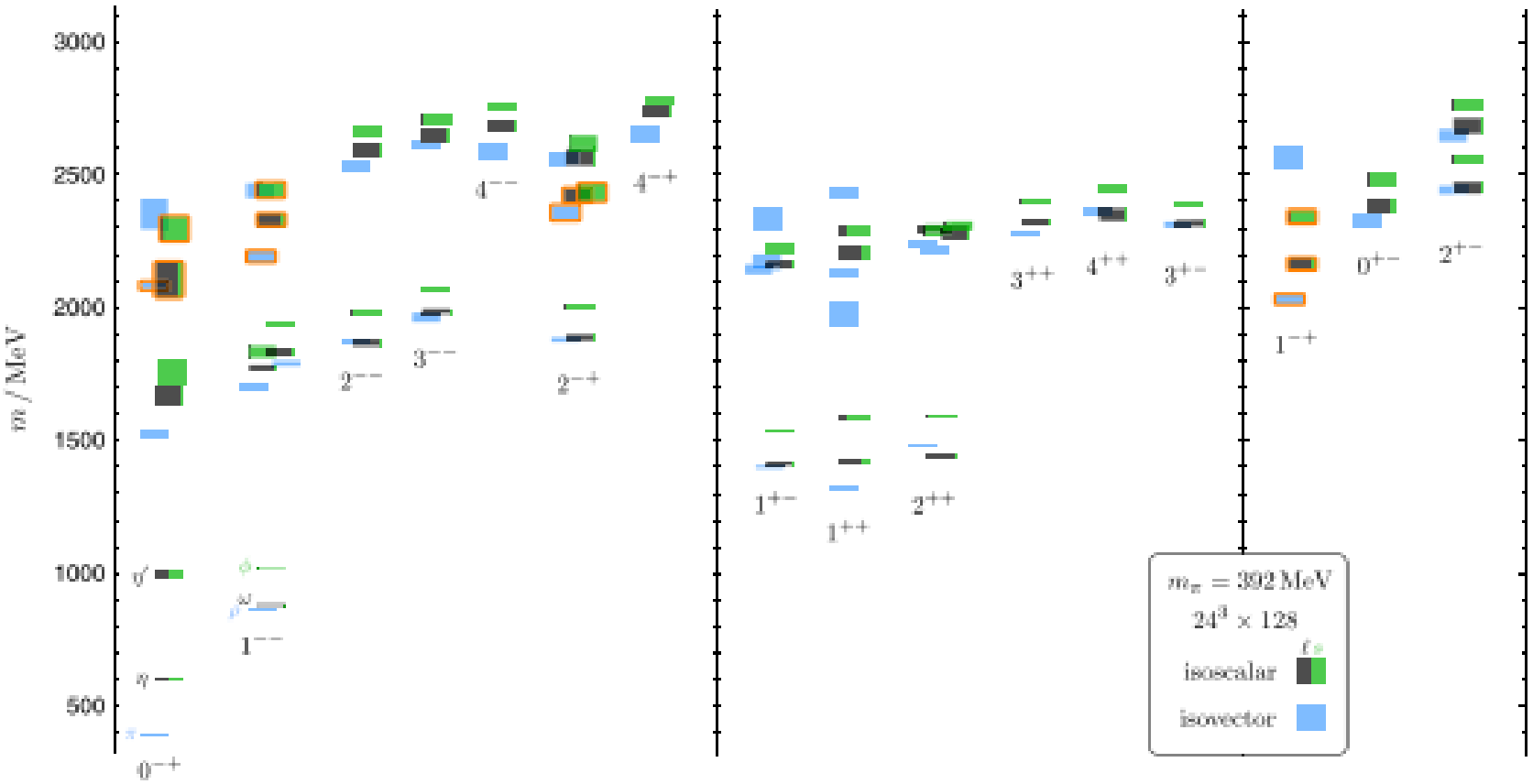


Hadrons



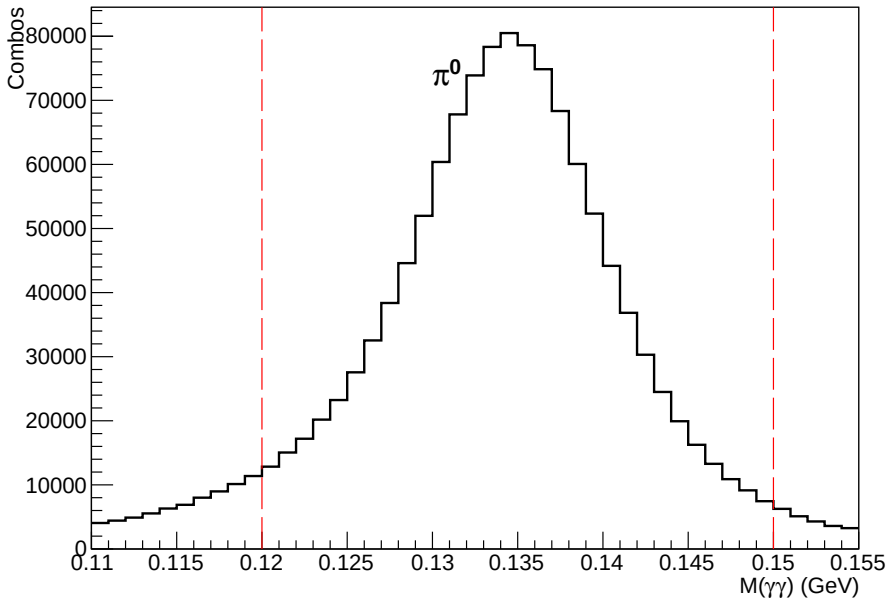
- Hadrons are subatomic particles consisting of quarks held together strong force through its mediator the gluon.

Lattice QCD problem

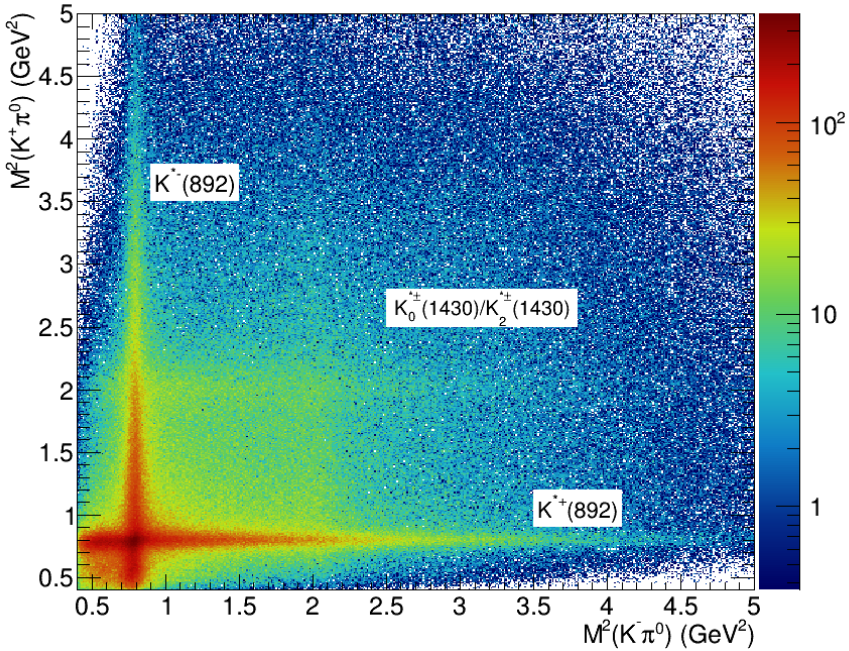


- HadSpec collaboration's lattice QCD prediction of the light meson spectrum including isoscalar (blue) and isovector (black) states with potential strange quark contributions (green) and 1^{+-} gluon contributions (orange).

π^0 and $K^{*\pm}(892)$ in $\gamma p \to pK^+K^-\gamma\gamma$ events

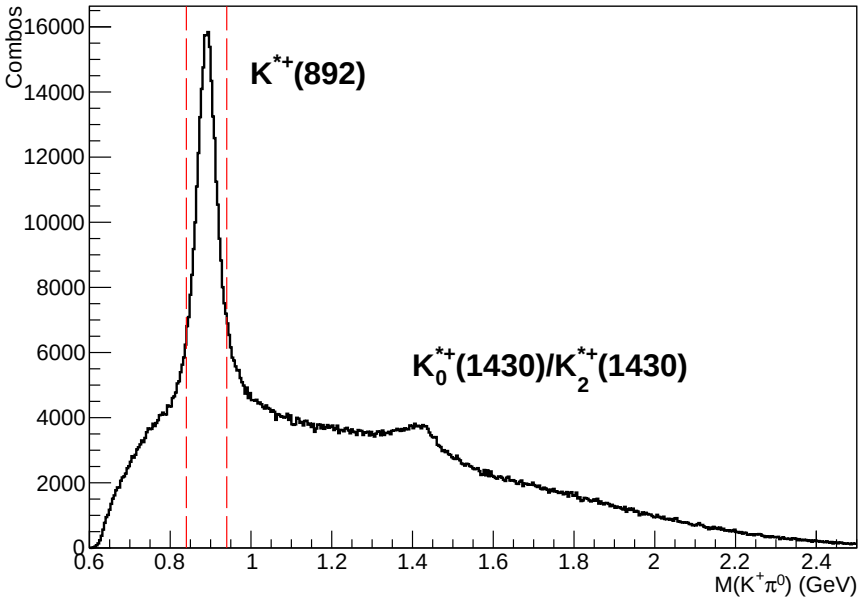


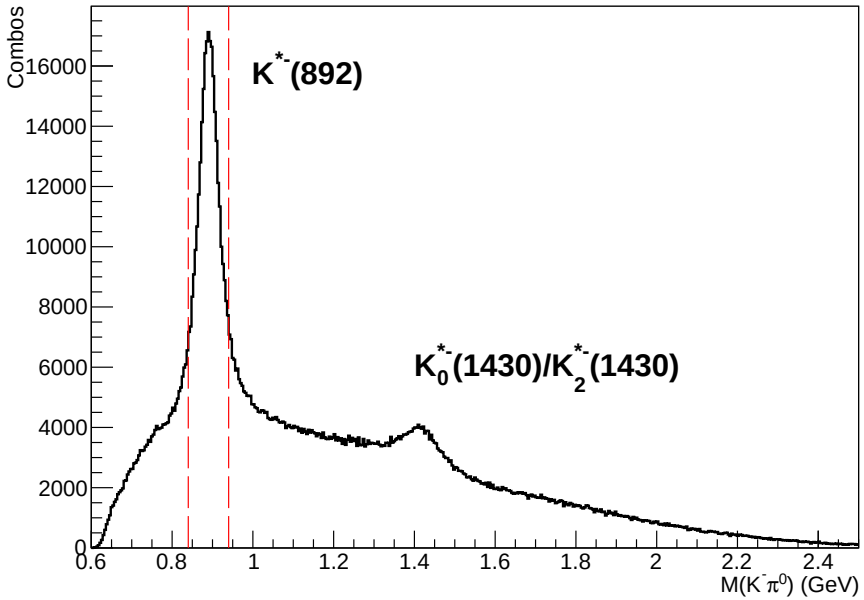
Invariant mass of $\gamma\gamma$ with red vertical lines indicating the used cut for the selection of π^0 from $0.12 < M(\gamma\gamma) < 0.155$ Gev.

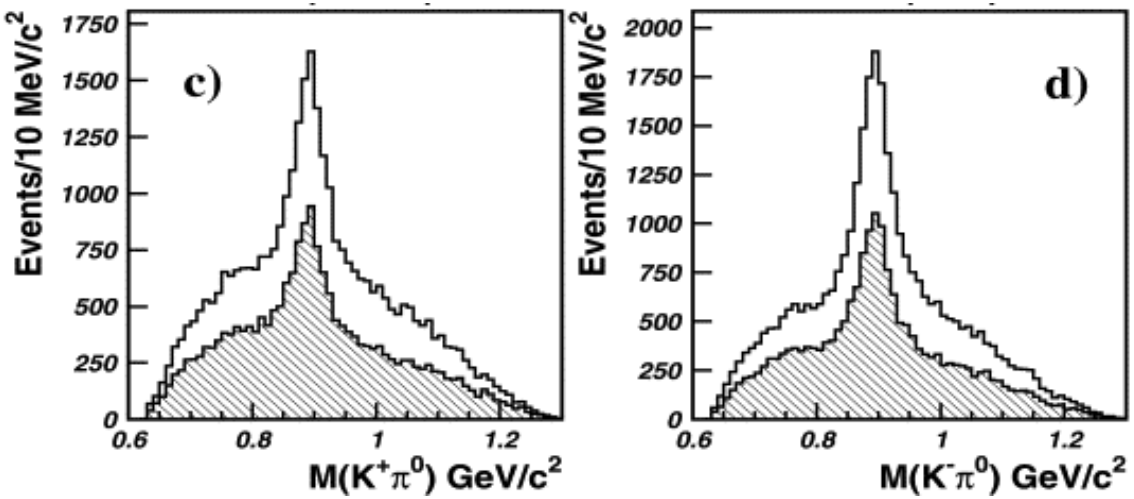


Dalitz of $M^2(K^+\pi^0)$ vs. $M^2(K^-\pi^0)$ showing horizontal band for $K^{*+}(892)$ and vertical band for $K^{*-}(892)$, as well as higher mass K^* states. These are selected from $0.84 < M(K^{*\pm}) < 0.94$ Gev.

GlueX $K^{*\pm}(892)$ consistency with E852

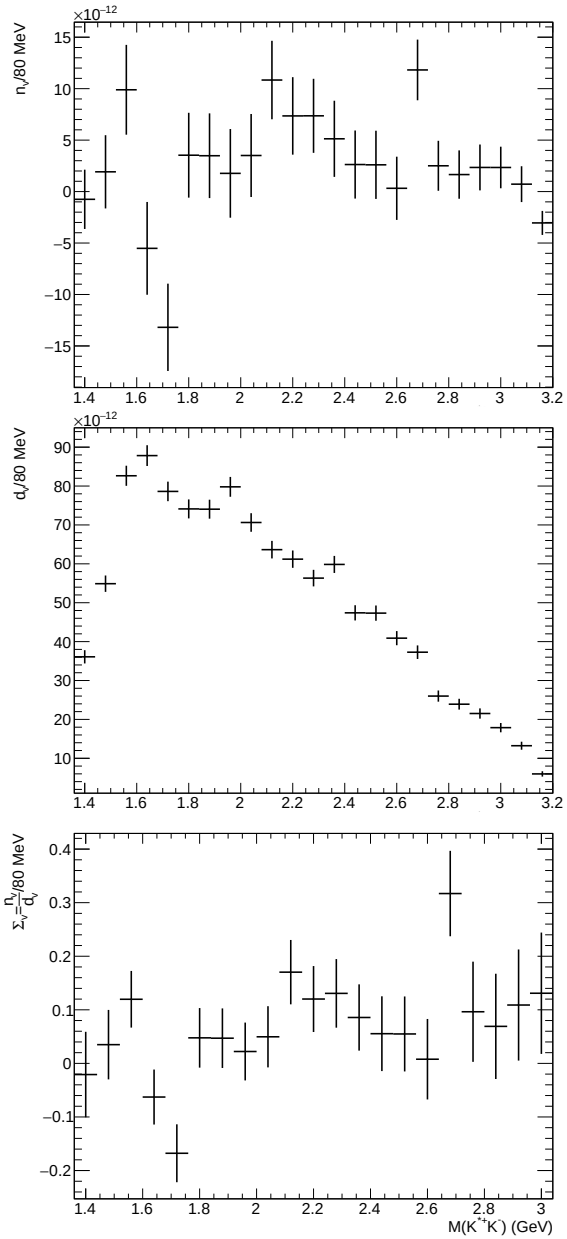






E852 $K^{\pm}\pi^0$ invariant mass distributions, left, to be compared to 2018 above. E852 shaded distributions have a $|t| > 0.1\ \mathrm{GeV}^2$ cut applied.

Searching of states decaying $K^{\pm}K^{*\mp}(892)$



- 9 seen particles decay to $K^{\pm}K^{*\mp}(892)$ between $1.235 - 1.85\ \mathrm{GeV}$.
- These particles are identified by their J^{PC} quantum numbers.
- Beam asymmetries assist in determining the parity exchange of a production process.
- Top plot represent trigonometric weighted events for polarized photon events.
- Middle plot is related to the total yield seen.
- Bottom plot is the beam asymmetry and is the division of top and middle.

Possible expected states from 2018 PDG

Particle	$I^G(J^{PC})$	Decays	Mass (MeV)	Width (MeV)
$b_1(1235)$	$1^+(1^{+-})$	$K^+K^-\pi^0/K^{*\pm}K^{\mp}\dagger$	1229.5 ± 3.2	142 ± 9
$a_1(1260)$	$1^-(1^{++})$	$K^{*\pm}K^{\mp}\dagger$	1230 ± 40	$250 - 600$
$f_1(1285)$	$0^+(1^{++})$	$K^+K^-\pi^0$	1281.9 ± 0.5	22.7 ± 1.1
$\eta(1405)$	$0^+(0^{-+})$	$K^+K^-\pi^0\dagger/K^{*\pm}K^{\mp}\dagger$	1408.8 ± 1.8	51.0 ± 2.9
$f_1(1420)$	$0^+(1^{++})$	$K^+K^-\pi^0\ddagger/K^{*\pm}K^{\mp}\ddagger$	1426.4 ± 0.9	54.9 ± 2.6
$f_1(1450)$	$1^+(1^{--})$	$K^{*\pm}K^{\mp}*$	1476 ± 4	85 ± 9
$\eta_2(1645)$	$0^+(2^{-+})$	$K^+K^-\pi^0\dagger/K^{*\pm}K^{\mp}\dagger$	1617 ± 5	181 ± 11
$\pi_2(1670)$	$1^-(2^{-+})$	$K^{*\pm}K^{\mp}$	1672.2 ± 3.0	260 ± 9
$\phi(1680)$	$0^-(1^{--})$	$K^{*\pm}K^{\mp}\ddagger$	1680 ± 20	150 ± 50
$\rho_3(1690)$	$1^+(3^{--})$	$K^+K^-\pi^0$	1688.8 ± 2.1	161 ± 10
$\rho(1700)$	$1^+(1^{--})$	$K^{*\pm}K^{\mp}\dagger$	1720 ± 20	250 ± 100
$\phi(1850)$	$0^-(3^{--})$	$K^{*\pm}K^{\mp}\dagger$	1854 ± 7	$87 \pm 28/23$

If no marker on the decay(s), has defined branching fraction.

$*$ - possibly seen

$\dagger$ - seen

$\ddagger$ - dominant