Λpn終状態における$\bar{K}NN$束縛状態の研究

Studying for the $\bar{K}NN$ bound state in the Λpn final state

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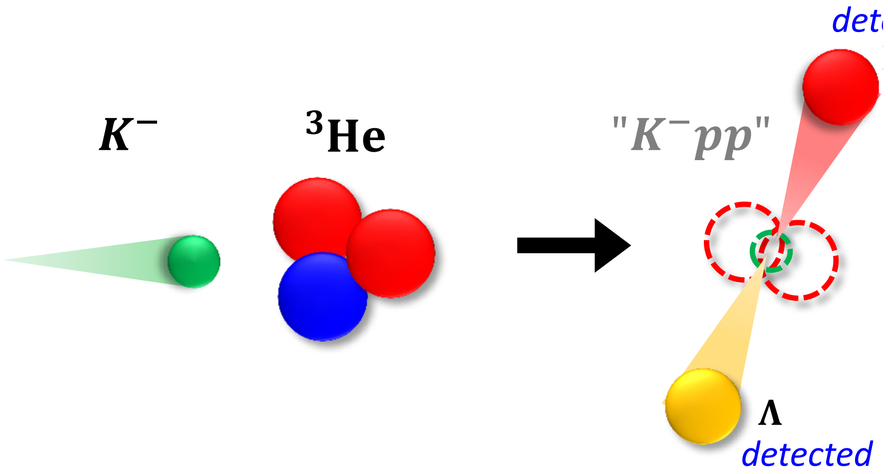
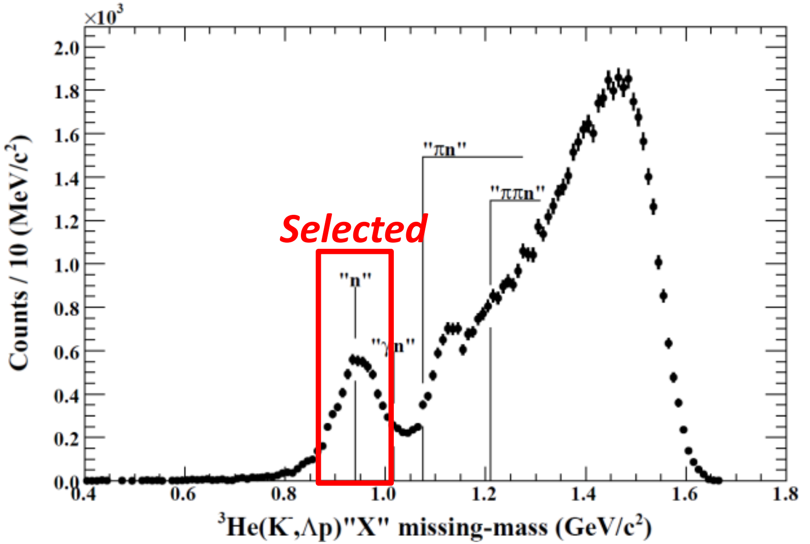
$^3\mathrm{He}(K^-, \Lambda p)n$ channel

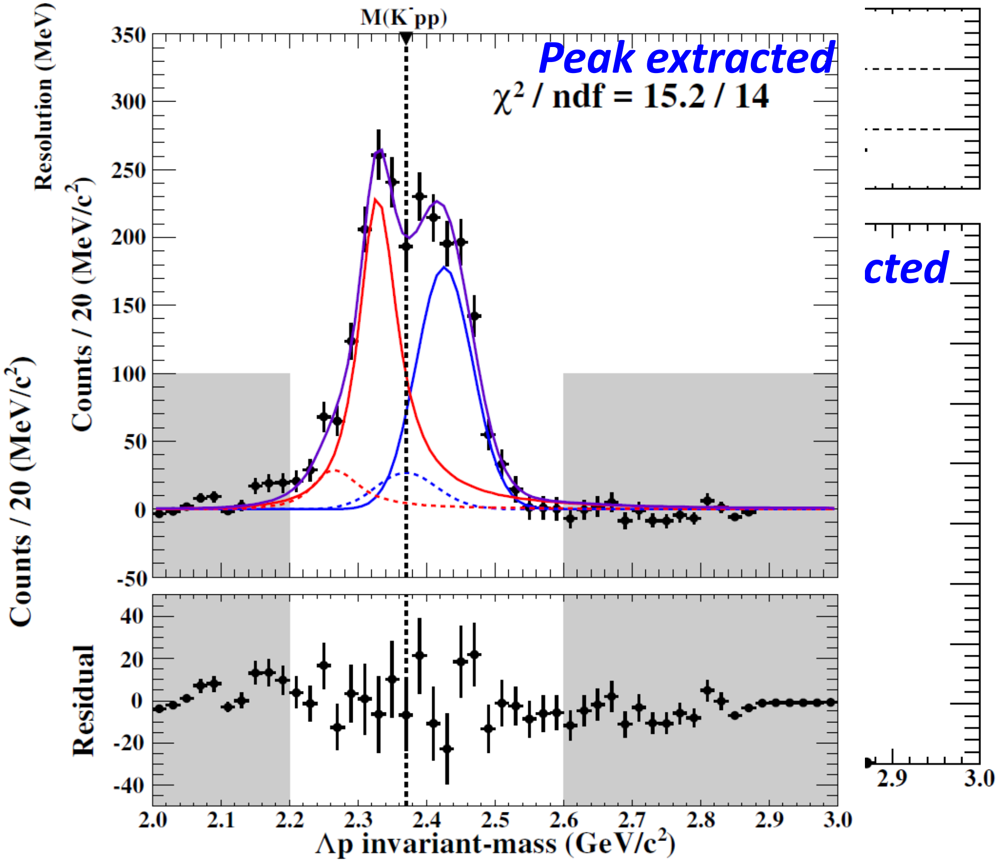




- **Analysis**
  - $\Lambda + p$ $(\to \pi^- p + p)$ **are measured.**
  - **Neutron is not detected.**
    - **Selected by Λp missing-mass**

Invariant-mass spectrum

DATA

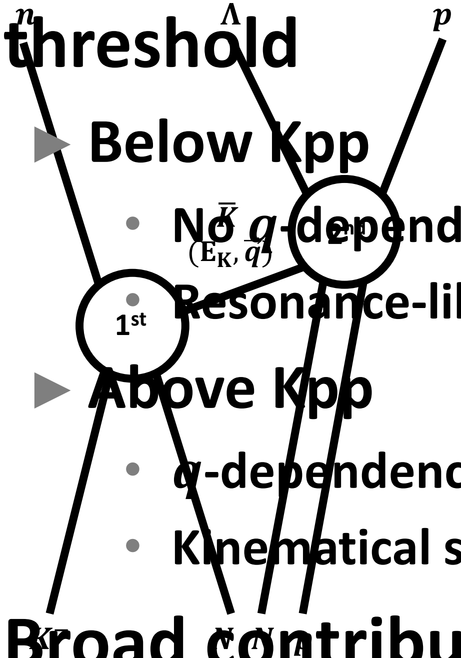


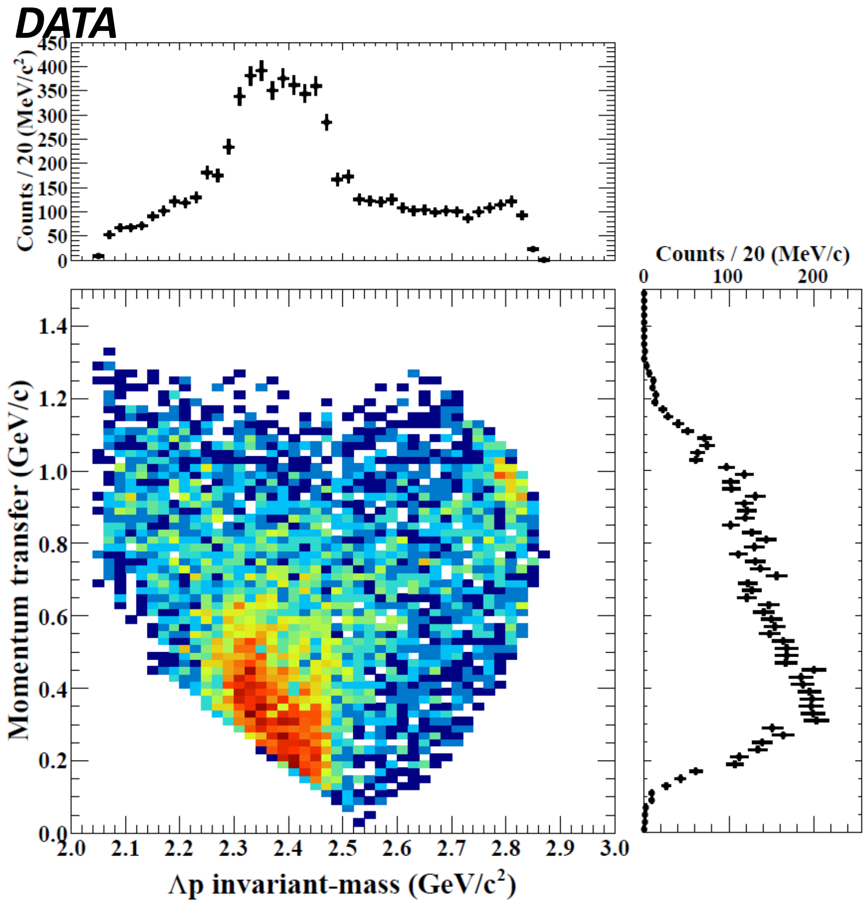
- **Peak was observed.**
  - **Below and above the threshold**
- **Two peaks**
  - **Above threshold**
    - **Peak position depends on $\cos\theta_n^{CM}$**
  - **Below threshold**
    - **Resonance-like**

$$B.E. = 44 \pm 4(stat.)^{+7}_{-2}(sys.)\ MeV$$
$$\Gamma = 64 \pm 8(stat.)^{+14}_{-7}(sys.)MeV$$

$IM(\Lambda p)$ vs. Momentum transfer

- Peaks around Kpp threshold
  - Below Kpp
    - No q-dependence
    - Resonance-like
  - Above Kpp
    - q-dependence
    - Kinematical structure
- Broad contribution

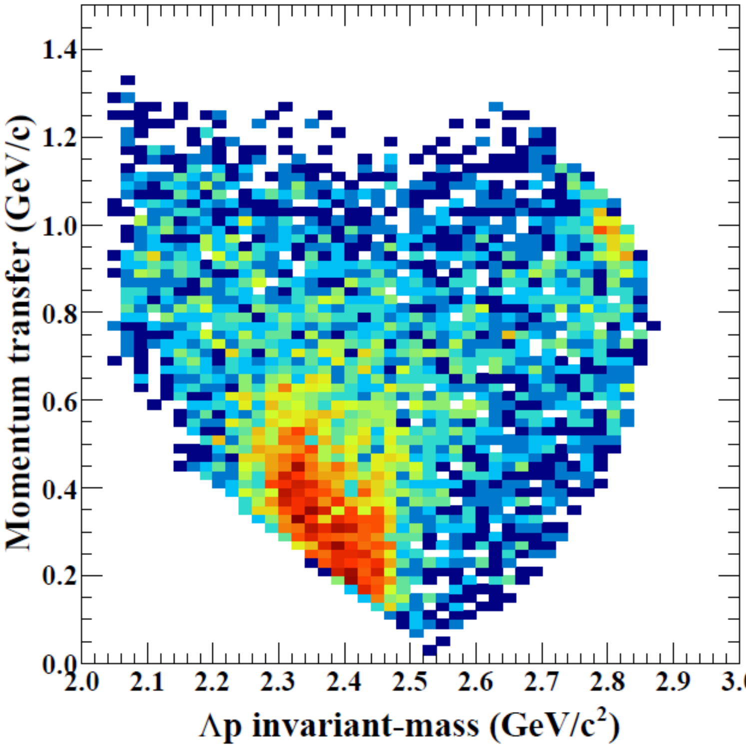




Spectrum fitting

- **We considered three components**
  - **Kpp bound state**
    - **Resonance-like structure**
  - **Qasi-elastic kaon absorption**
    - **Kinematical structure**
  - **Other contribution**
    - **Broad distribution**
- **Expected spectrum**
  - $\underbrace{\rho_{3B}(M,q)}_{\text{phase space}} \times \underbrace{\mathcal{E}_{pp\pi^-}(M,q)}_{\text{Acceptance}} \times \underbrace{phys_j(M,q)}_{\text{Structure of component}}$

DATA



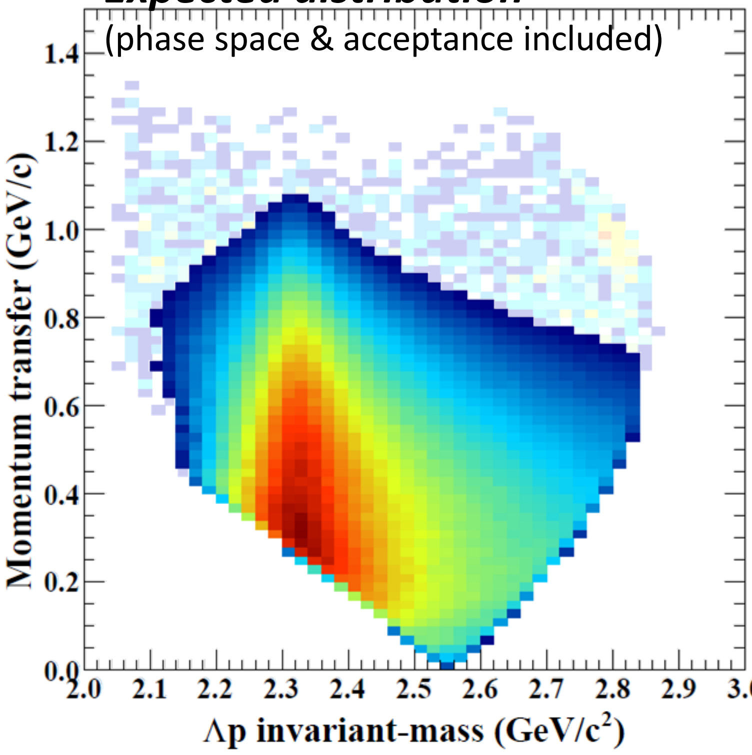
2D view of each component

Resonant state

- $$phys_{Kpp}(M,q) = A_{Kpp}\frac{\left(\Gamma_{Kpp}/2\right)^2}{\left(M-M_{Kpp}\right)^2+\left(\Gamma_{Kpp}/2\right)^2}\times\exp\left(-\frac{q^2}{Q_{Kpp}^2}\right),$$

Expected distribution

(phase space & acceptance included)



Possible components

◆ Resonant state

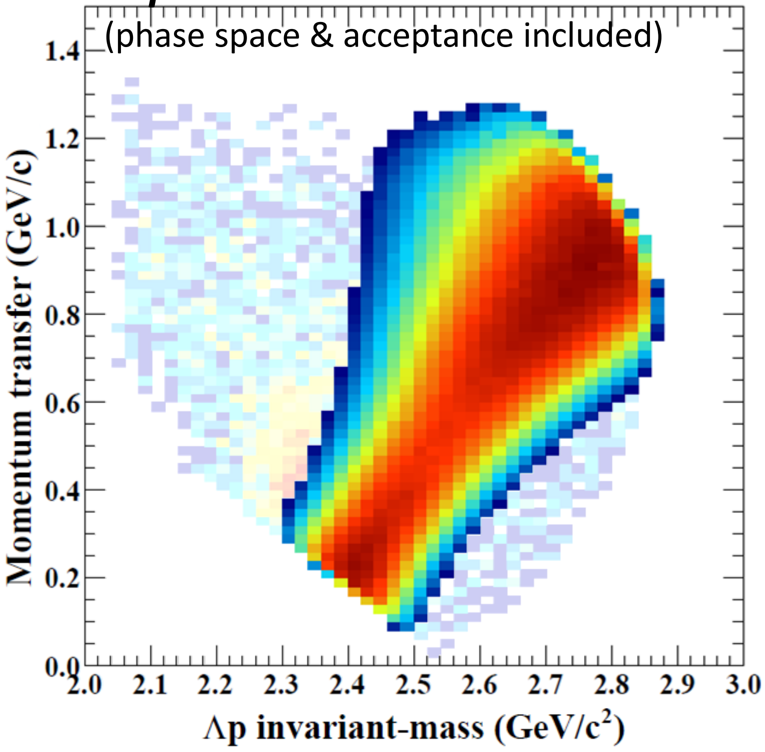
▶ $$phys_{Kpp}(M,q) = A_{Kpp}\frac{\left(\Gamma_{Kpp}/2\right)^2}{\left(M - M_{Kpp}\right)^2 + \left(\Gamma_{Kpp}/2\right)^2} \times \exp\left(-\frac{q^2}{Q_{Kpp}^2}\right),$$

◆ Qasi-elastic kaon absorption

▶ $$\begin{aligned} phys_{2NR}(M,q) &= A_{2NR}\exp\left(-\left(\frac{M - M_{2NR}(q)}{\Delta M_{2NR}(q)}\right)^2\right) \\ &\times \left(\exp\left(-\frac{q^2}{Q_b^2}\right) + R_c + R_f\exp\left(\Delta M_f \cdot M + \Delta q_f \cdot q\right)\right), \end{aligned}$$

Expected distribution

(phase space & acceptance included)



Possible components

Resonant state

$$phys_{Kpp}(M,q) = A_{Kpp}\frac{\left(\Gamma_{Kpp}/2\right)^2}{\left(M-M_{Kpp}\right)^2+\left(\Gamma_{Kpp}/2\right)^2}\times\exp\left(-\frac{q^2}{Q^2_{Kpp}}\right),$$

Qasi-elastic kaon absorption

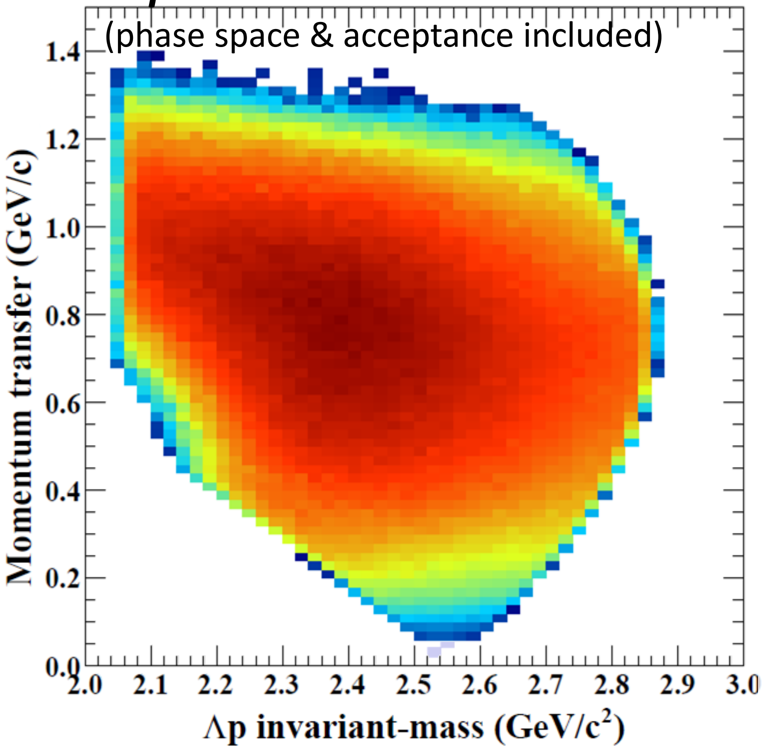
$$phys_{2NR}(M,q) = A_{2NR}\exp\left(-\left(\frac{M-M_{2NR}(q)}{\Delta M_{2NR}(q)}\right)^2\right)\times\left(\exp\left(-\frac{q^2}{Q_b^2}\right)+R_c+R_f\exp\left(\Delta M_f\cdot M+\Delta q_f\cdot q\right)\right),$$

Other contribution

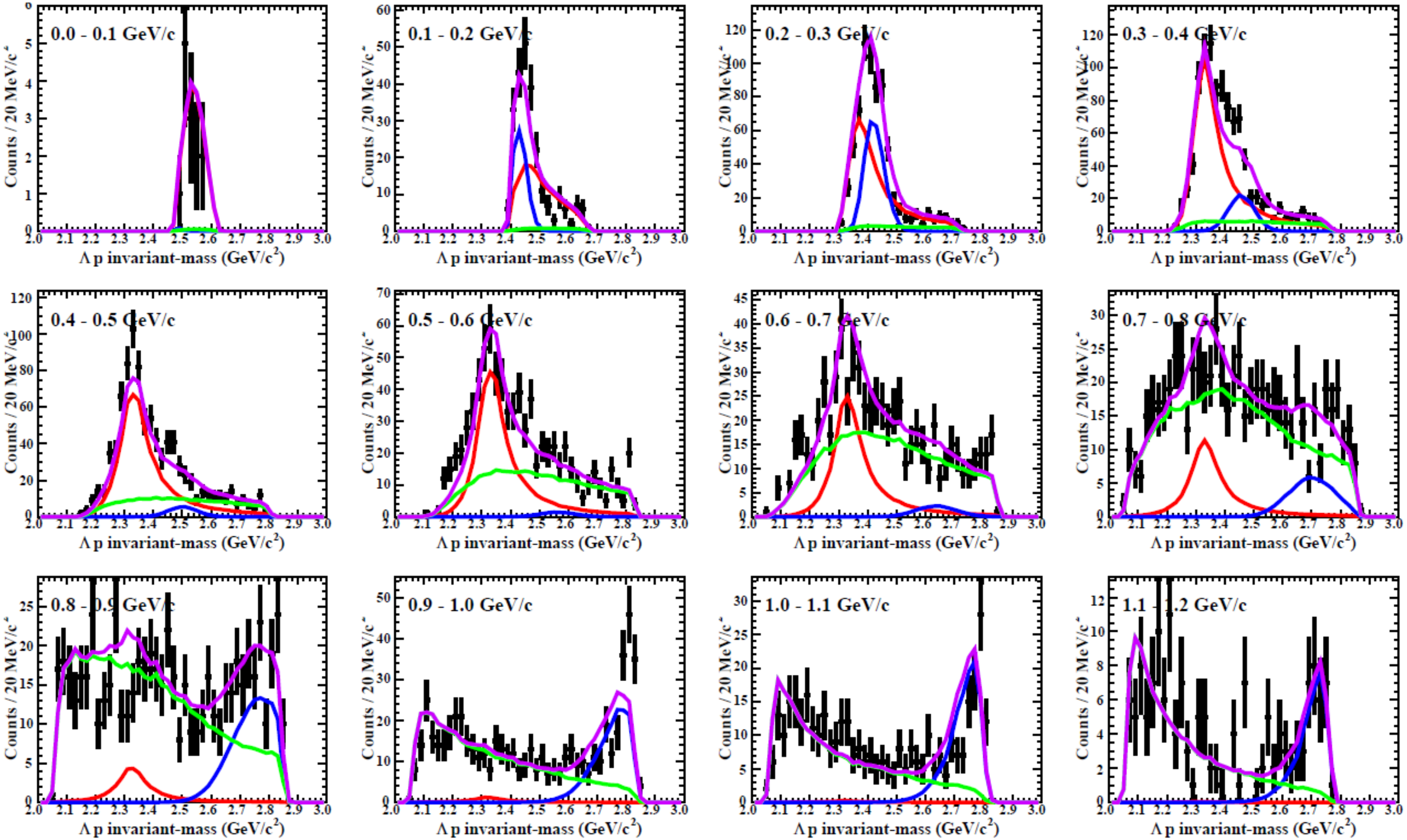
$$phys_X(M,q) = A_X\frac{(\Gamma_X/2)^2}{(M-M_X)^2+(\Gamma_X/2)^2}\times\frac{q^2}{Q_X^2}\cdot\exp\left(-\frac{q^2}{Q_X^2}\right),$$

Expected distribution

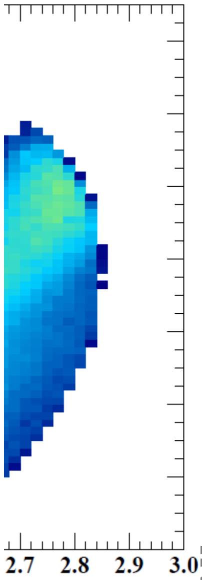
(phase space & acceptance included)



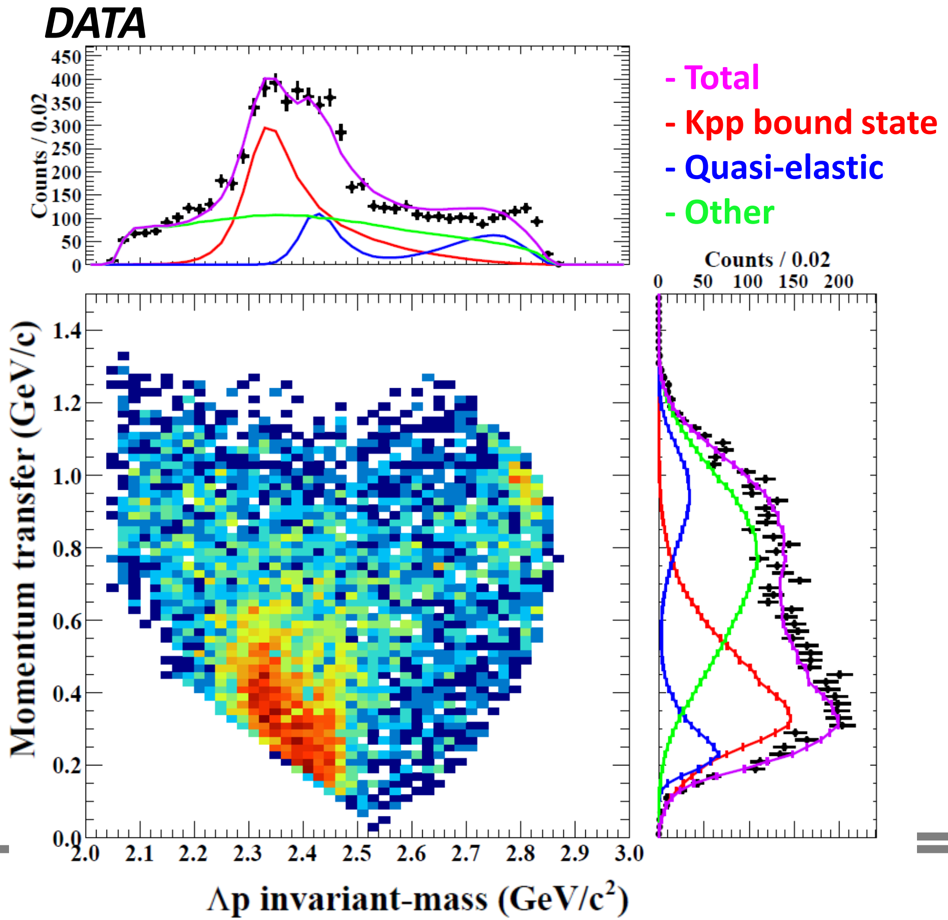
Spectrum fitting



- Total
- Kpp bound state
- Quasi-elastic
- Other



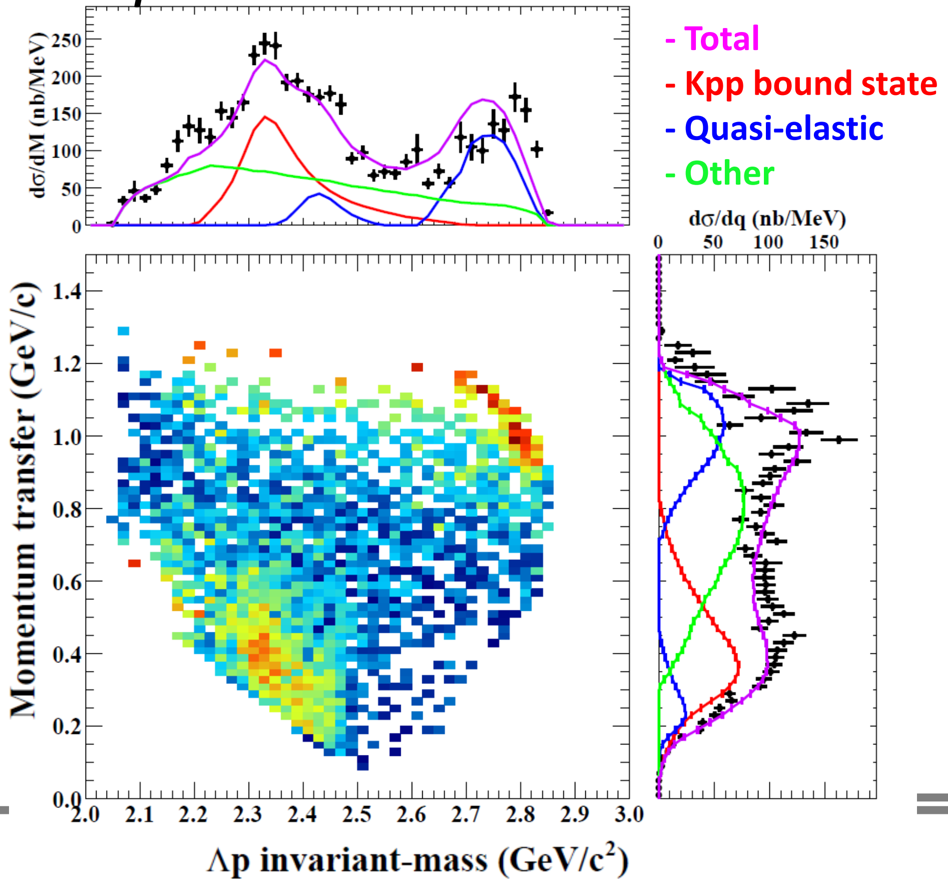
Spectrum fitting



- **Observed resonance** Error : ~ 5%
  - $K^{-}pp$ bound state?
  - $B.E. \sim 50$ MeV
  - $\Gamma \sim 110$ MeV
    - Will be narrower
      - Resolution
      - Σ^0 contamination
  - $Q_{Kpp} \sim 400$ MeV

Cross section

Acceptance corrected

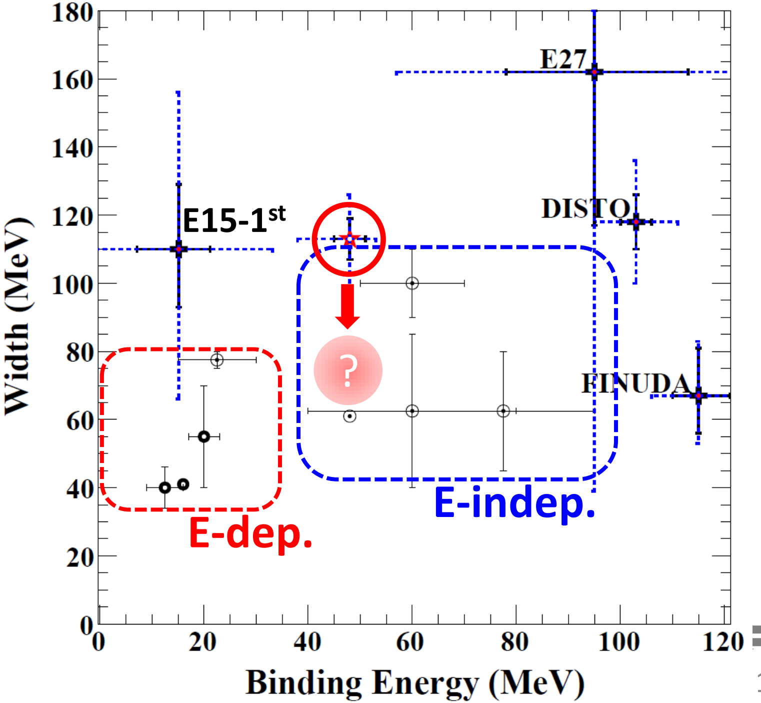


- **Observed resonance** Error : ~ 5%
  - $K^{-}pp$ bound state?
  - $B.E. \sim 50$ MeV
  - $\Gamma \sim 110$ MeV
    - Will be narrower
      - Resolution
      - Σ^0 contamination
  - $Q_{Kpp} \sim 400$ MeV
- **Cross section**
  - $\sim 10\ \mu b$
    - Below the Kpp threshold
    - $q < 0.7\ GeV/c$

➡ *To be compared with Λ^* prod.*

Summary

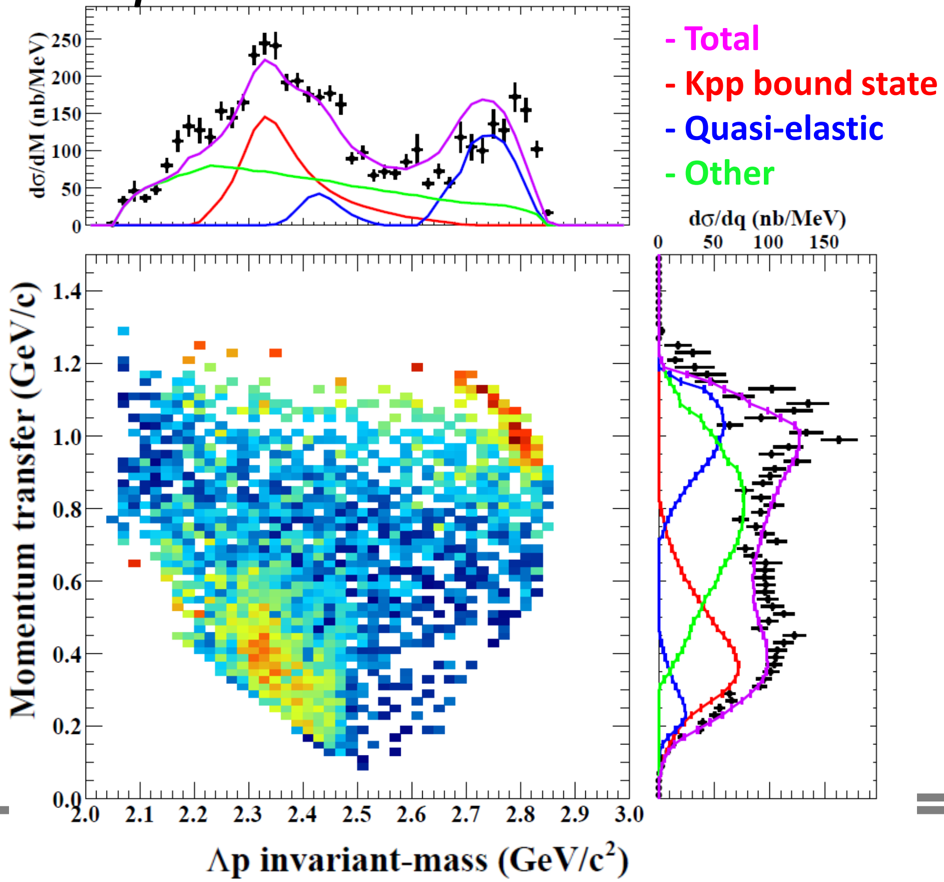
- **Λp invariant-mass and momentum transfer distributions are well reproduced by three components.**
  - Resonance
  - Quasi-free
  - Broad contribution
- **Observed resonance state**
  - $B.E. \sim 50$ MeV
  - $\Gamma \sim 110$ MeV
  - $Q_{Kpp} \sim 400$ MeV
  - $\sigma \sim 10\ \mu b$



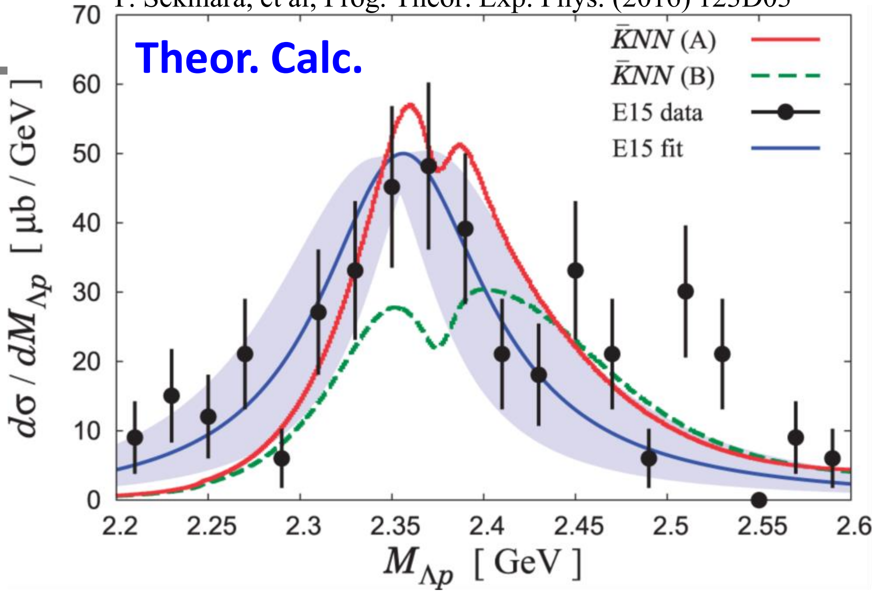
BACKUP

Cross section

Acceptance corrected



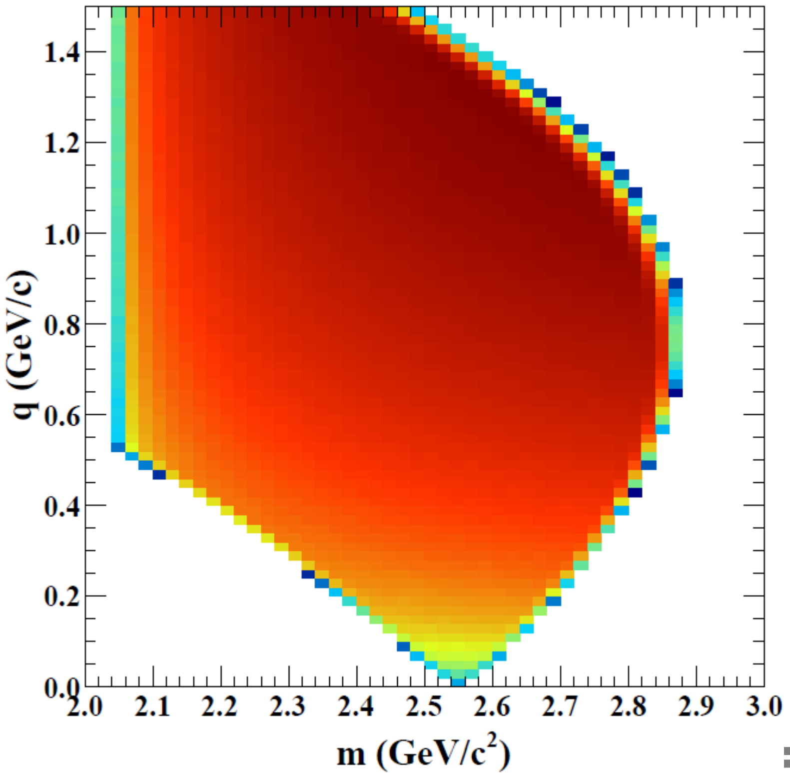
T. Sekihara, et al, Prog. Theor. Exp. Phys. (2016) 123D03



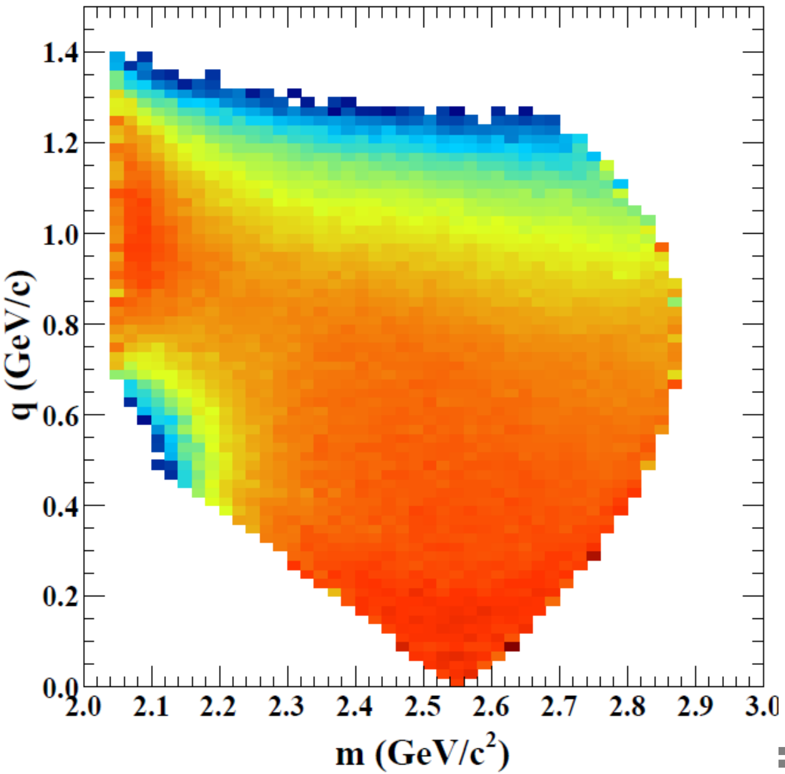
- **Integrated cross section**
  - ▶ $\sim 20\ \mu b$

3-body phase space and acceptance

Simulation : 3-body phase space



Simulation : Acceptance



$\Sigma^0 pn$ contamination

- **We can reduce the $\Sigma^0 pn$ contamination by,**
  - **p-value cut of kinematical fit**
  - **Missing-neutron selection**

- **Reduction efficiency is studied by using MC simulation.**
  - **3-body phase space Λpn / $\Sigma^0 pn$ final states**

$\Sigma^0 pn$ contamination

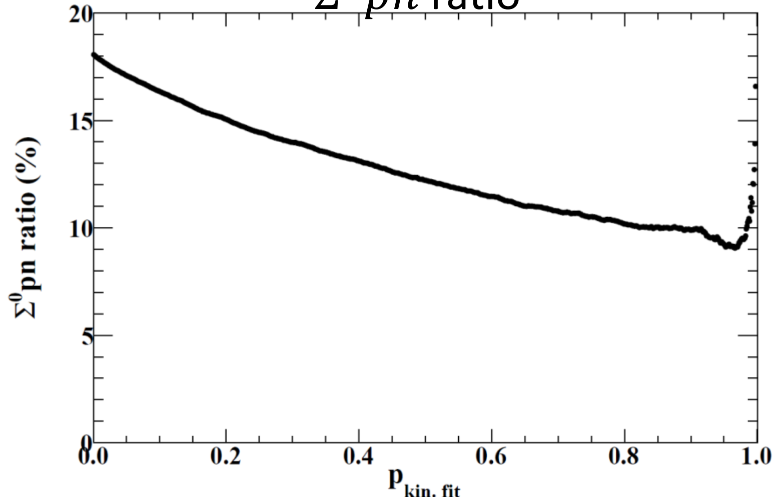
- **Missing-neutron window selection**
  - **We can reduce the contamination easily.**
  - **It is better way?**

	“n”-window (GeV/c^2)	$\Sigma^0 pn$ ratio
Default setting →	0.85 – 1.03	18 %
Lower side →	0.85 – 0.94	5 %
Tight condition →	0.90 – 0.98	10 %

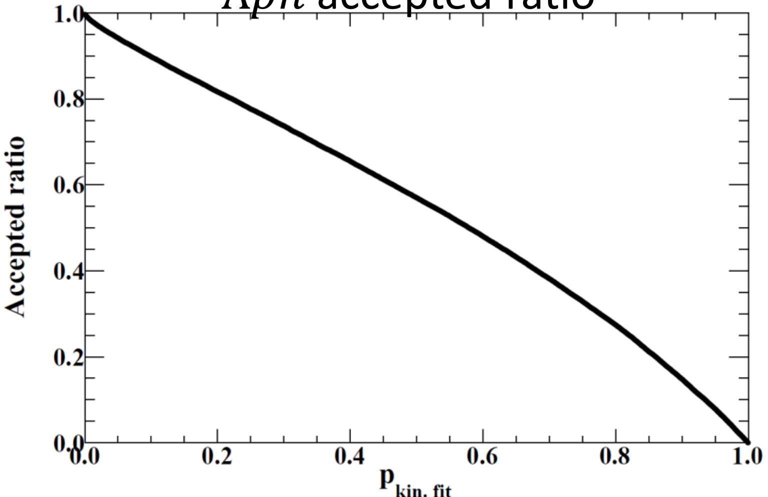
$\Sigma^0 pn$ contamination

- **p-value cut of kinematical fit**
  - **Σpn contamination reducing is small**
  - **Ex.) If we set the p-value cut at 0.1, $\Sigma^0 pn$ ratio and Λpn event become 15.5% and 85%, respectively.**
  - **Not useful?**

$\Sigma^0 pn$ ratio



Λpn accepted ratio



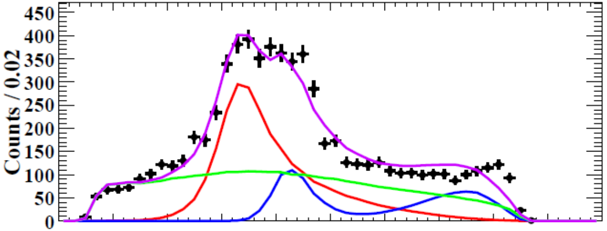
$\Sigma^0 pn$ contamination

- **To reduce the $\Sigma^0 pn$ contamination, “n”-window selection is better way.**

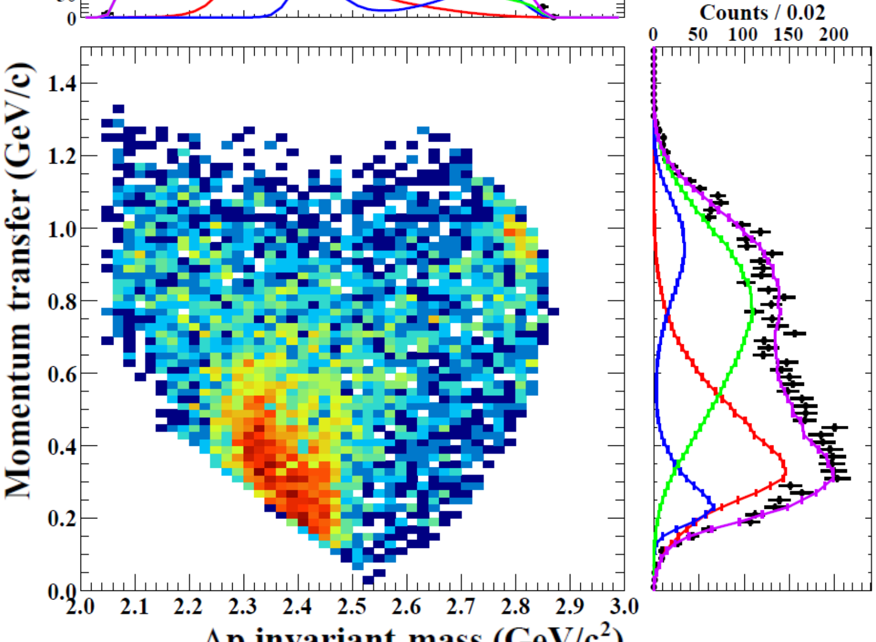
- **Fitting is performed for tight cut condition**
  - **Acceptance which includes analysis efficiency is evaluated to different cut condition.**

Fitting result :: All free

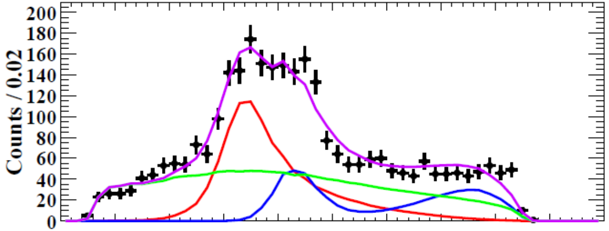
“n”-window : 0.85 – 1.03 GeV



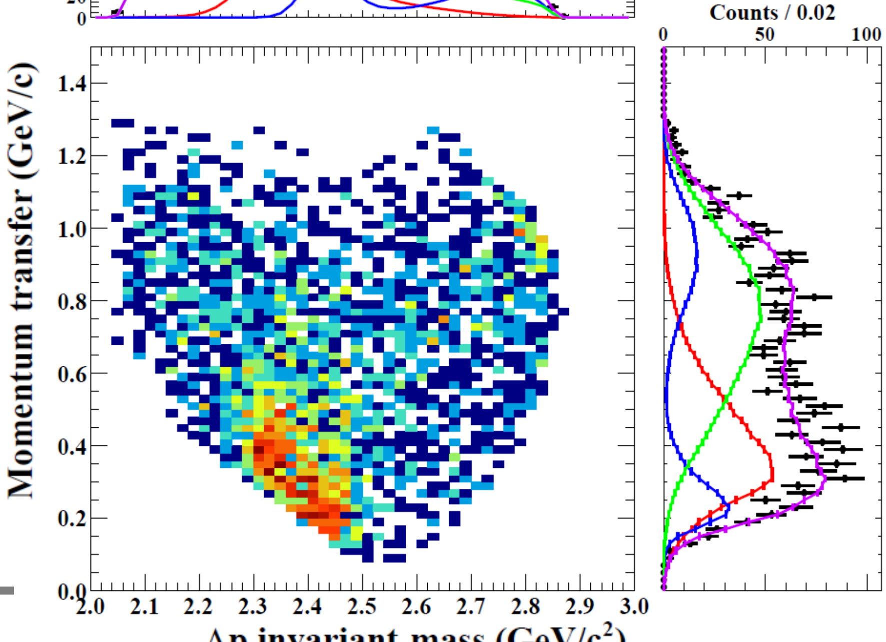
$B.E._{Kpp}$	$48\ MeV$
Γ_{Kpp}	$114\ MeV$
Q_{Kpp}	$400\ MeV$
σ	$24\ \mu b$



“n”-window : 0.85 – 0.94 GeV

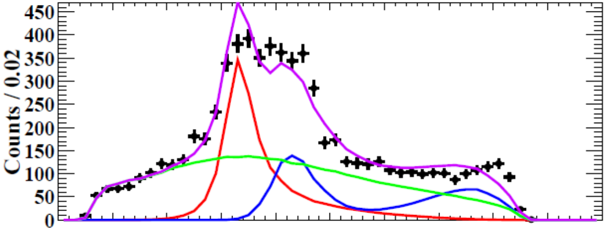


$B.E._{Kpp}$	$44\ MeV$
Γ_{Kpp}	$111\ MeV$
Q_{Kpp}	$407\ MeV$
σ	$14\ \mu b$

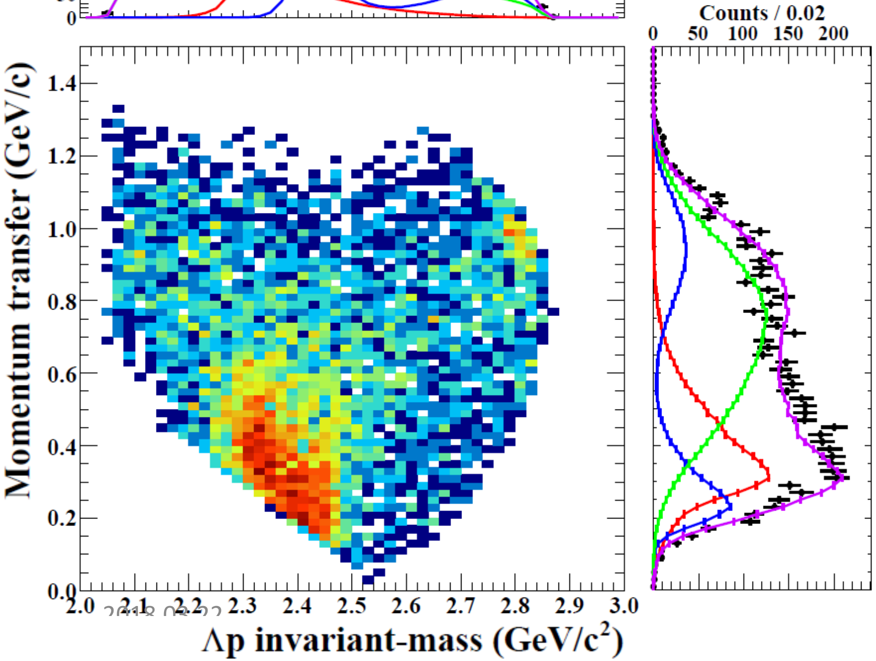


Fitting result :: Fix $\Gamma_{Kpp} = 66\ MeV$ & $BE_{Kpp} = 56\ MeV$

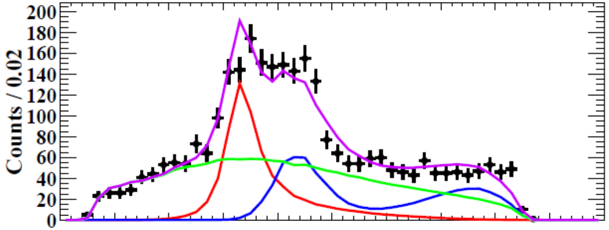
"n"-window : 0.85 – 1.03 GeV



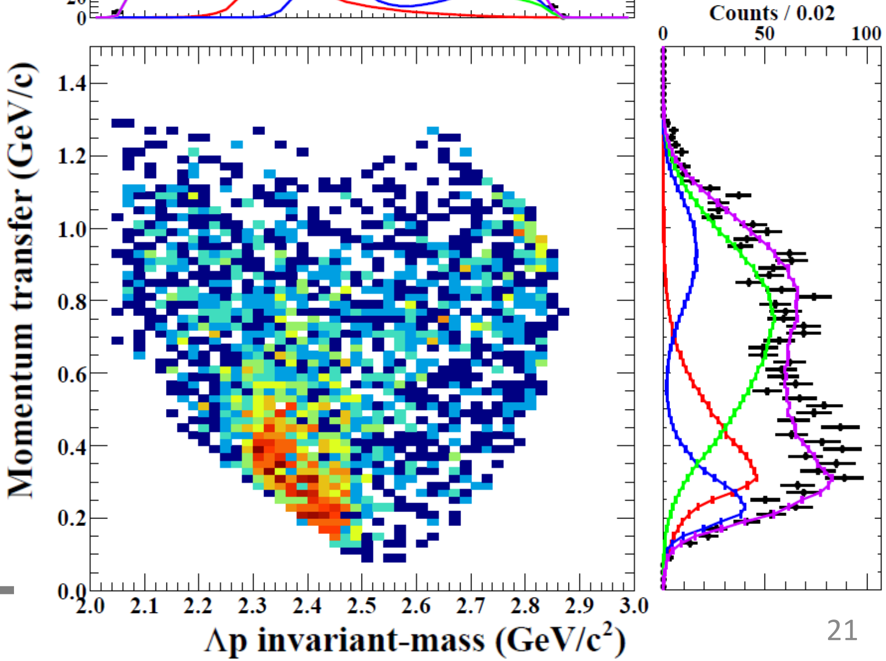
$B.E._{Kpp}$	$44\ MeV$
Γ_{Kpp}	$64\ MeV$
Q_{Kpp}	$357\ MeV$
σ	$16\ \mu b$



"n"-window : 0.85 – 0.94 GeV

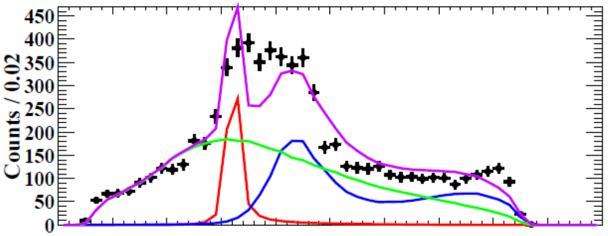


$B.E._{Kpp}$	$44\ MeV$
Γ_{Kpp}	$64\ MeV$
Q_{Kpp}	$372\ MeV$
σ	$10\ \mu b$

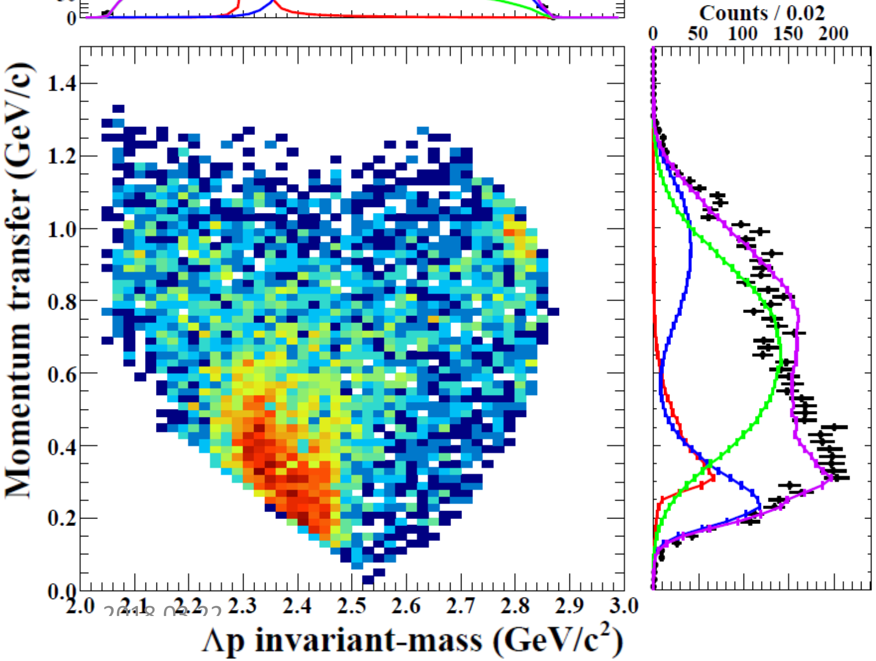


Fitting result :: Fix $\Gamma_{Kpp} = 10$ MeV

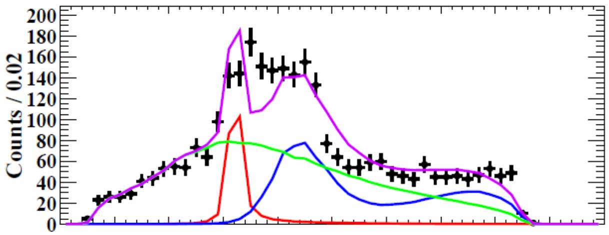
“n”-window : 0.85 – 1.03 GeV



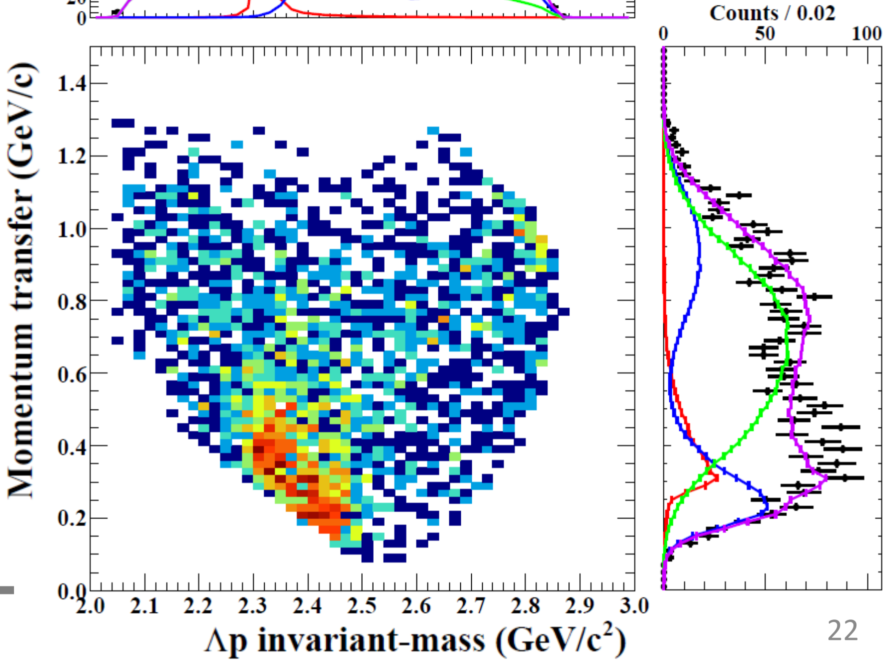
$B.E._{Kpp}$	$50\ MeV$
Γ_{Kpp}	$10\ MeV$
Q_{Kpp}	$322\ MeV$
σ	$6\ \mu b$



“n”-window : 0.85 – 0.94 GeV

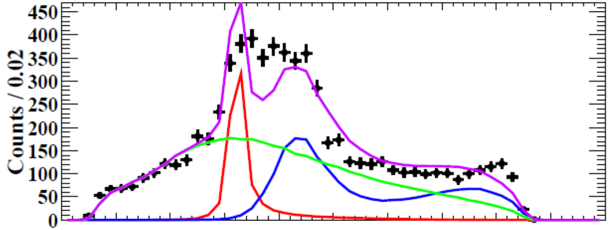


$B.E._{Kpp}$	$50\ MeV$
Γ_{Kpp}	$10\ MeV$
Q_{Kpp}	$325\ MeV$
σ	$4\ \mu b$

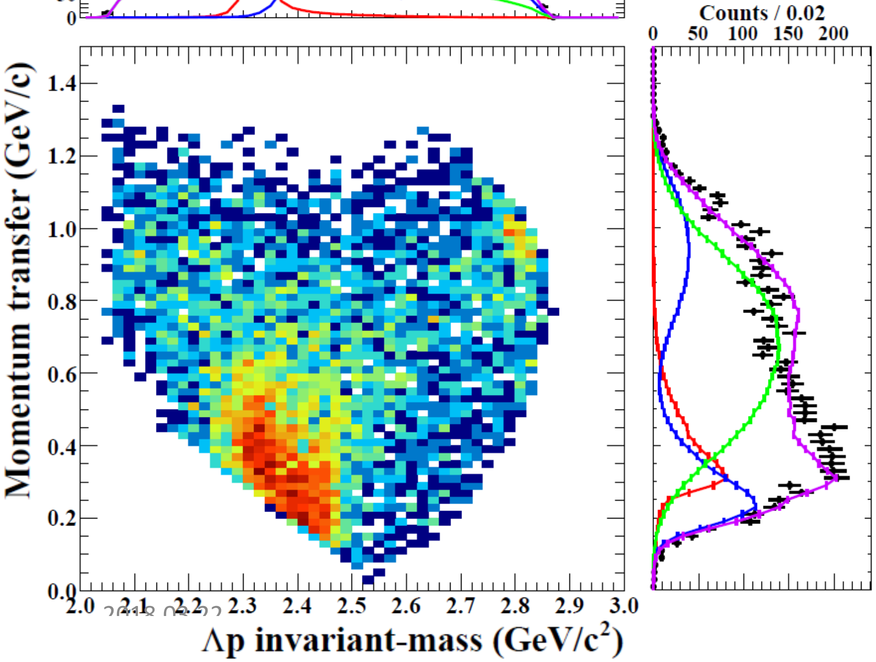


Fitting result :: Fix $\Gamma_{Kpp} = 20$ MeV

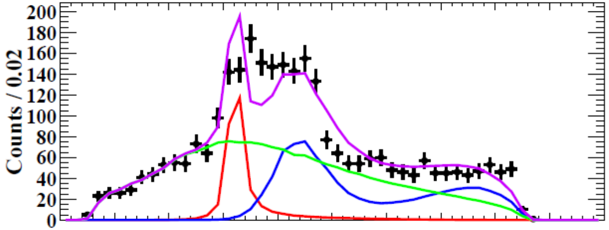
"n"-window : 0.85 – 1.03 GeV



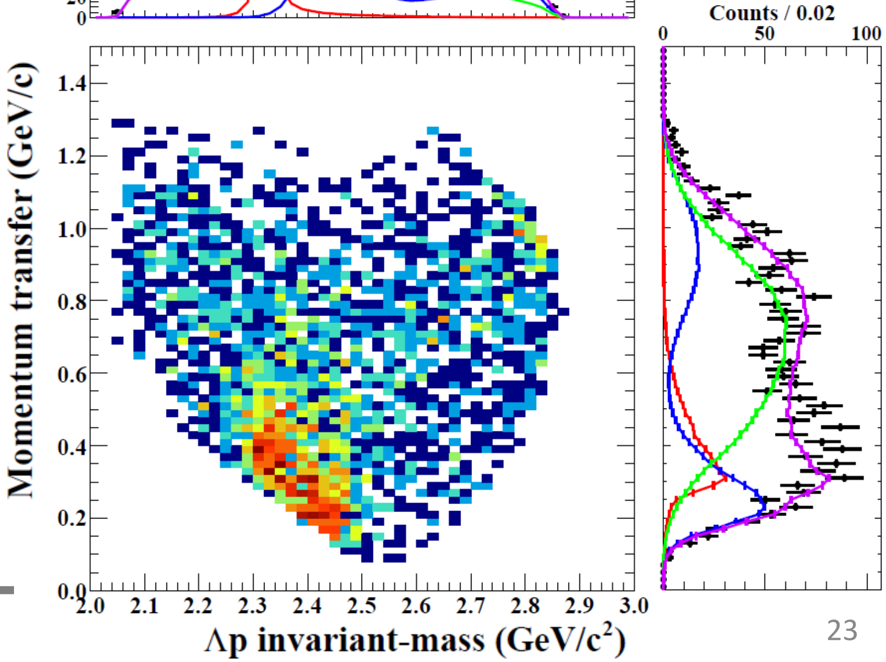
$B.E._{Kpp}$	$50\ MeV$
Γ_{Kpp}	$20\ MeV$
Q_{Kpp}	$323\ MeV$
σ	$8\ \mu b$



"n"-window : 0.85 – 0.94 GeV

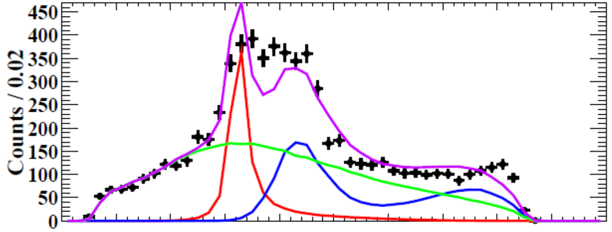


$B.E._{Kpp}$	$50\ MeV$
Γ_{Kpp}	$20\ MeV$
Q_{Kpp}	$329\ MeV$
σ	$5\ \mu b$

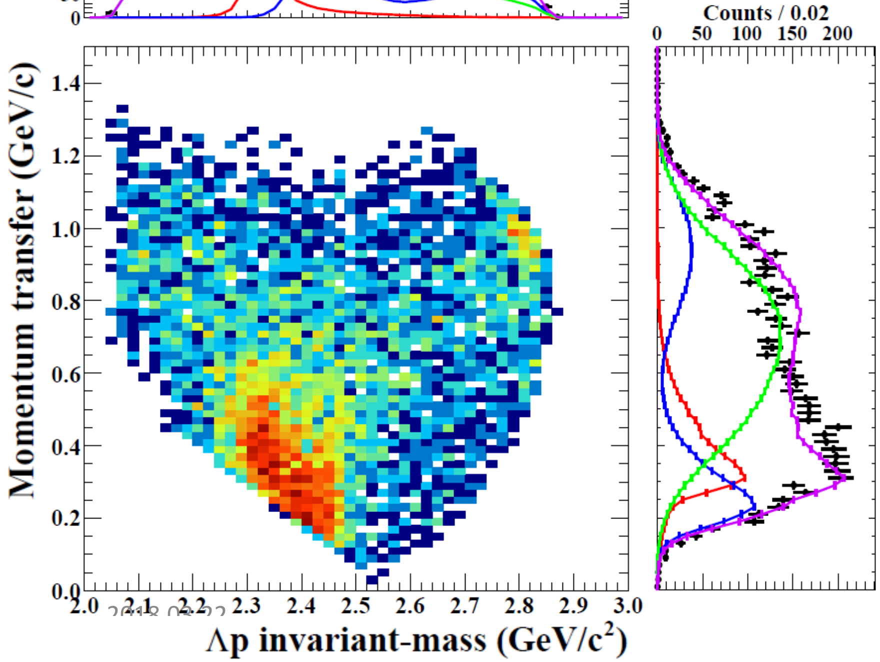


Fitting result :: Fix $\Gamma_{Kpp} = 30$ MeV

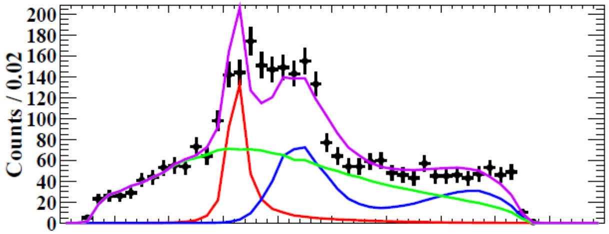
"n"-window : 0.85 – 1.03 GeV



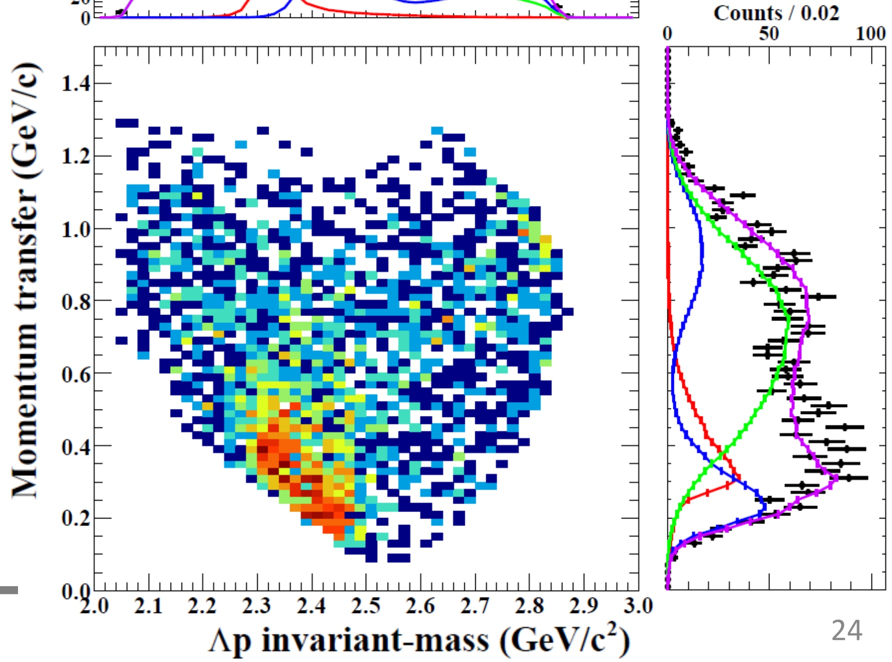
$B.E._{Kpp}$	$48\ MeV$
Γ_{Kpp}	$30\ MeV$
Q_{Kpp}	$328\ MeV$
σ	$10\ \mu b$



"n"-window : 0.85 – 0.94 GeV

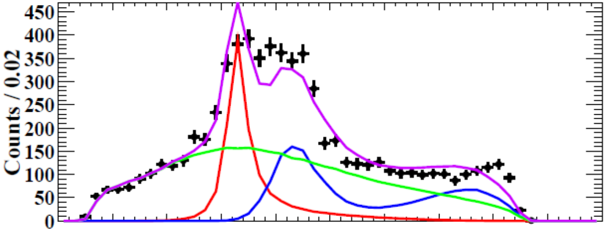


$B.E._{Kpp}$	$49\ MeV$
Γ_{Kpp}	$30\ MeV$
Q_{Kpp}	$338\ MeV$
σ	$6\ \mu b$

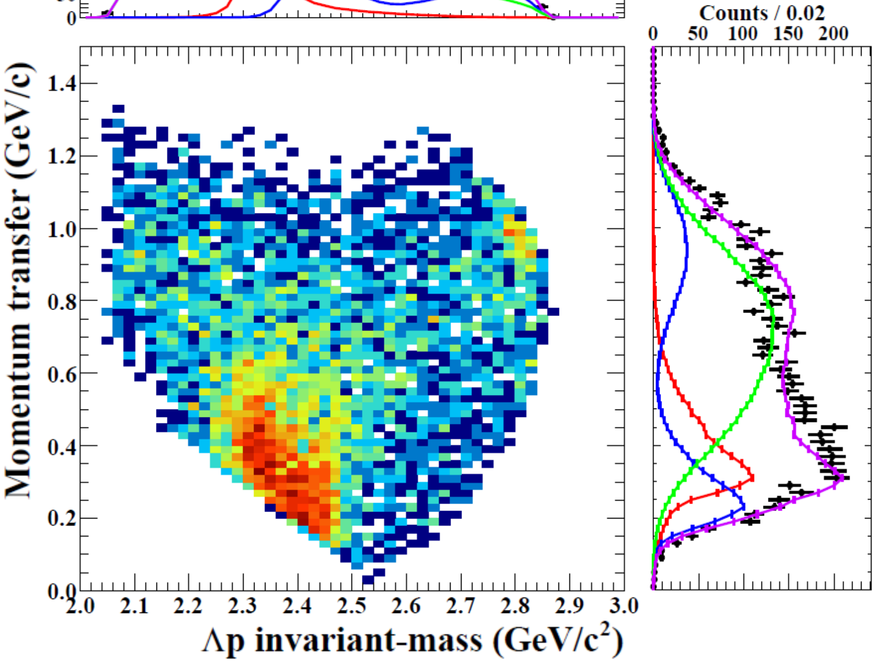


Fitting result :: Fix $\Gamma_{Kpp} = 40$ MeV

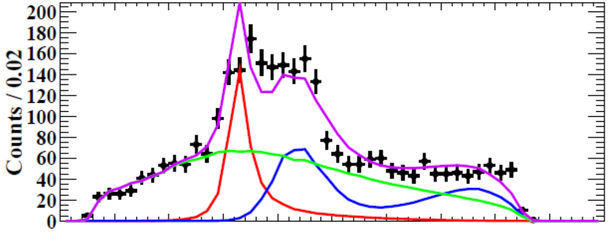
"n"-window : 0.85 – 1.03 GeV



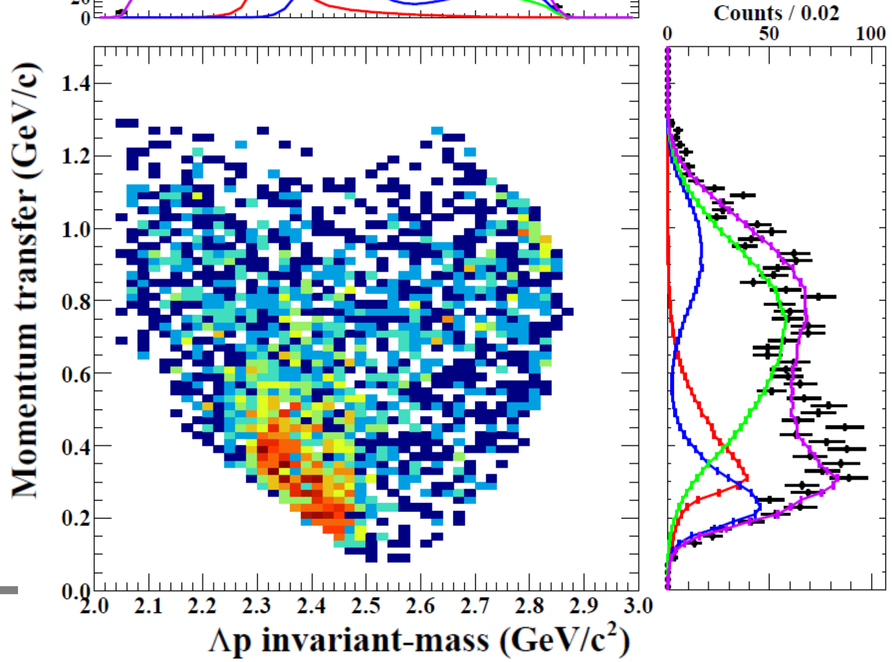
$B.E._{Kpp}$	$45\ MeV$
Γ_{Kpp}	$40\ MeV$
Q_{Kpp}	$337\ MeV$
σ	$12\ \mu b$



"n"-window : 0.85 – 0.94 GeV

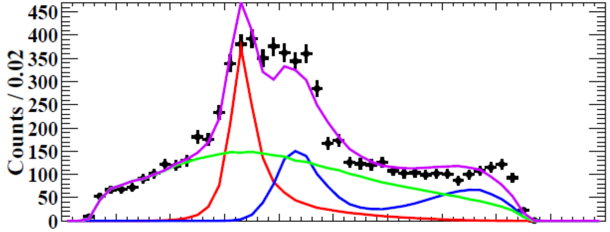


$B.E._{Kpp}$	$46\ MeV$
Γ_{Kpp}	$40\ MeV$
Q_{Kpp}	$349\ MeV$
σ	$7\ \mu b$

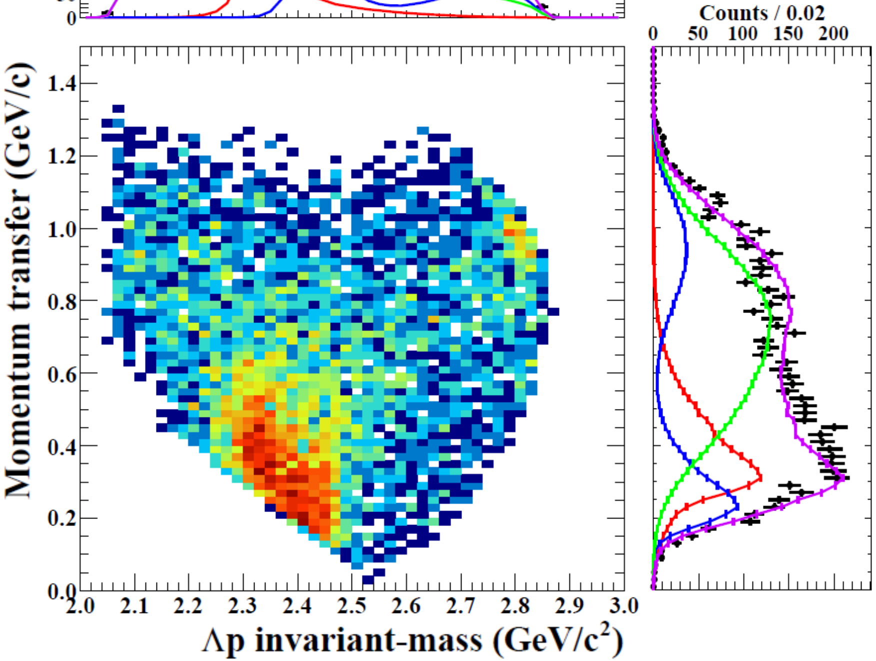


Fitting result :: Fix $\Gamma_{Kpp} = 50$ MeV

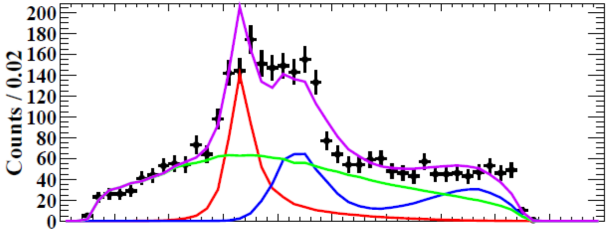
"n"-window : 0.85 – 1.03 GeV



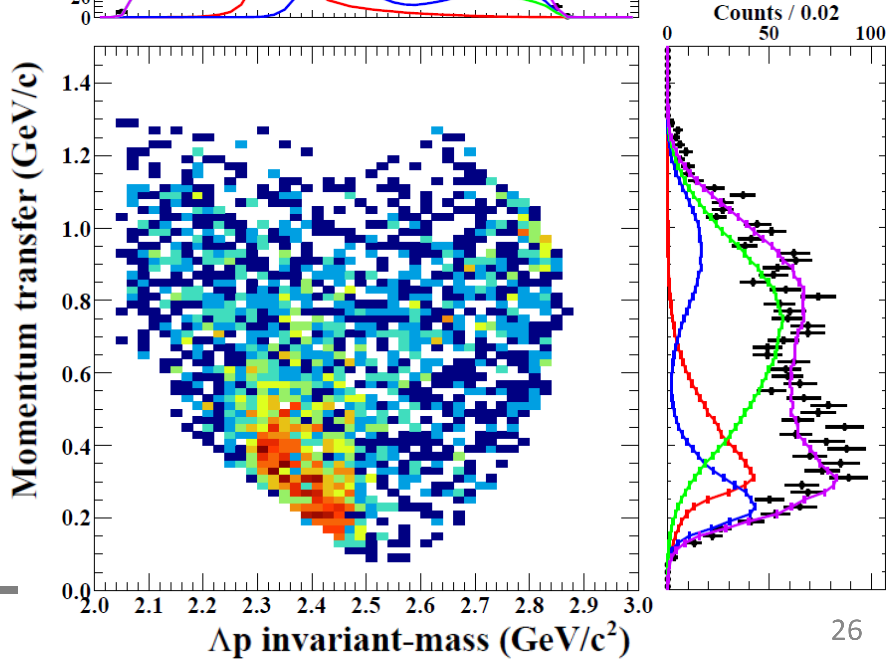
$B.E._{Kpp}$	$43\ MeV$
Γ_{Kpp}	$50\ MeV$
Q_{Kpp}	$346\ MeV$
σ	$14\ \mu b$



"n"-window : 0.85 – 0.94 GeV

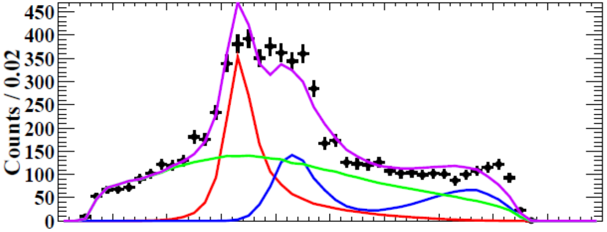


$B.E._{Kpp}$	$43\ MeV$
Γ_{Kpp}	$50\ MeV$
Q_{Kpp}	$360\ MeV$
σ	$8\ \mu b$

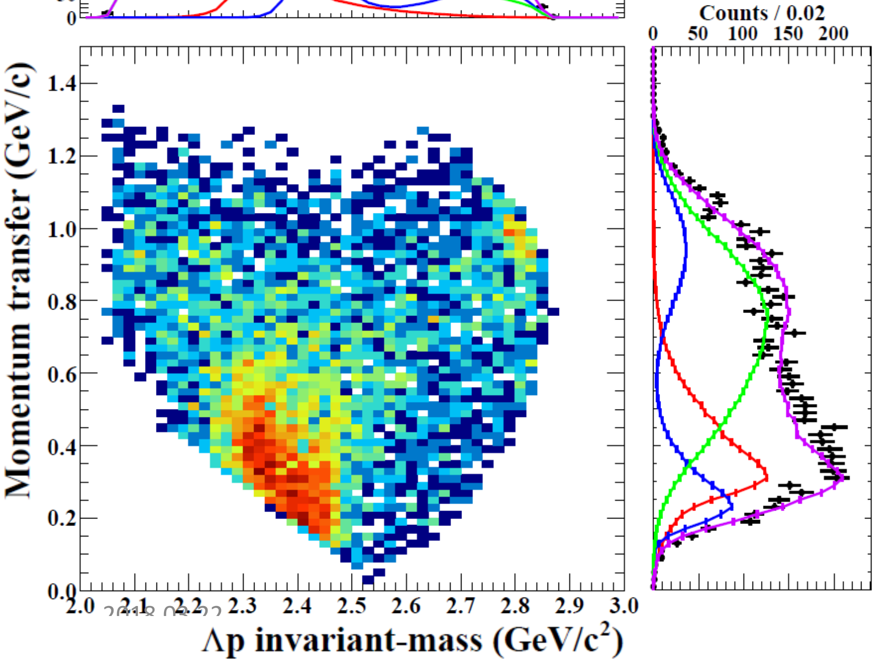


Fitting result :: Fix $\Gamma_{Kpp} = 60$ MeV

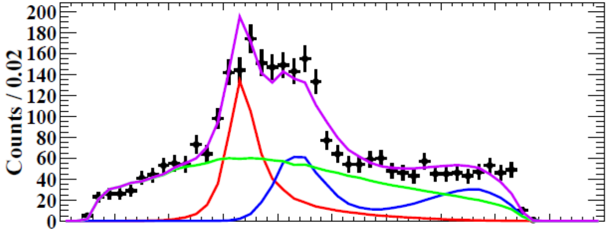
"n"-window : 0.85 – 1.03 GeV



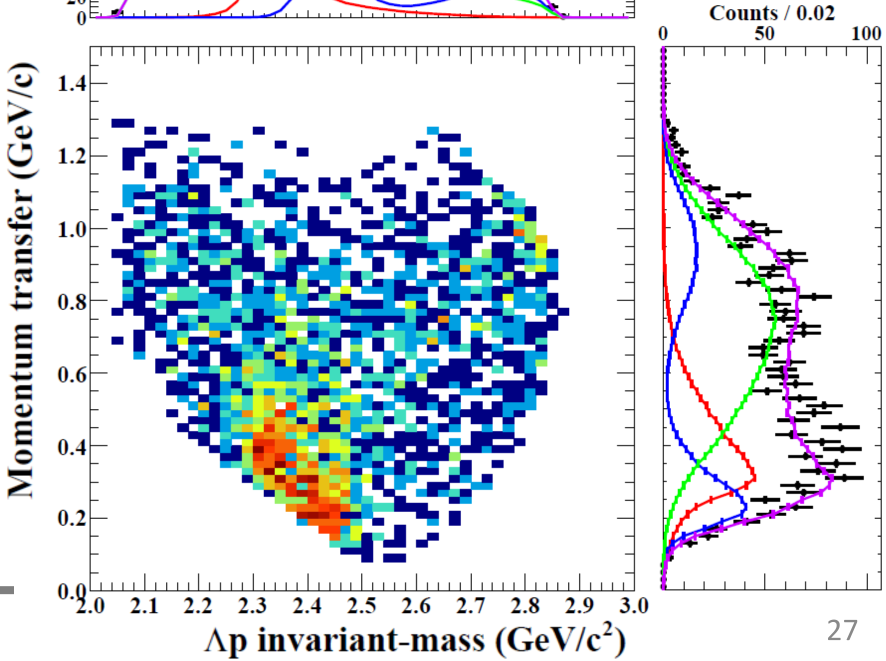
$B.E._{Kpp}$	$43\ MeV$
Γ_{Kpp}	$60\ MeV$
Q_{Kpp}	$354\ MeV$
σ	$16\ \mu b$



"n"-window : 0.85 – 0.94 GeV

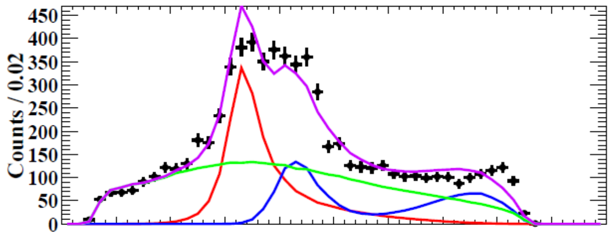


$B.E._{Kpp}$	$43\ MeV$
Γ_{Kpp}	$60\ MeV$
Q_{Kpp}	$369\ MeV$
σ	$9\ \mu b$

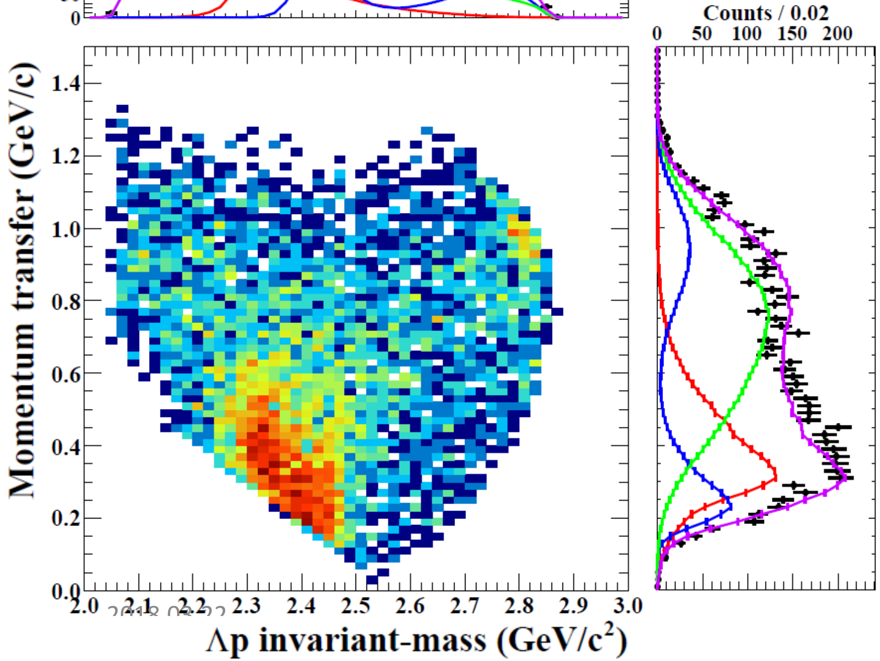


Fitting result :: Fix $\Gamma_{Kpp} = 70$ MeV

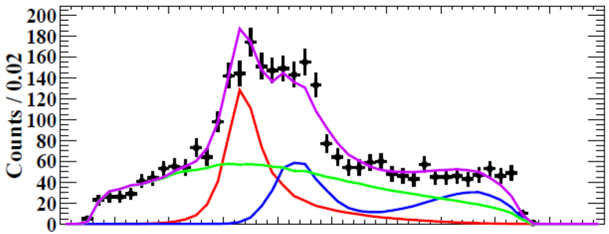
"n"-window : 0.85 – 1.03 GeV



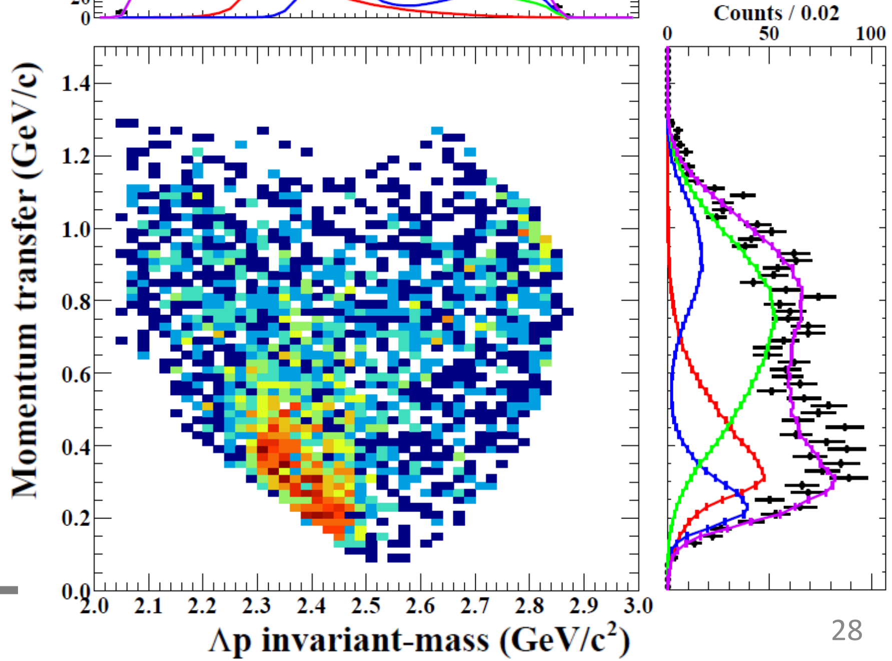
$B.E._{Kpp}$	$44\ MeV$
Γ_{Kpp}	$70\ MeV$
Q_{Kpp}	$362\ MeV$
σ	$17\ \mu b$



"n"-window : 0.85 – 0.94 GeV

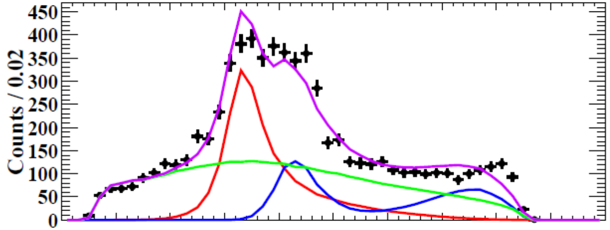


$B.E._{Kpp}$	$42\ MeV$
Γ_{Kpp}	$70\ MeV$
Q_{Kpp}	$377\ MeV$
σ	$10\ \mu b$

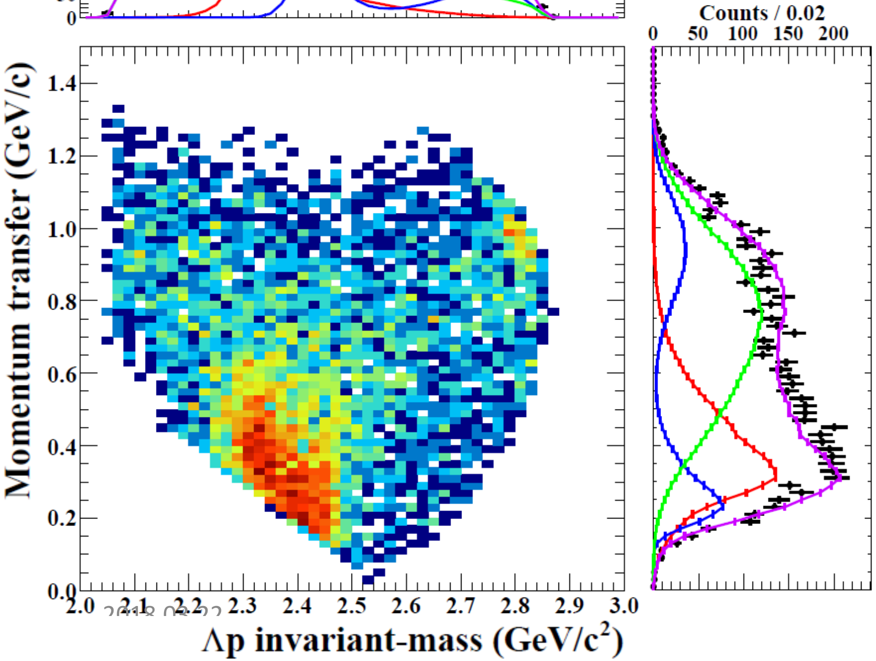


Fitting result :: Fix $\Gamma_{Kpp} = 80$ MeV

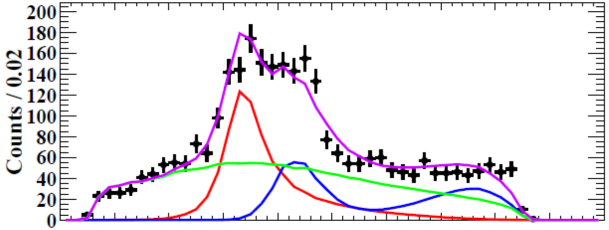
"n"-window : 0.85 – 1.03 GeV



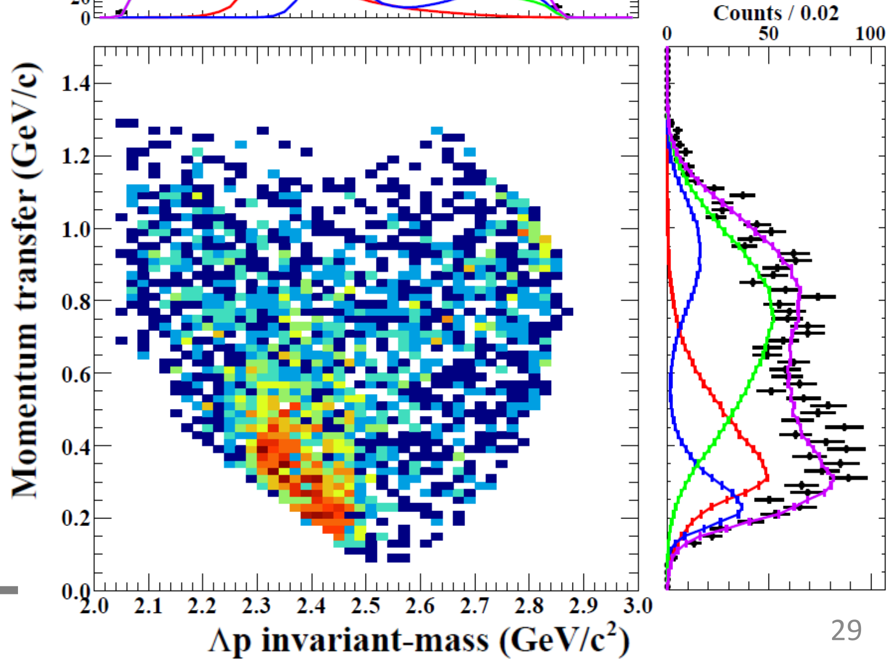
$B.E._{Kpp}$	45 MeV
Γ_{Kpp}	80 MeV
Q_{Kpp}	370 MeV
σ	19 μb



"n"-window : 0.85 – 0.94 GeV

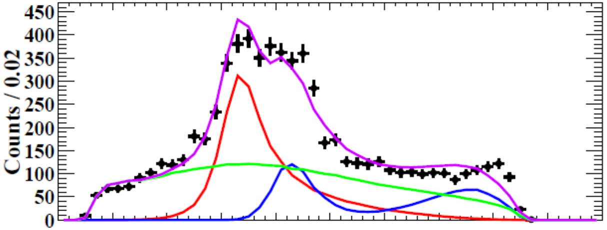


$B.E._{Kpp}$	43 MeV
Γ_{Kpp}	80 MeV
Q_{Kpp}	385 MeV
σ	11 μb

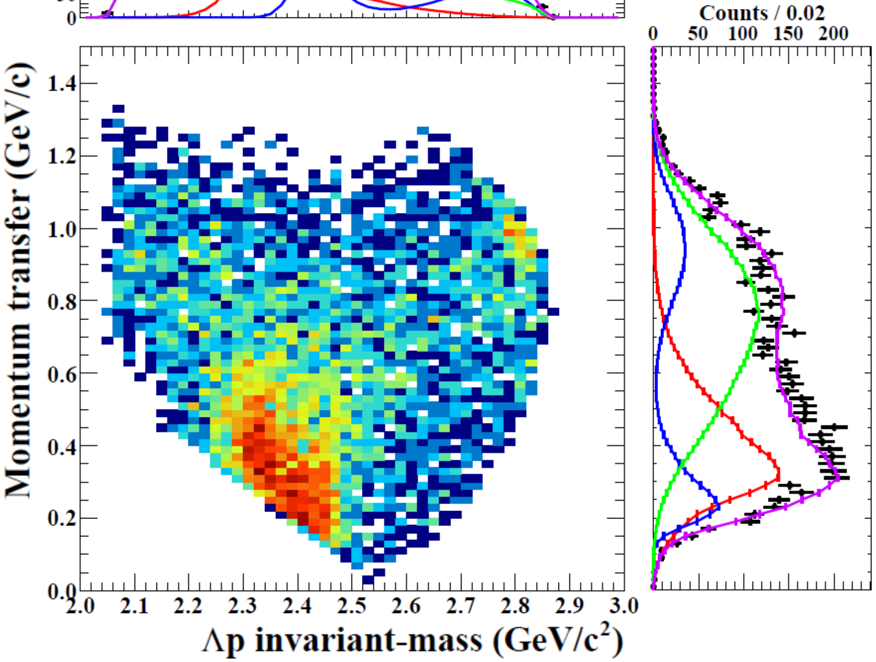


Fitting result :: Fix $\Gamma_{Kpp} = 90$ MeV

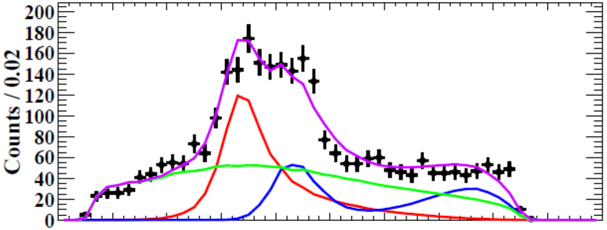
“n”-window : 0.85 – 1.03 GeV



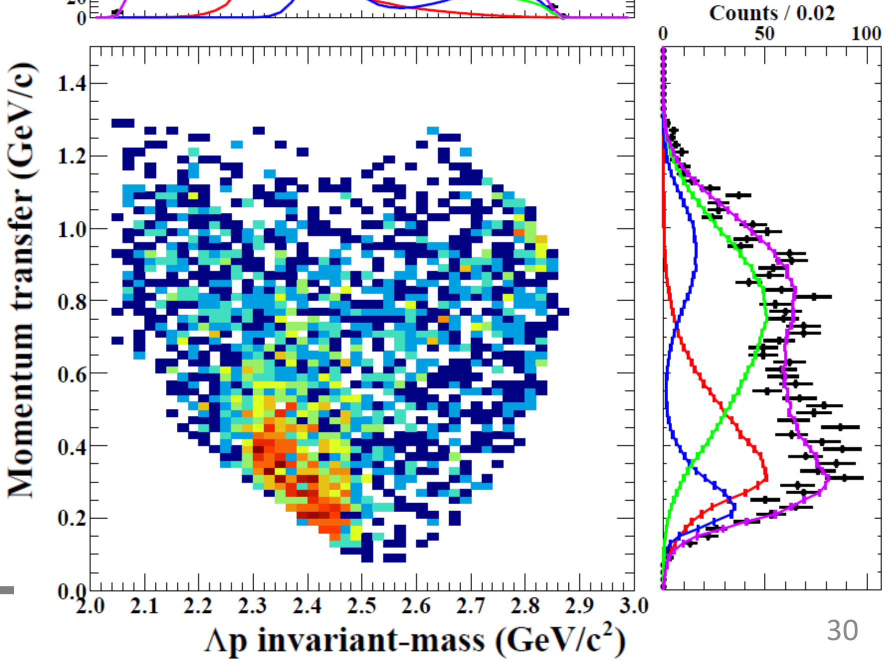
$B.E._{Kpp}$	$45\ MeV$
Γ_{Kpp}	$90\ MeV$
Q_{Kpp}	$378\ MeV$
σ	$20\ \mu b$



“n”-window : 0.85 – 0.94 GeV

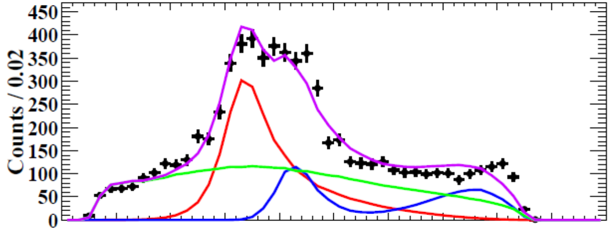


$B.E._{Kpp}$	$43\ MeV$
Γ_{Kpp}	$90\ MeV$
Q_{Kpp}	$392\ MeV$
σ	$12\ \mu b$

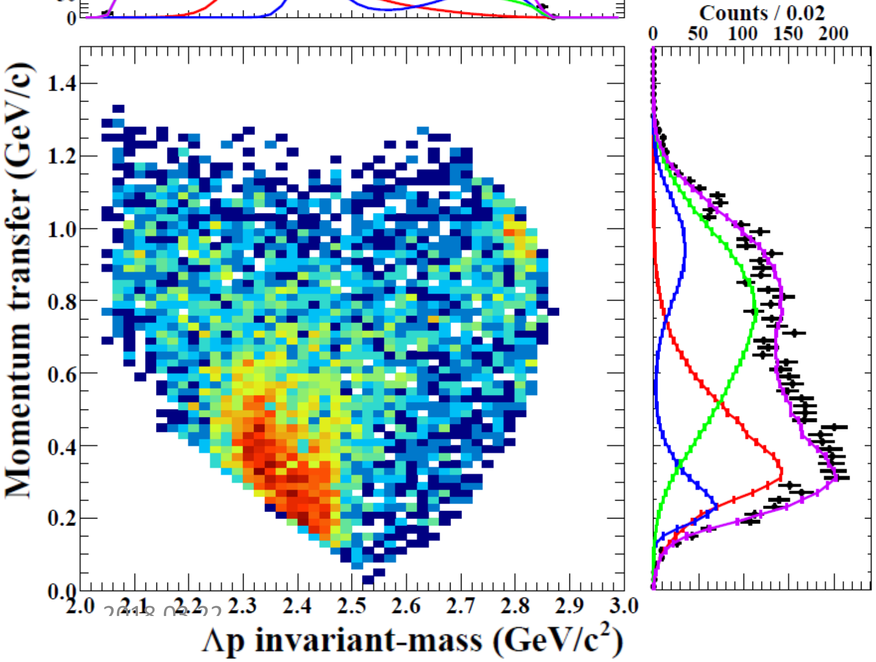


Fitting result :: Fix $\Gamma_{Kpp} = 100$ MeV

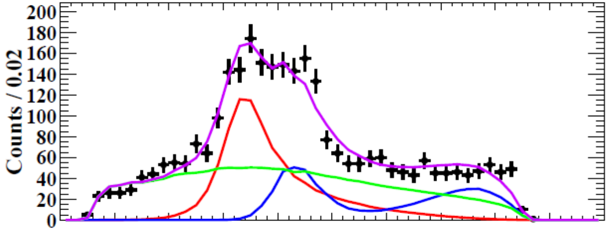
"n"-window : 0.85 – 1.03 GeV



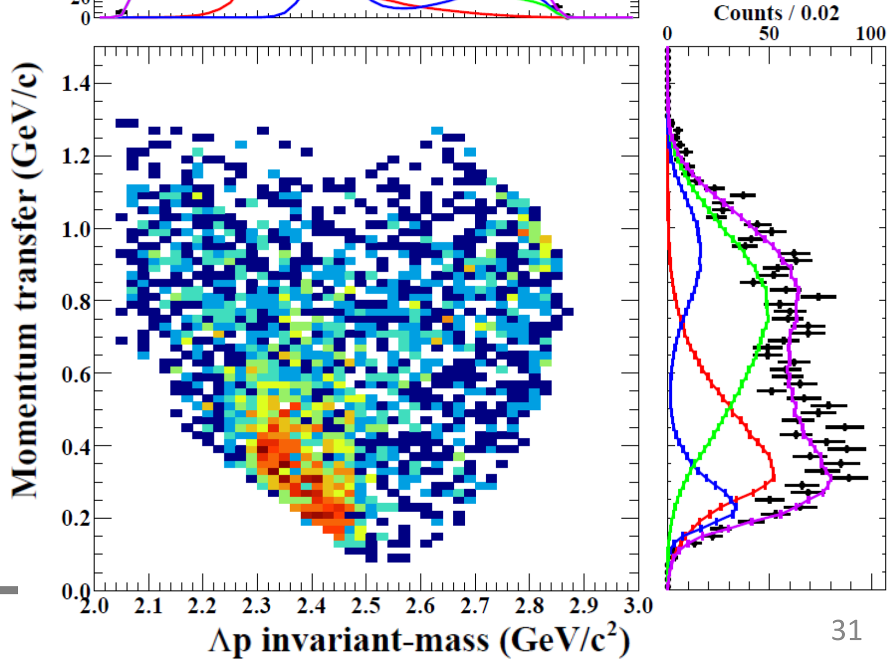
$B.E._{Kpp}$	$46\ MeV$
Γ_{Kpp}	$100\ MeV$
Q_{Kpp}	$385\ MeV$
σ	$22\ \mu b$



"n"-window : 0.85 – 0.94 GeV

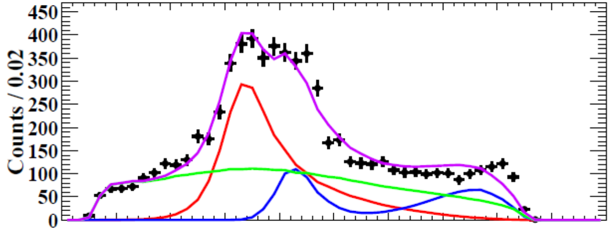


$B.E._{Kpp}$	$43\ MeV$
Γ_{Kpp}	$100\ MeV$
Q_{Kpp}	$399\ MeV$
σ	$13\ \mu b$

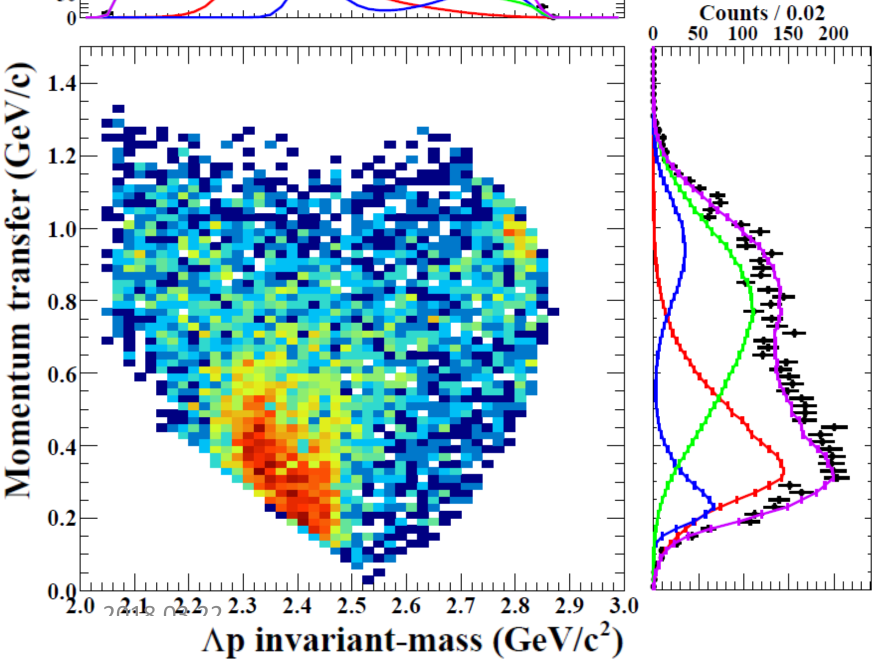


Fitting result :: Fix $\Gamma_{Kpp} = 110$ MeV

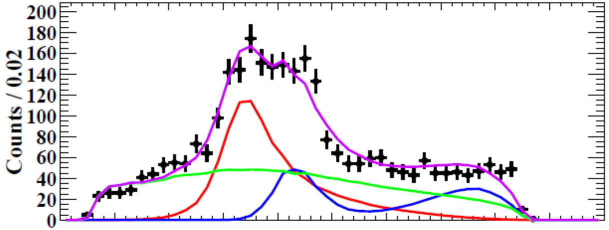
"n"-window : 0.85 – 1.03 GeV



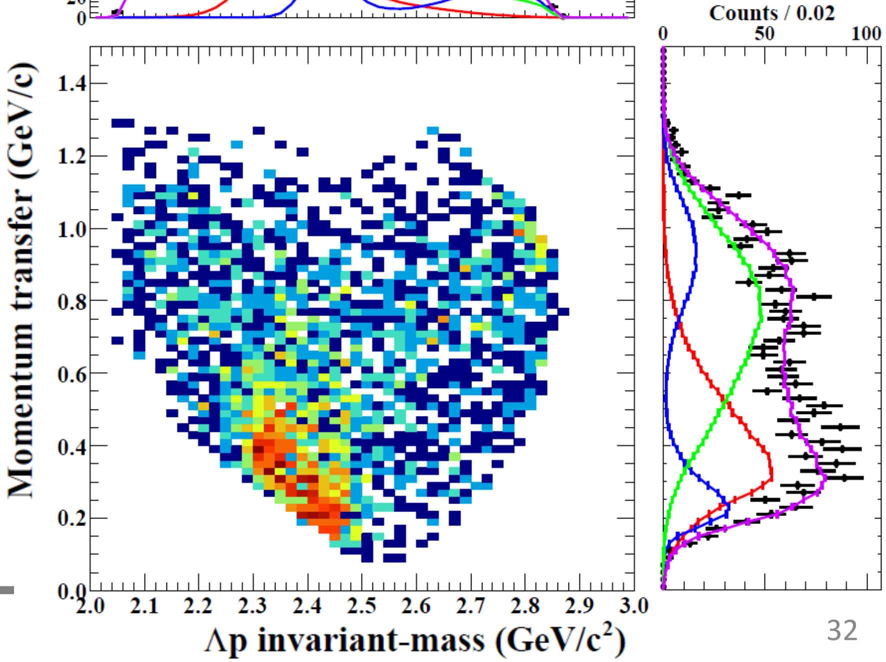
$B.E._{Kpp}$	$47\ MeV$
Γ_{Kpp}	$110\ MeV$
Q_{Kpp}	$393\ MeV$
σ	$23\ \mu b$



"n"-window : 0.85 – 0.94 GeV

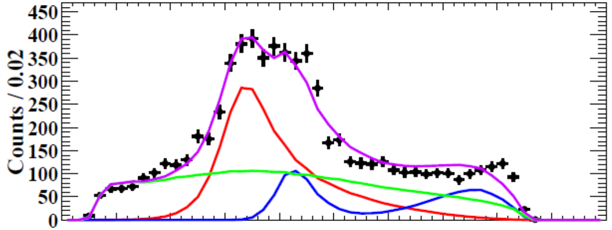


$B.E._{Kpp}$	$44\ MeV$
Γ_{Kpp}	$110\ MeV$
Q_{Kpp}	$406\ MeV$
σ	$14\ \mu b$

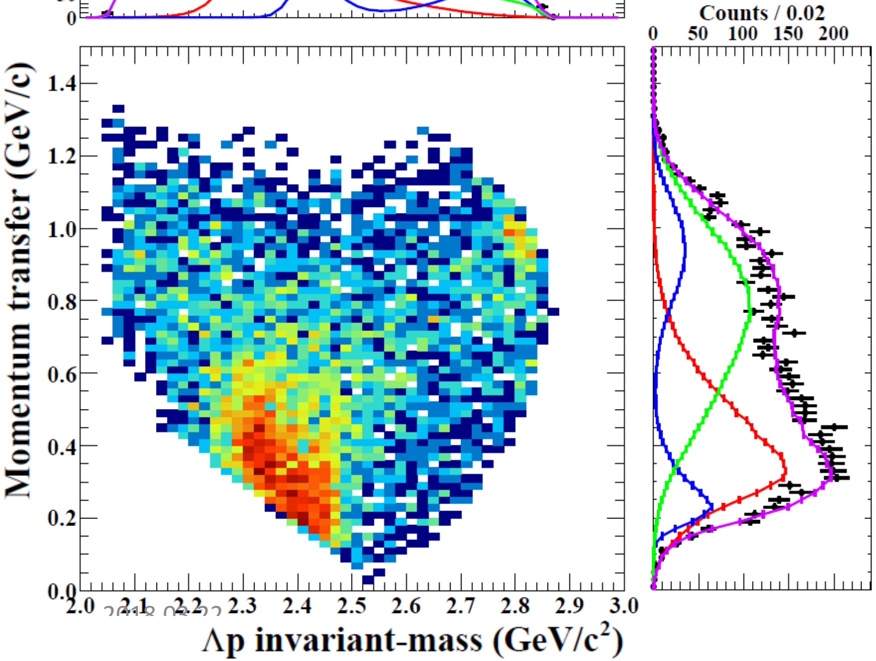


Fitting result :: Fix $\Gamma_{Kpp} = 120$ MeV

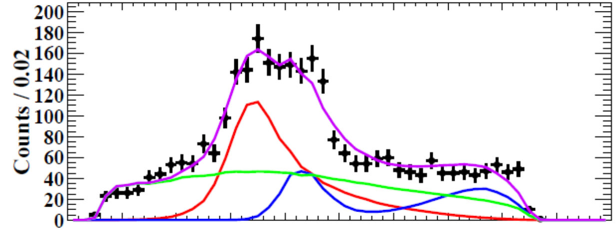
"n"-window : 0.85 – 1.03 GeV



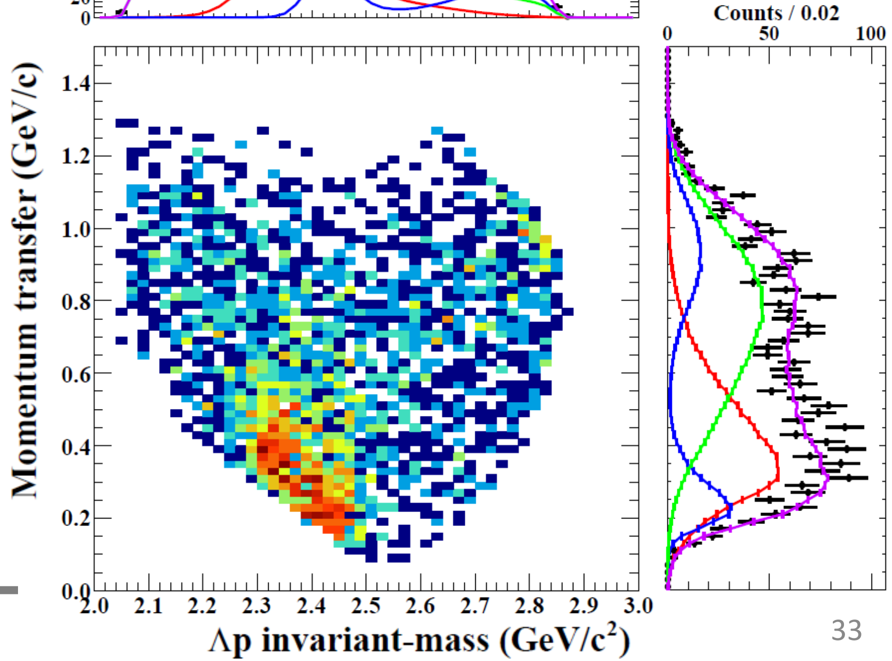
$B.E._{Kpp}$	$49\ MeV$
Γ_{Kpp}	$120\ MeV$
Q_{Kpp}	$400\ MeV$
σ	$25\ \mu b$



"n"-window : 0.85 – 0.94 GeV

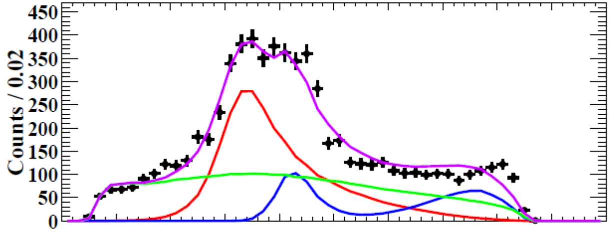


$B.E._{Kpp}$	$45\ MeV$
Γ_{Kpp}	$120\ MeV$
Q_{Kpp}	$413\ MeV$
σ	$15\ \mu b$

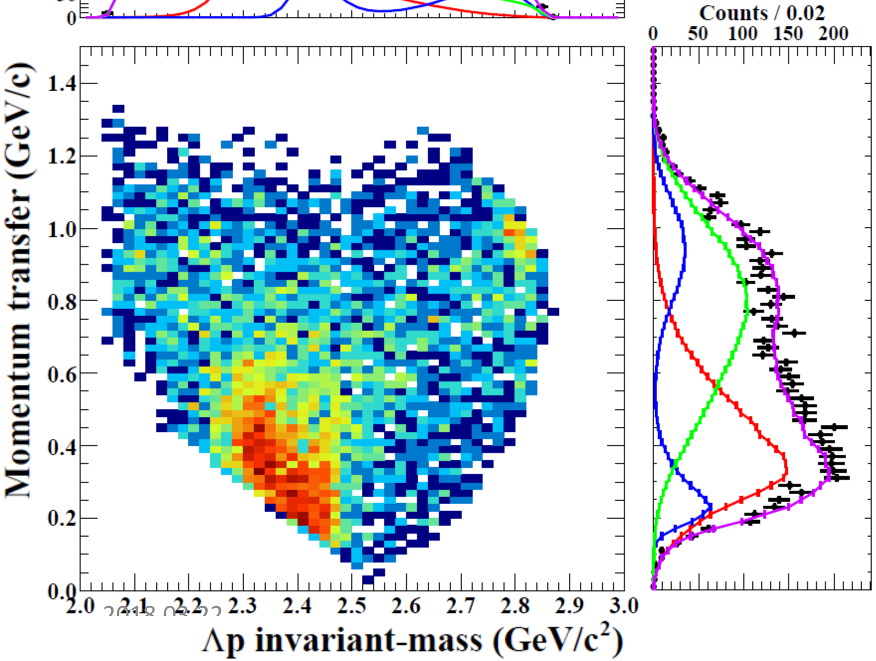


Fitting result :: Fix $\Gamma_{Kpp} = 130$ MeV

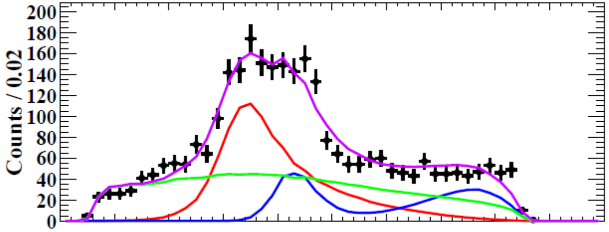
"n"-window : 0.85 – 1.03 GeV



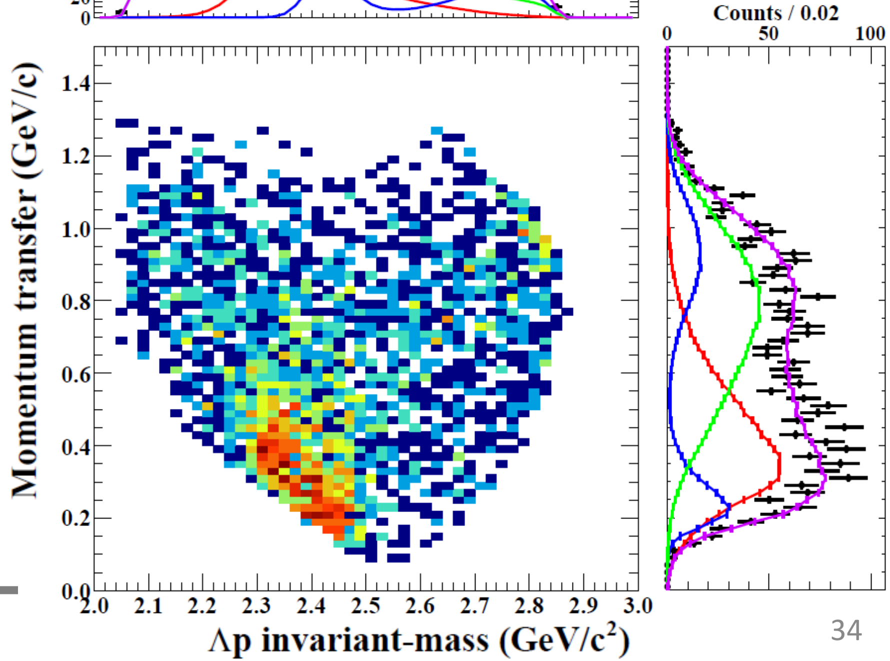
$B.E._{Kpp}$	50 MeV
Γ_{Kpp}	130 MeV
Q_{Kpp}	408 MeV
σ	26 μb



"n"-window : 0.85 – 0.94 GeV

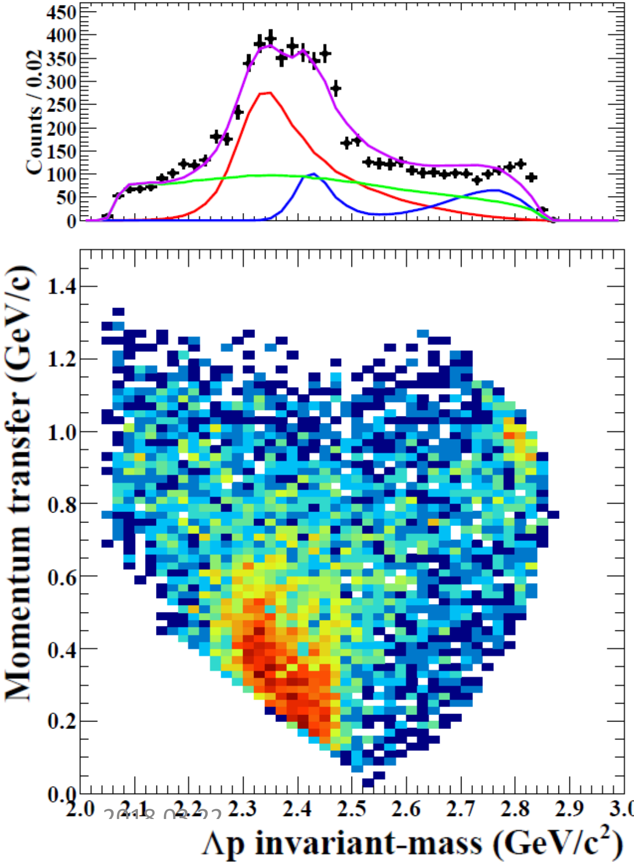


$B.E._{Kpp}$	46 MeV
Γ_{Kpp}	130 MeV
Q_{Kpp}	420 MeV
σ	15 μb

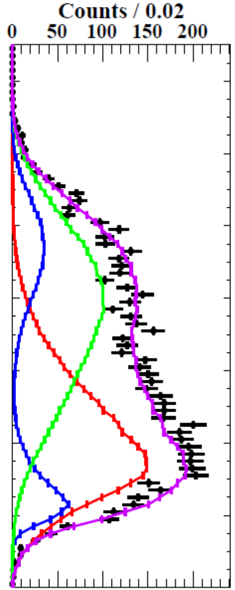


Fitting result :: Fix $\Gamma_{Kpp} = 140$ MeV

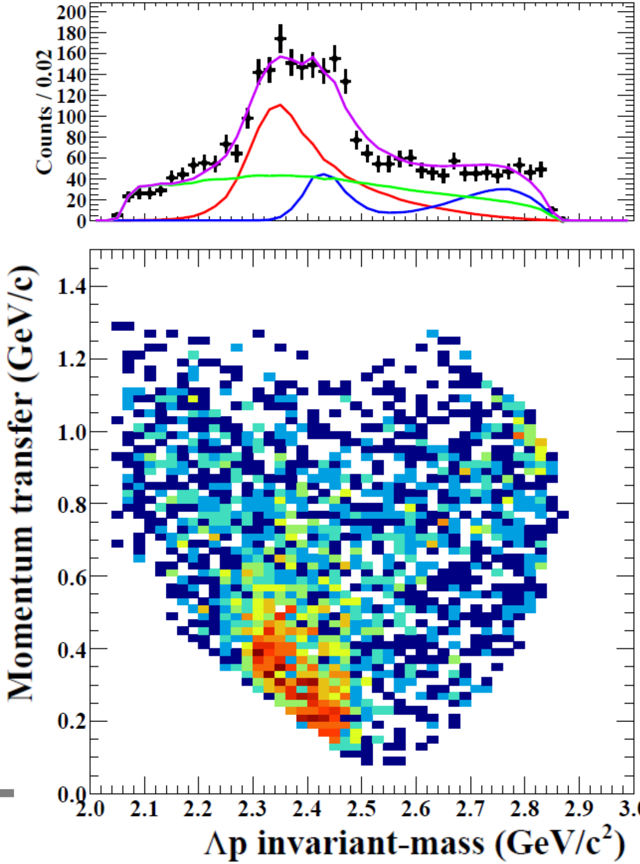
"n"-window : 0.85 – 1.03 GeV



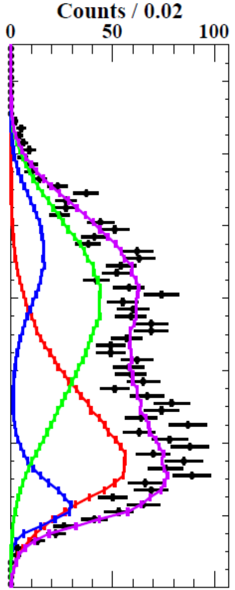
$B.E._{Kpp}$	$52\ MeV$
Γ_{Kpp}	$140\ MeV$
Q_{Kpp}	$416\ MeV$
σ	$27\ \mu b$



"n"-window : 0.85 – 0.94 GeV

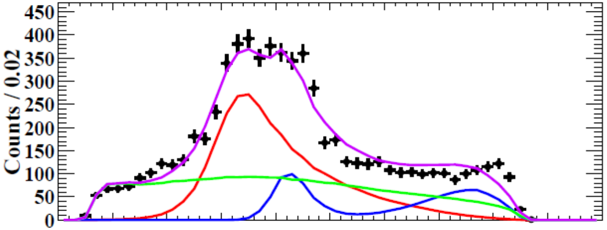


$B.E._{Kpp}$	$47\ MeV$
Γ_{Kpp}	$140\ MeV$
Q_{Kpp}	$428\ MeV$
σ	$16\ \mu b$

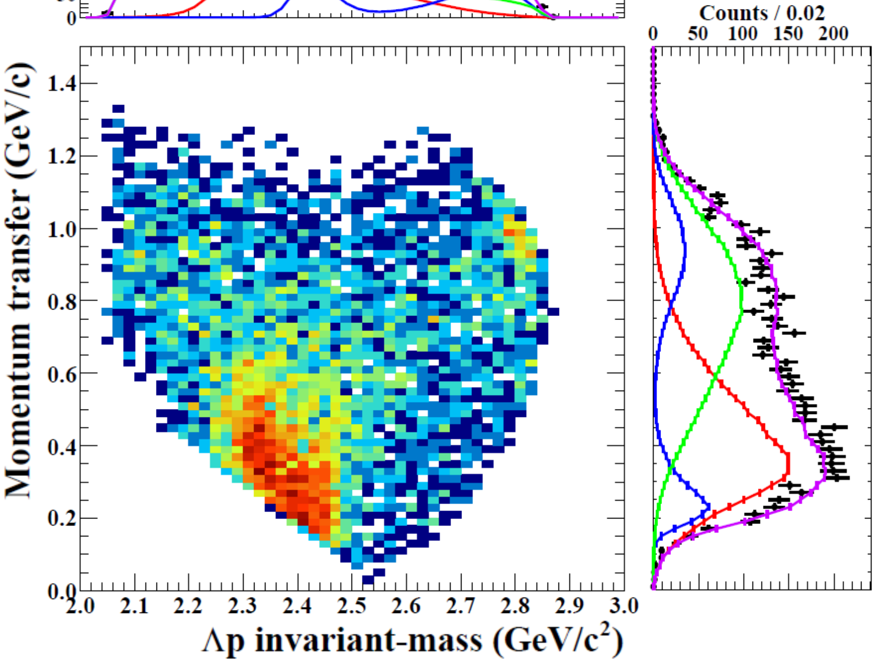


Fitting result :: Fix $\Gamma_{Kpp} = 150$ MeV

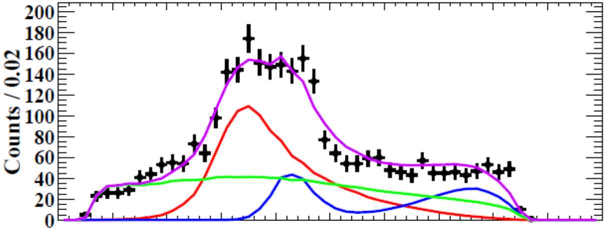
"n"-window : 0.85 – 1.03 GeV



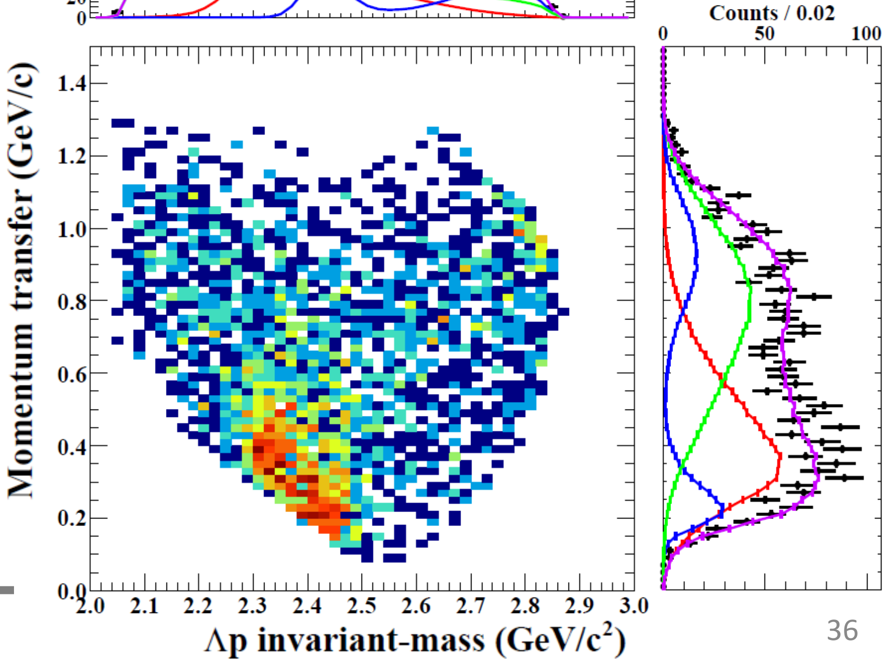
$B.E._{Kpp}$	$54\ MeV$
Γ_{Kpp}	$150\ MeV$
Q_{Kpp}	$424\ MeV$
σ	$28\ \mu b$



"n"-window : 0.85 – 0.94 GeV

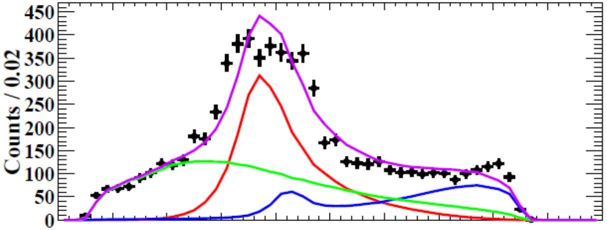


$B.E._{Kpp}$	$49\ MeV$
Γ_{Kpp}	$150\ MeV$
Q_{Kpp}	$435\ MeV$
σ	$17\ \mu b$

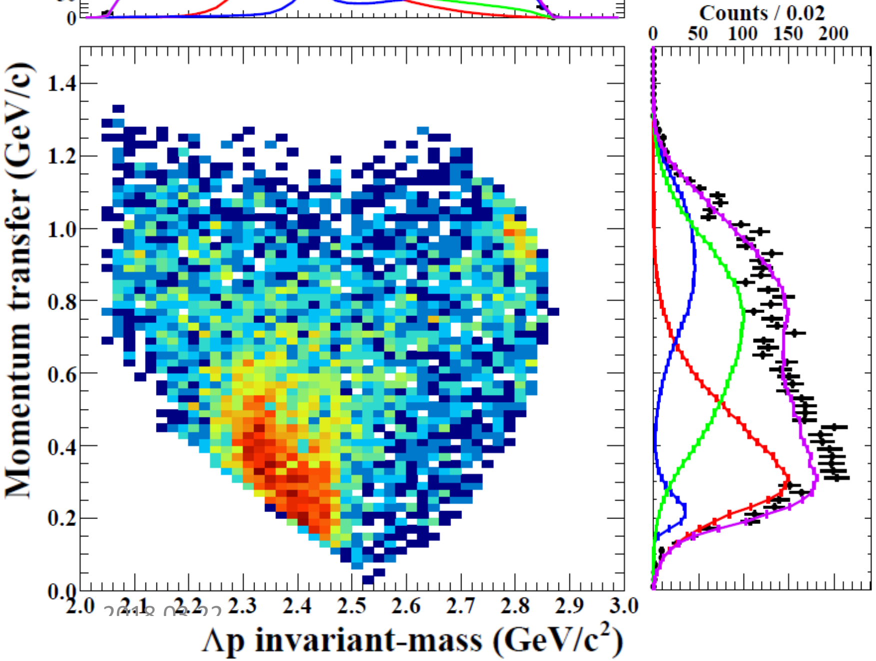


Fitting result :: Fix $BE_{Kpp} = 10$ MeV

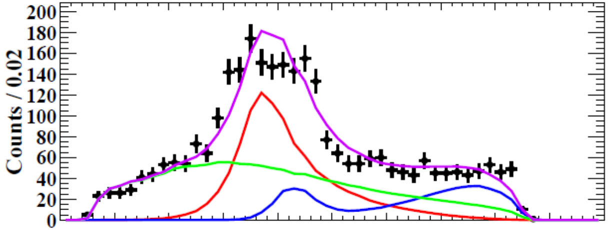
"n"-window : 0.85 – 1.03 GeV



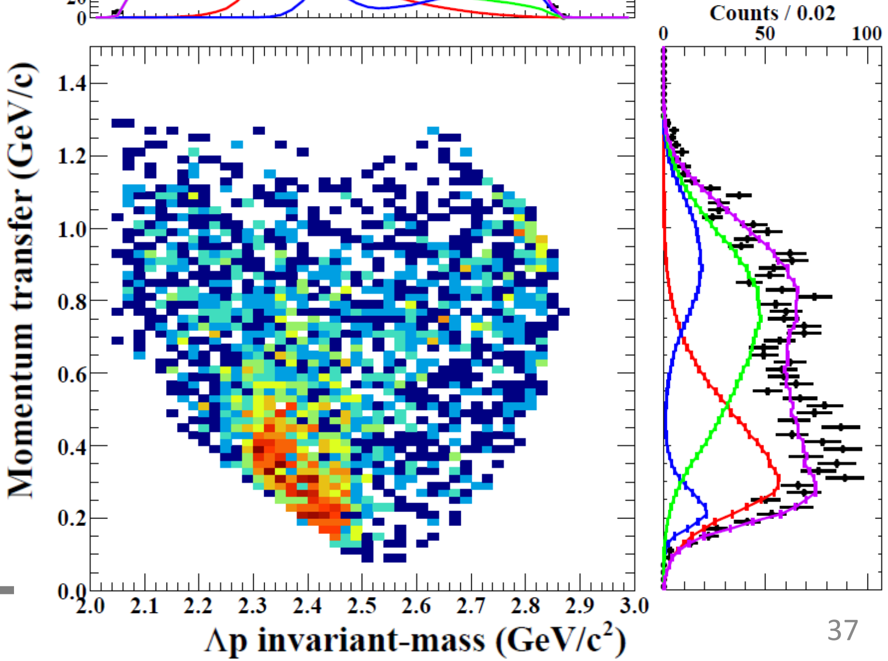
$B.E._{Kpp}$	$10\ MeV$
Γ_{Kpp}	$119\ MeV$
Q_{Kpp}	$389\ MeV$
σ	$23\ \mu b$



"n"-window : 0.85 – 0.94 GeV

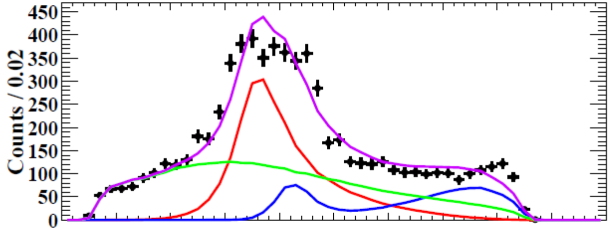


$B.E._{Kpp}$	$10\ MeV$
Γ_{Kpp}	$121\ MeV$
Q_{Kpp}	$400\ MeV$
σ	$14\ \mu b$

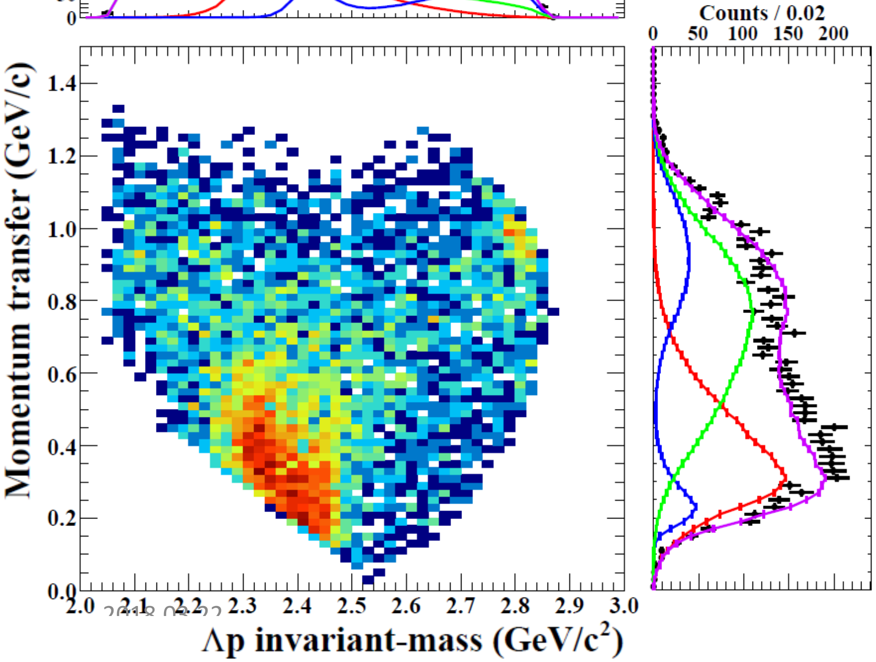


Fitting result :: Fix $BE_{Kpp} = 20$ MeV

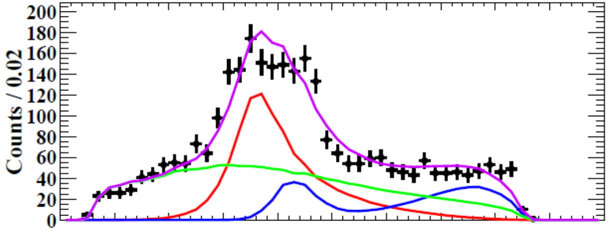
"n"-window : 0.85 – 1.03 GeV



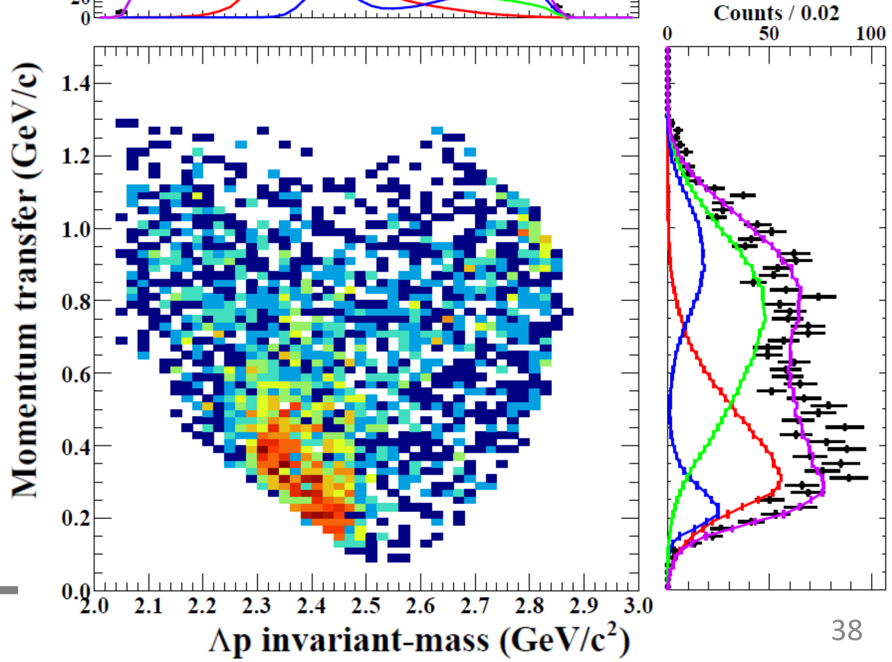
$B.E._{Kpp}$	$20\ MeV$
Γ_{Kpp}	$113\ MeV$
Q_{Kpp}	$387\ MeV$
σ	$22\ \mu b$



"n"-window : 0.85 – 0.94 GeV

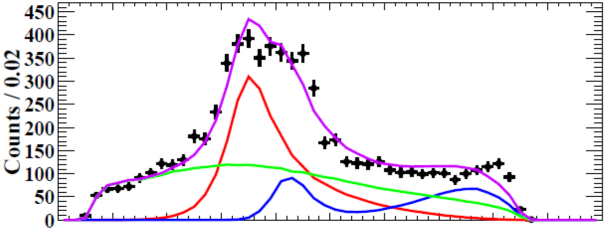


$B.E._{Kpp}$	$20\ MeV$
Γ_{Kpp}	$116\ MeV$
Q_{Kpp}	$403\ MeV$
σ	$14\ \mu b$

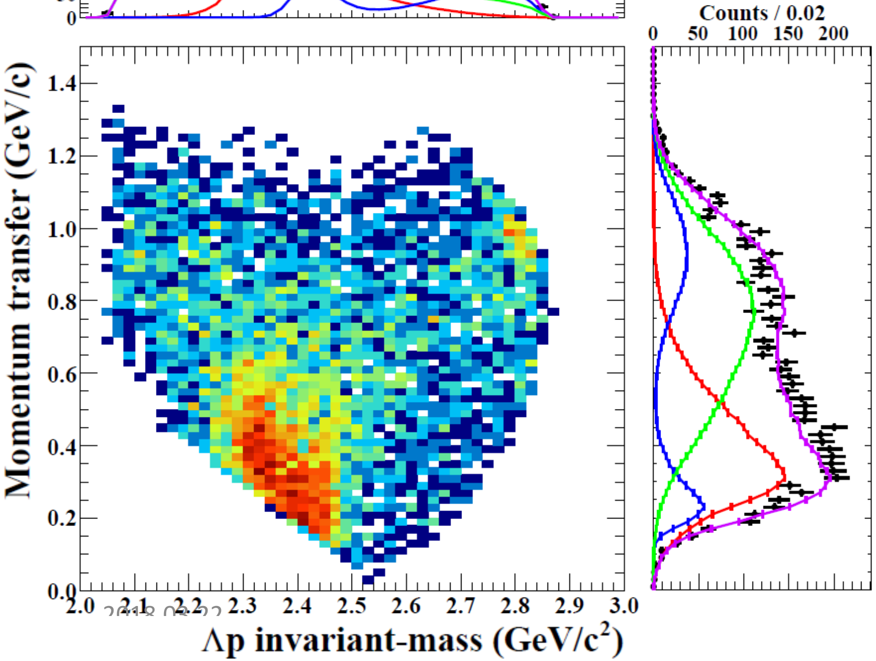


Fitting result :: Fix $BE_{Kpp} = 30$ MeV

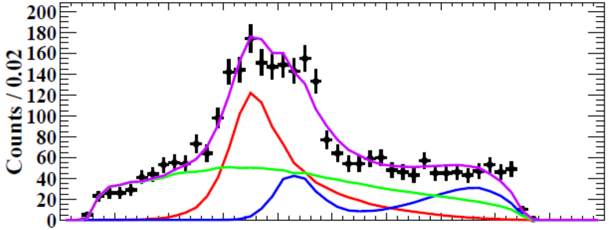
"n"-window : 0.85 – 1.03 GeV



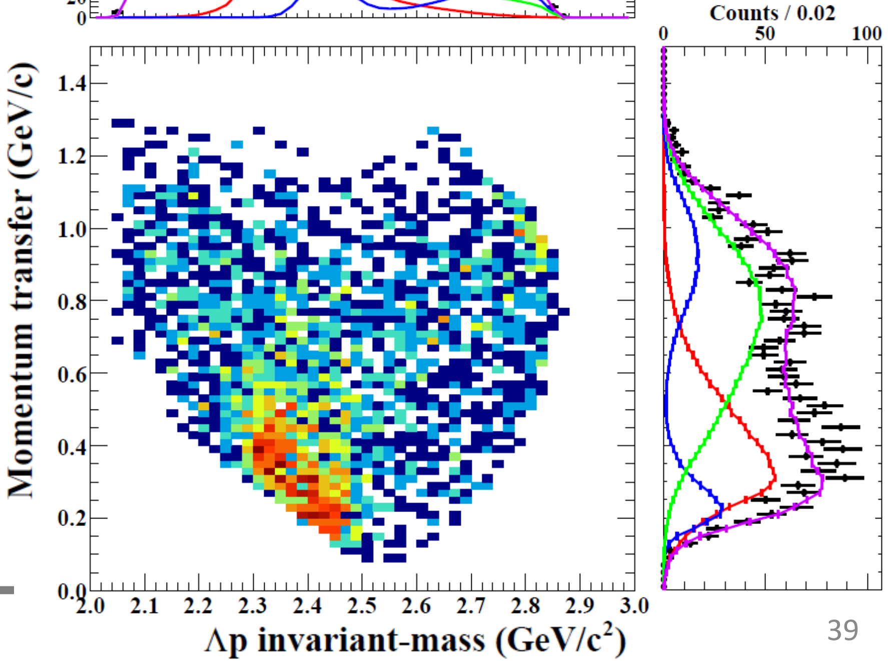
$B.E._{Kpp}$	$30\ MeV$
Γ_{Kpp}	$109\ MeV$
Q_{Kpp}	$388\ MeV$
σ	$22\ \mu b$



"n"-window : 0.85 – 0.94 GeV

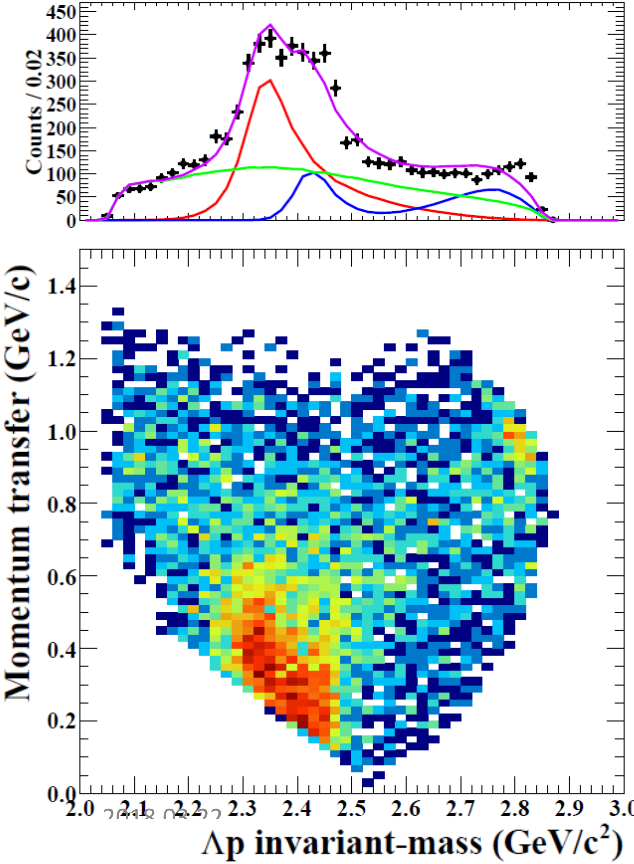


$B.E._{Kpp}$	$30\ MeV$
Γ_{Kpp}	$111\ MeV$
Q_{Kpp}	$404\ MeV$
σ	$14\ \mu b$

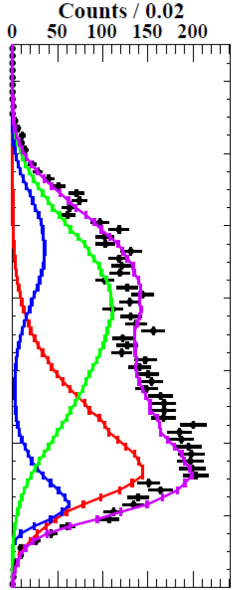


Fitting result :: Fix $BE_{Kpp} = 40$ MeV

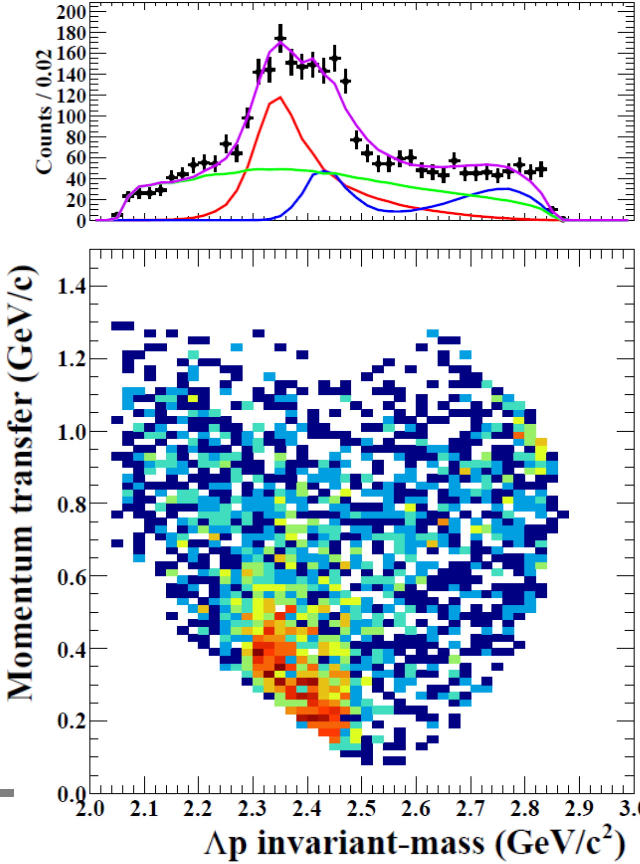
“n”-window : 0.85 – 1.03 GeV



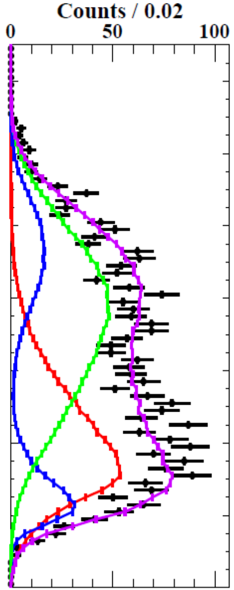
$B.E._{Kpp}$	$40\ MeV$
Γ_{Kpp}	$109\ MeV$
Q_{Kpp}	$391\ MeV$
σ	$23\ \mu b$



“n”-window : 0.85 – 0.94 GeV

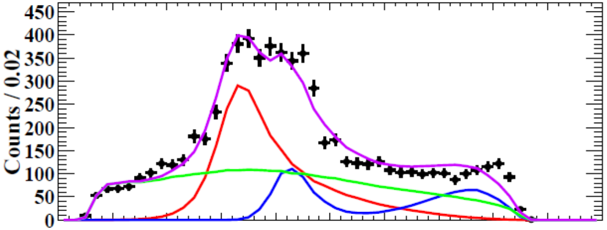


$B.E._{Kpp}$	$40\ MeV$
Γ_{Kpp}	$110\ MeV$
Q_{Kpp}	$406\ MeV$
σ	$14\ \mu b$

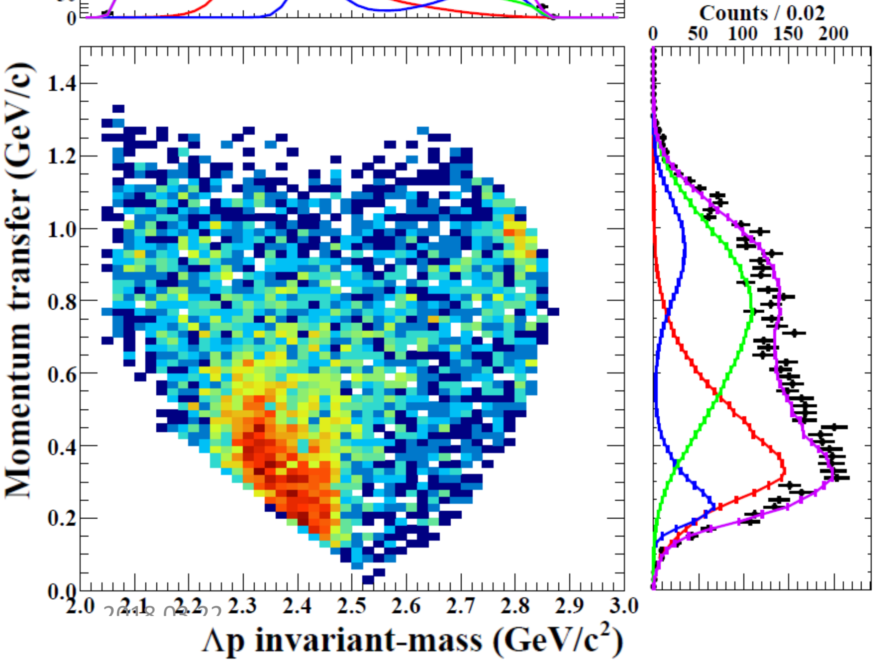


Fitting result :: Fix $BE_{Kpp} = 50$ MeV

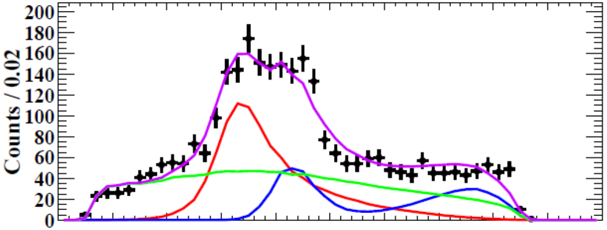
"n"-window : 0.85 – 1.03 GeV



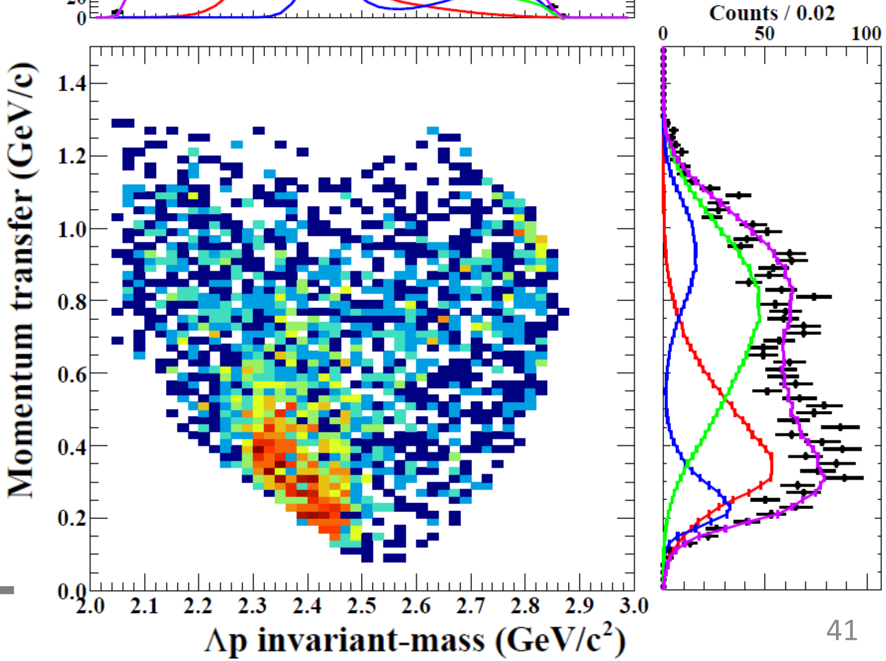
$B.E._{Kpp}$	$50\ MeV$
Γ_{Kpp}	$114\ MeV$
Q_{Kpp}	$396\ MeV$
σ	$24\ \mu b$



"n"-window : 0.85 – 0.94 GeV

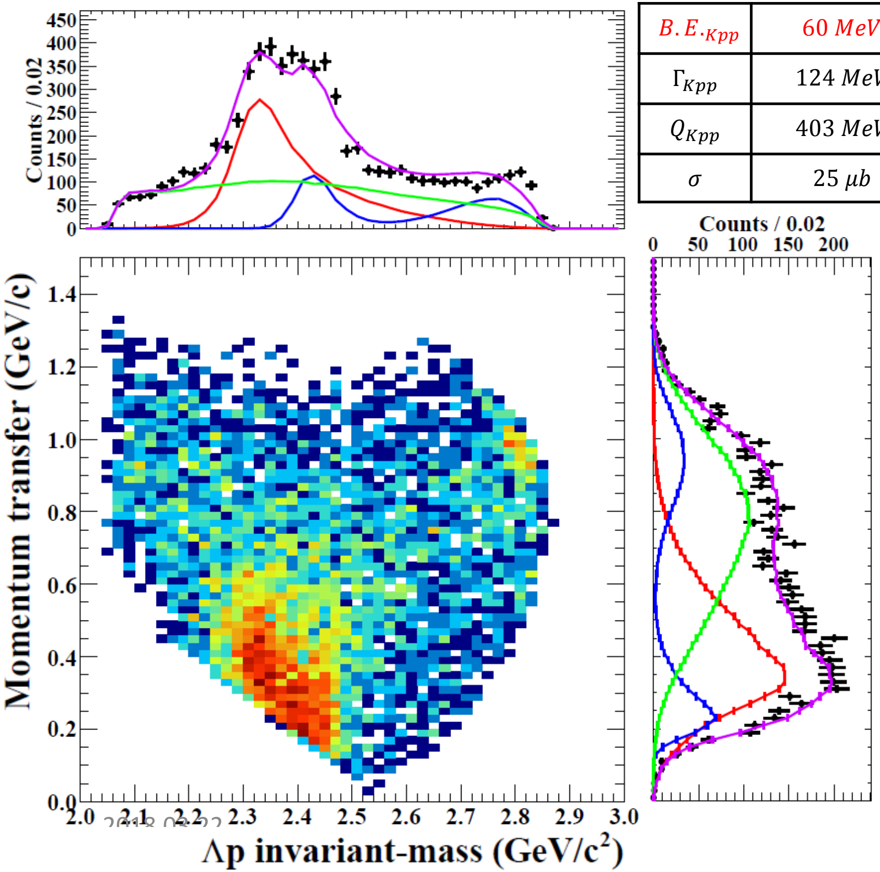


$B.E._{Kpp}$	$50\ MeV$
Γ_{Kpp}	$115\ MeV$
Q_{Kpp}	$410\ MeV$
σ	$14\ \mu b$



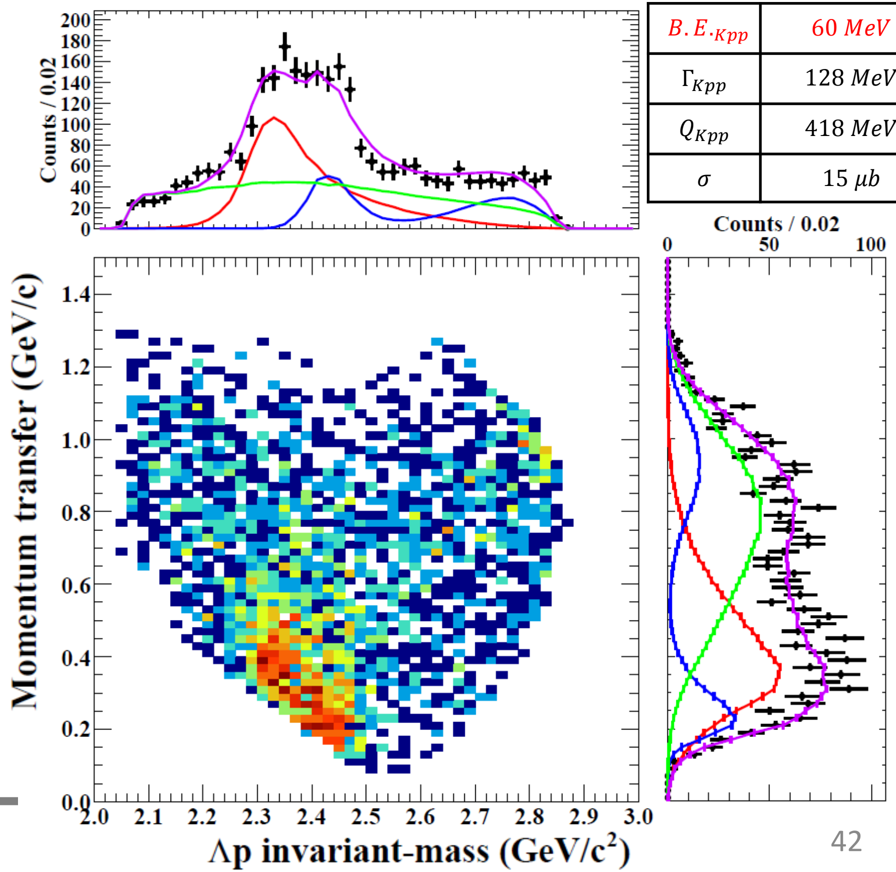
Fitting result :: Fix $BE_{Kpp} = 60$ MeV

"n"-window : 0.85 – 1.03 GeV



$B.E._{Kpp}$	$60\ MeV$
Γ_{Kpp}	$124\ MeV$
Q_{Kpp}	$403\ MeV$
σ	$25\ \mu b$

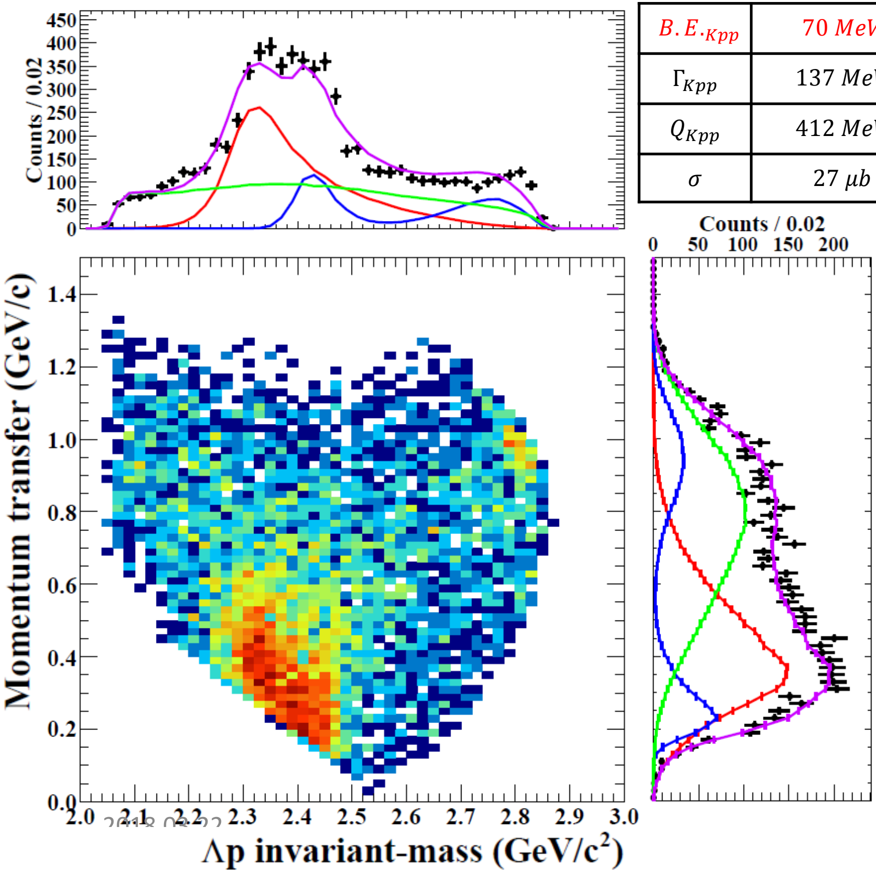
"n"-window : 0.85 – 0.94 GeV



$B.E._{Kpp}$	$60\ MeV$
Γ_{Kpp}	$128\ MeV$
Q_{Kpp}	$418\ MeV$
σ	$15\ \mu b$

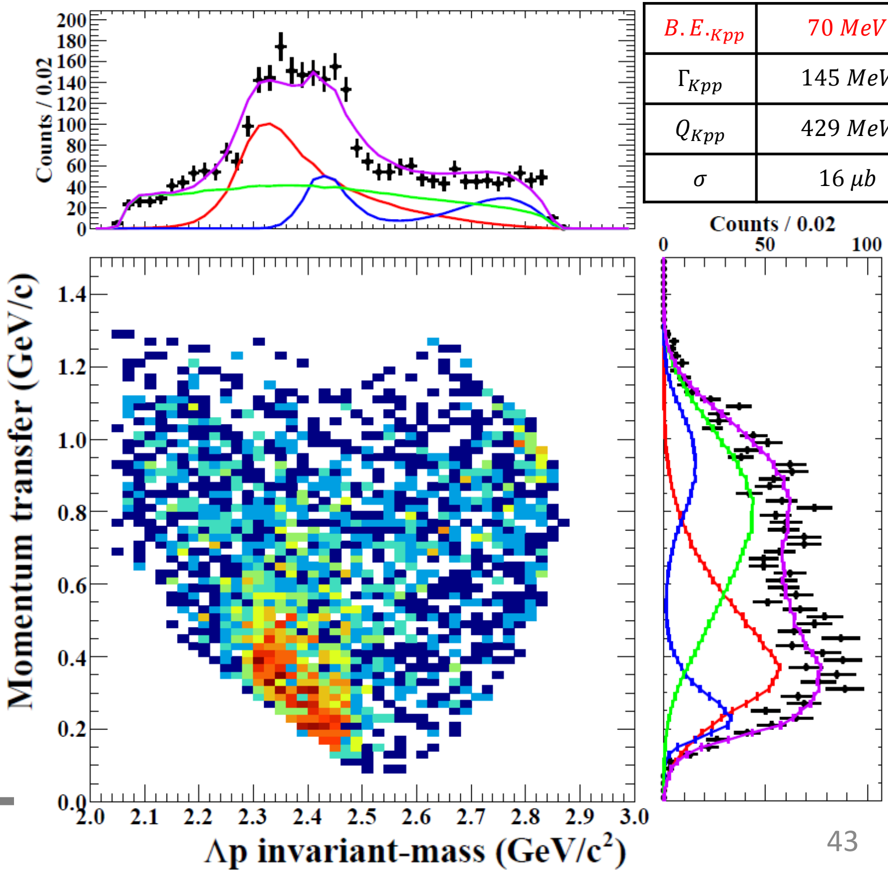
Fitting result :: Fix $BE_{Kpp} = 70$ MeV

"n"-window : 0.85 – 1.03 GeV



$B.E._{Kpp}$	70 MeV
Γ_{Kpp}	137 MeV
Q_{Kpp}	412 MeV
σ	27 μb

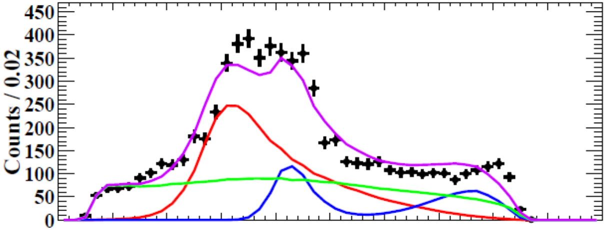
"n"-window : 0.85 – 0.94 GeV



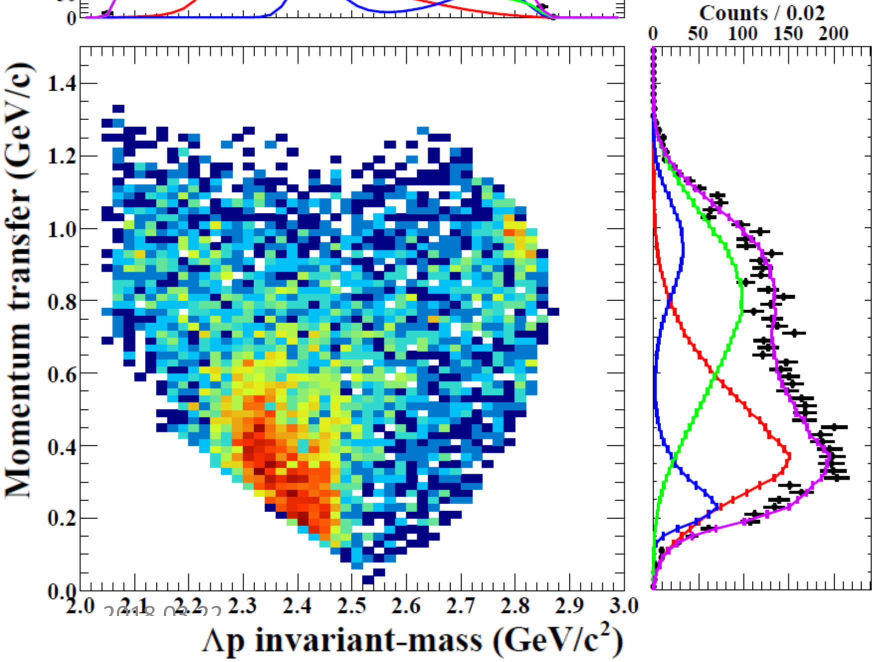
$B.E._{Kpp}$	70 MeV
Γ_{Kpp}	145 MeV
Q_{Kpp}	429 MeV
σ	16 μb

Fitting result :: Fix $BE_{Kpp} = 80$ MeV

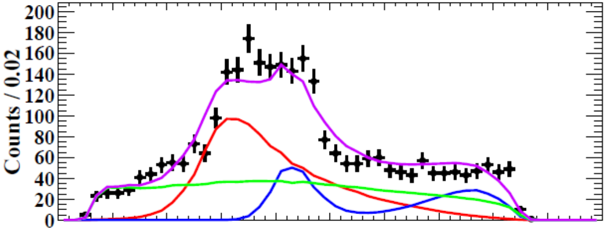
"n"-window : 0.85 – 1.03 GeV



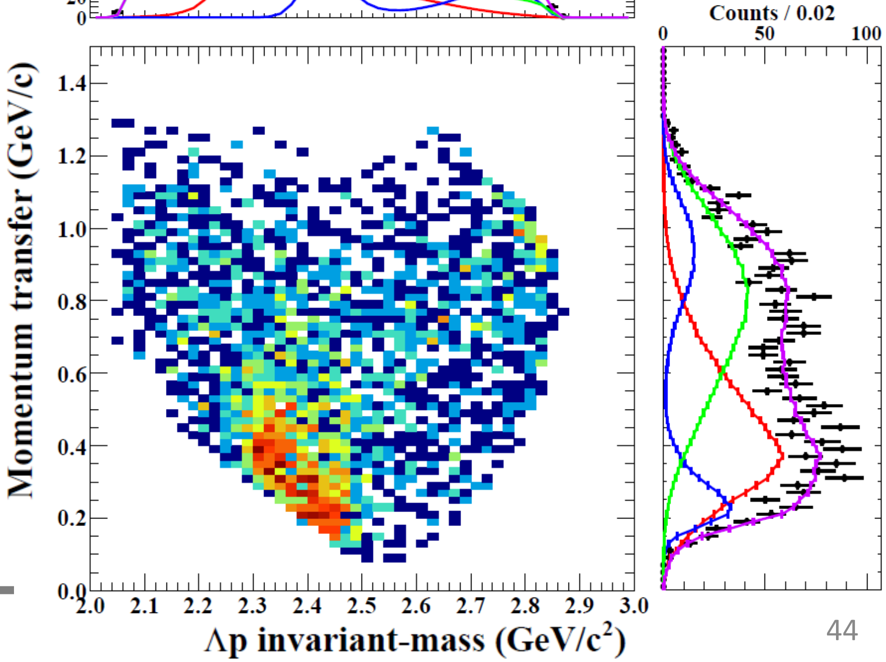
$B.E._{Kpp}$	$80\ MeV$
Γ_{Kpp}	$152\ MeV$
Q_{Kpp}	$423\ MeV$
σ	$29\ \mu b$



"n"-window : 0.85 – 0.94 GeV

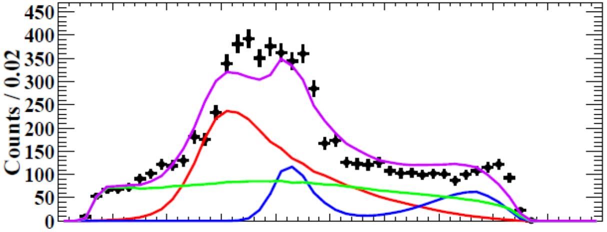


$B.E._{Kpp}$	$80\ MeV$
Γ_{Kpp}	$163\ MeV$
Q_{Kpp}	$446\ MeV$
σ	$18\ \mu b$

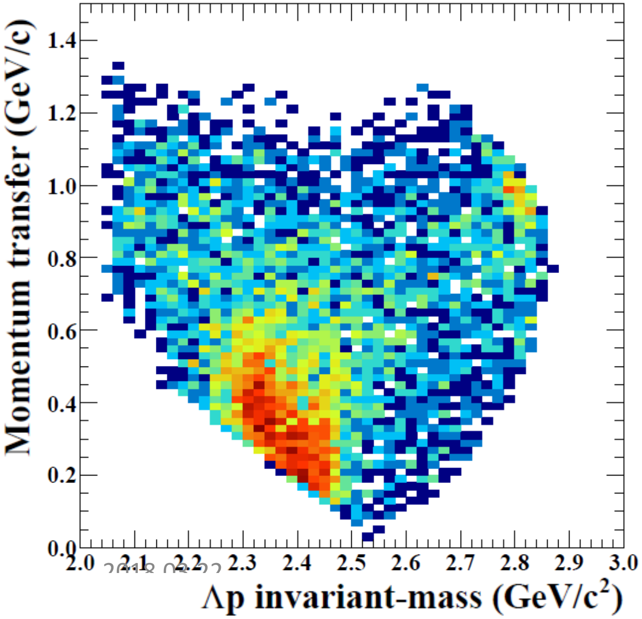


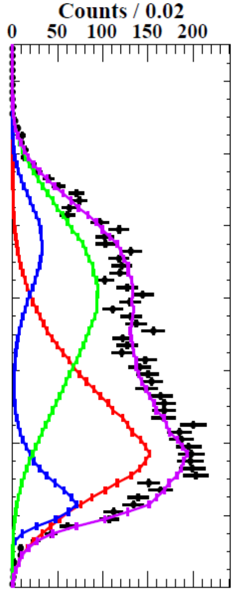
Fitting result :: Fix $BE_{Kpp} = 90$ MeV

"n"-window : 0.85 – 1.03 GeV

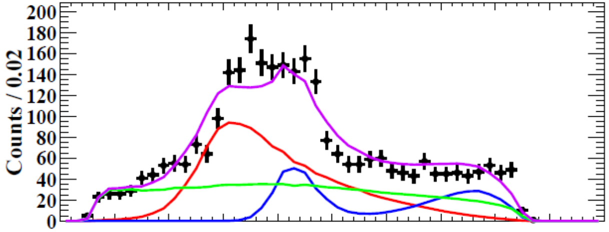


$B.E._{Kpp}$	$90\ MeV$
Γ_{Kpp}	$166\ MeV$
Q_{Kpp}	$4.0\ MeV$
σ	$31\ \mu b$

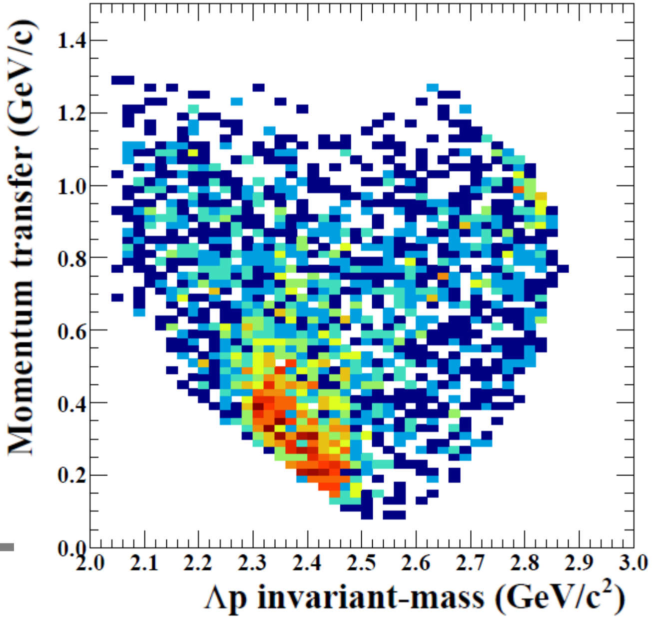


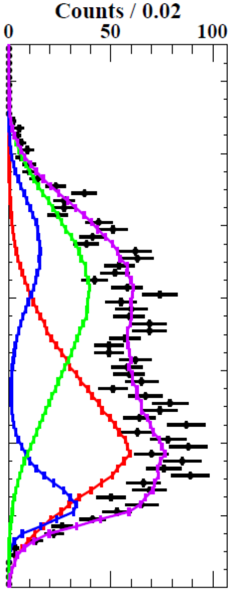


"n"-window : 0.85 – 0.94 GeV



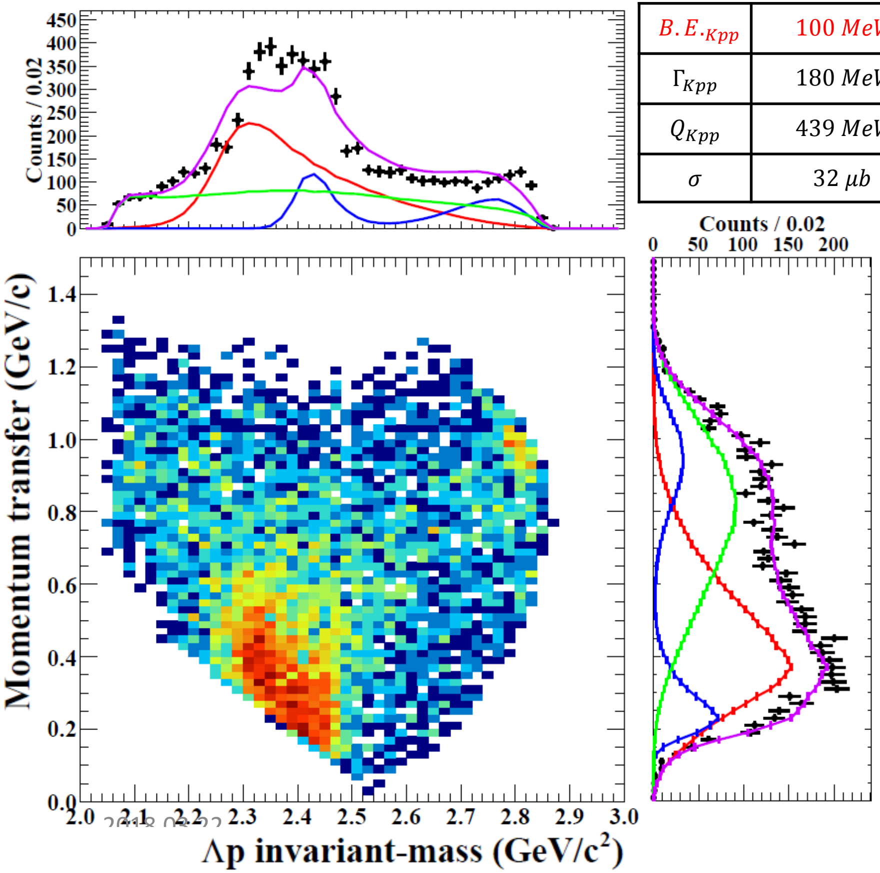
$B.E._{Kpp}$	$90\ MeV$
Γ_{Kpp}	$181\ MeV$
Q_{Kpp}	$456\ MeV$
σ	$19\ \mu b$





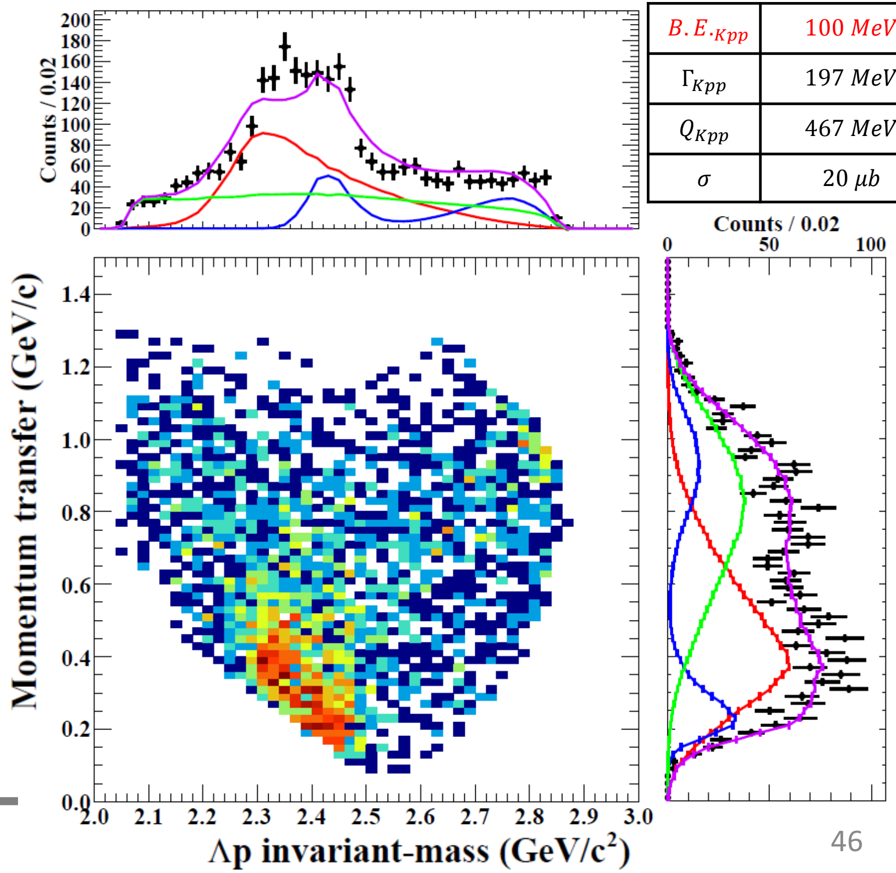
Fitting result :: Fix $BE_{Kpp} = 100$ MeV

"n"-window : 0.85 – 1.03 GeV



$B.E._{Kpp}$	$100\ MeV$
Γ_{Kpp}	$180\ MeV$
Q_{Kpp}	$439\ MeV$
σ	$32\ \mu b$

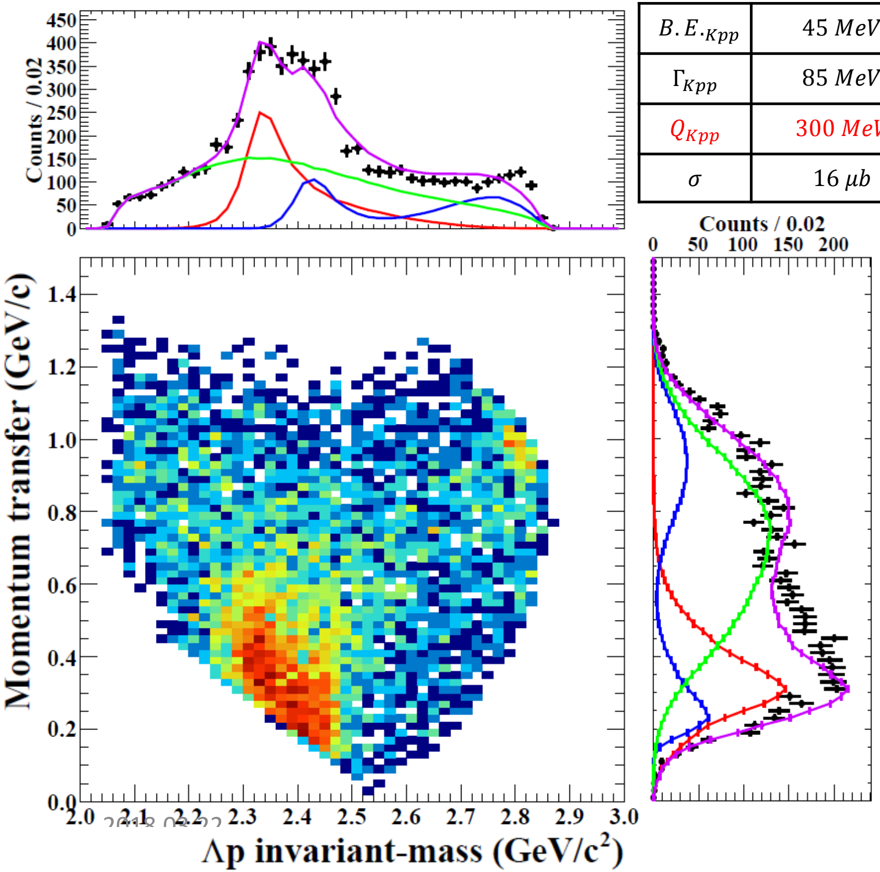
"n"-window : 0.85 – 0.94 GeV



$B.E._{Kpp}$	$100\ MeV$
Γ_{Kpp}	$197\ MeV$
Q_{Kpp}	$467\ MeV$
σ	$20\ \mu b$

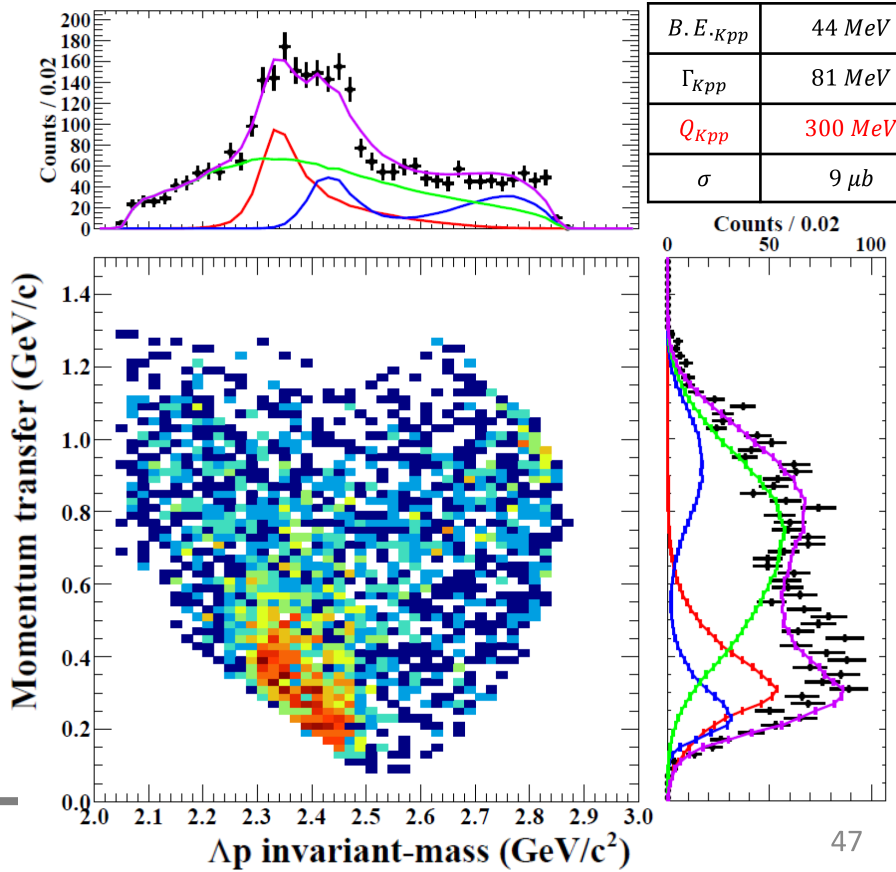
Fitting result :: Fix $Q_{Kpp} = 300$ MeV

"n"-window : 0.85 – 1.03 GeV



$B.E._{Kpp}$	$45\ MeV$
Γ_{Kpp}	$85\ MeV$
Q_{Kpp}	$300\ MeV$
σ	$16\ \mu b$

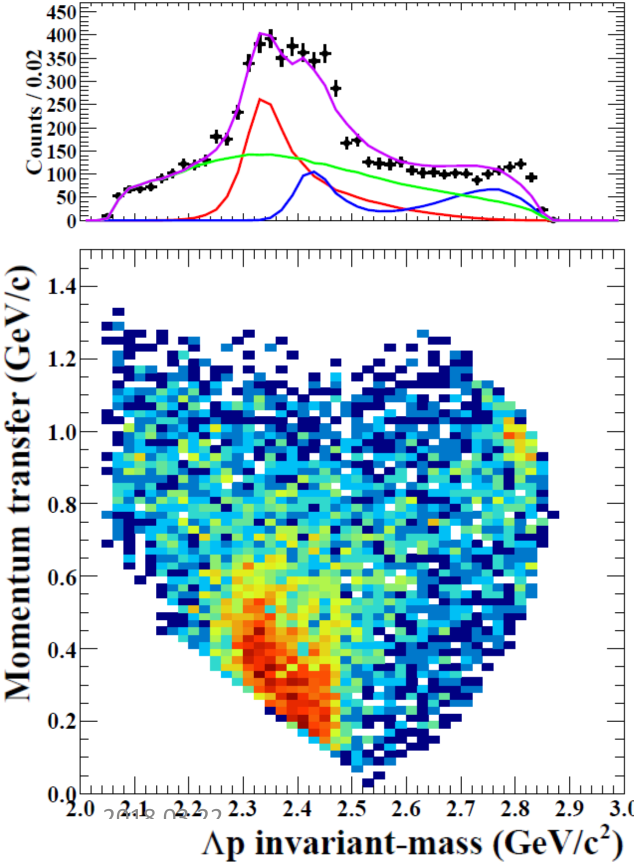
"n"-window : 0.85 – 0.94 GeV



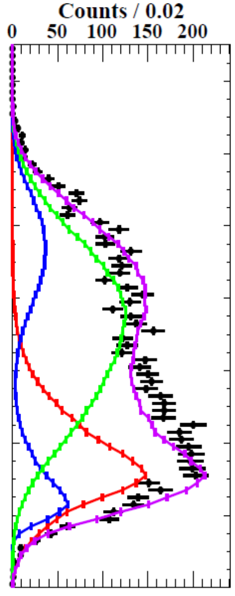
$B.E._{Kpp}$	$44\ MeV$
Γ_{Kpp}	$81\ MeV$
Q_{Kpp}	$300\ MeV$
σ	$9\ \mu b$

Fitting result :: Fix $Q_{Kpp} = 320$ MeV

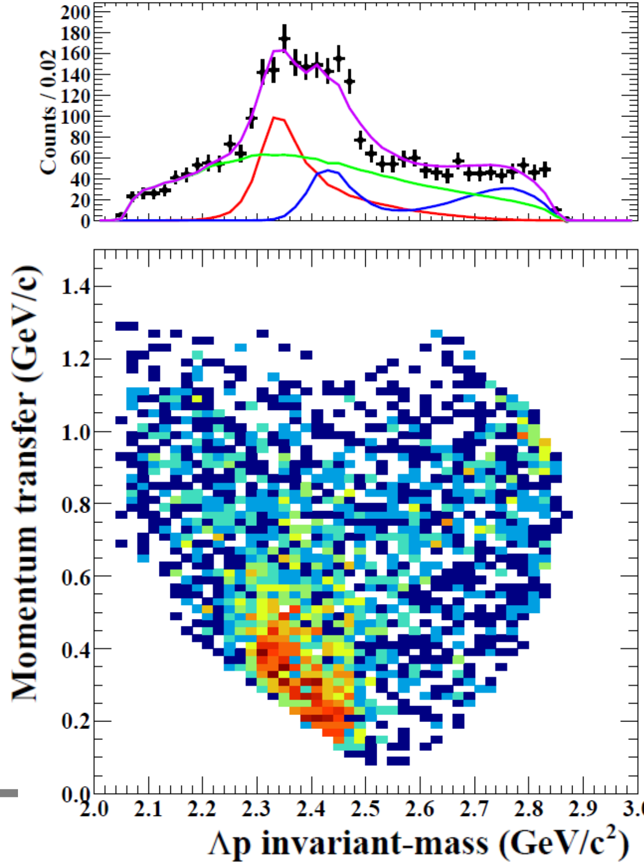
"n"-window : 0.85 – 1.03 GeV



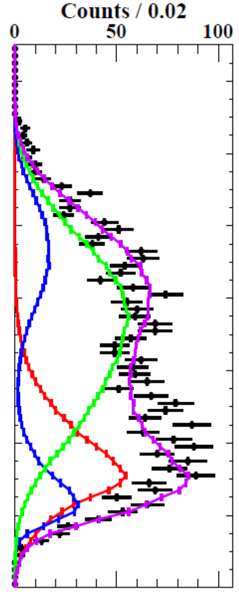
$B.E._{Kpp}$	$45\ MeV$
Γ_{Kpp}	$91\ MeV$
Q_{Kpp}	$320\ MeV$
σ	$18\ \mu b$



"n"-window : 0.85 – 0.94 GeV

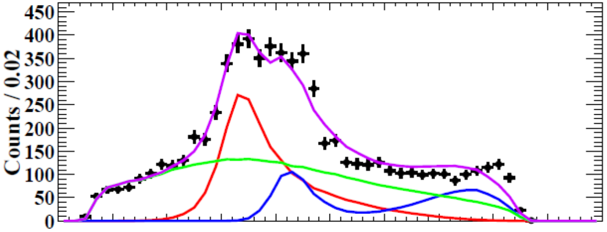


$B.E._{Kpp}$	$44\ MeV$
Γ_{Kpp}	$87\ MeV$
Q_{Kpp}	$320\ MeV$
σ	$10\ \mu b$

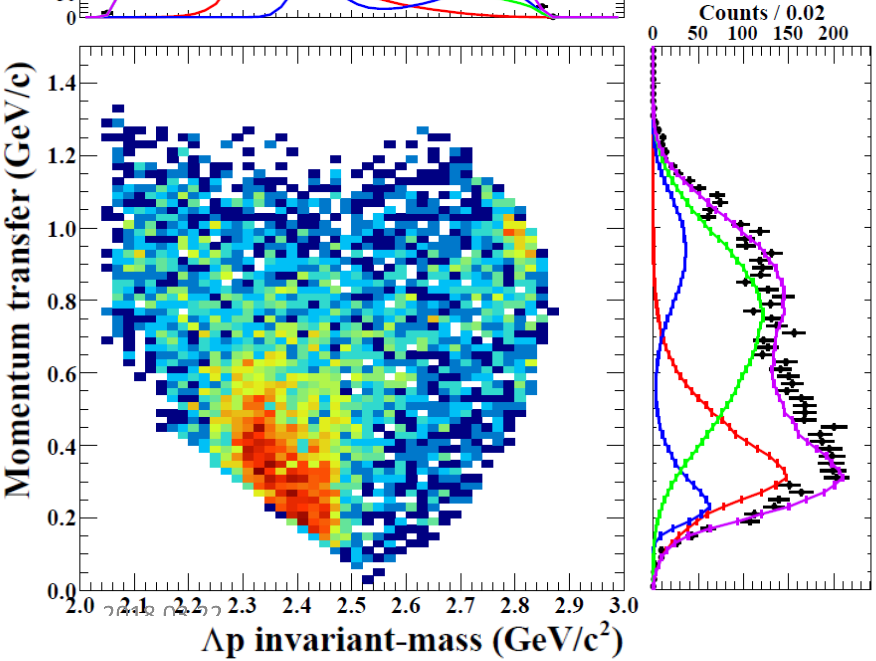


Fitting result :: Fix $Q_{Kpp} = 340$ MeV

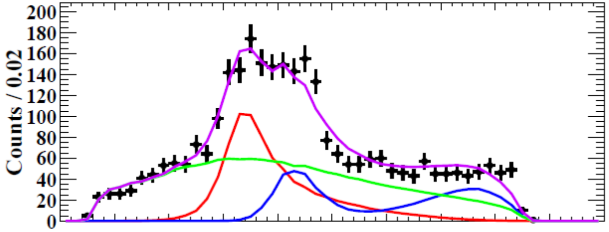
"n"-window : 0.85 – 1.03 GeV



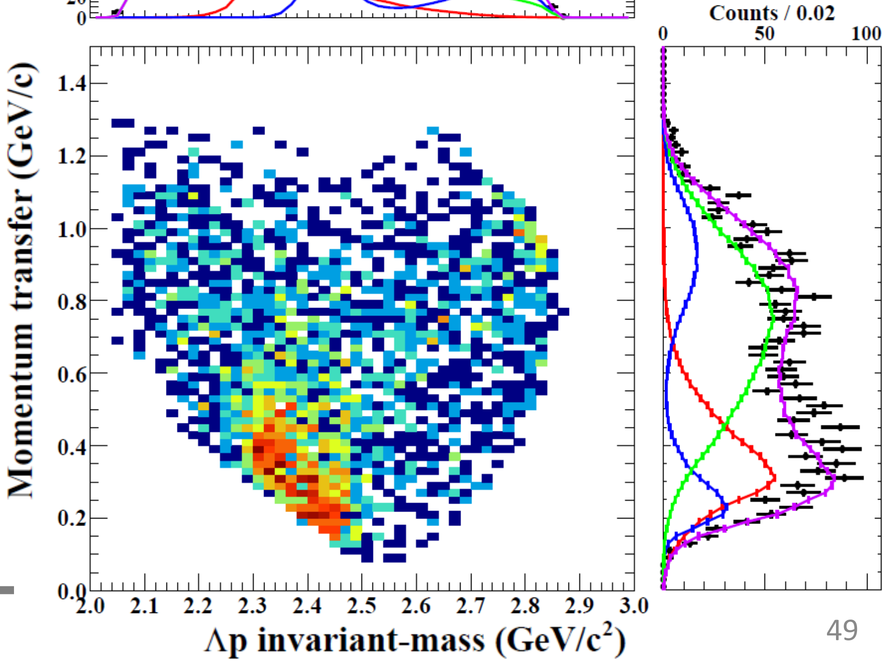
$B.E._{Kpp}$	46 MeV
Γ_{Kpp}	97 MeV
Q_{Kpp}	340 MeV
σ	19 μb



"n"-window : 0.85 – 0.94 GeV

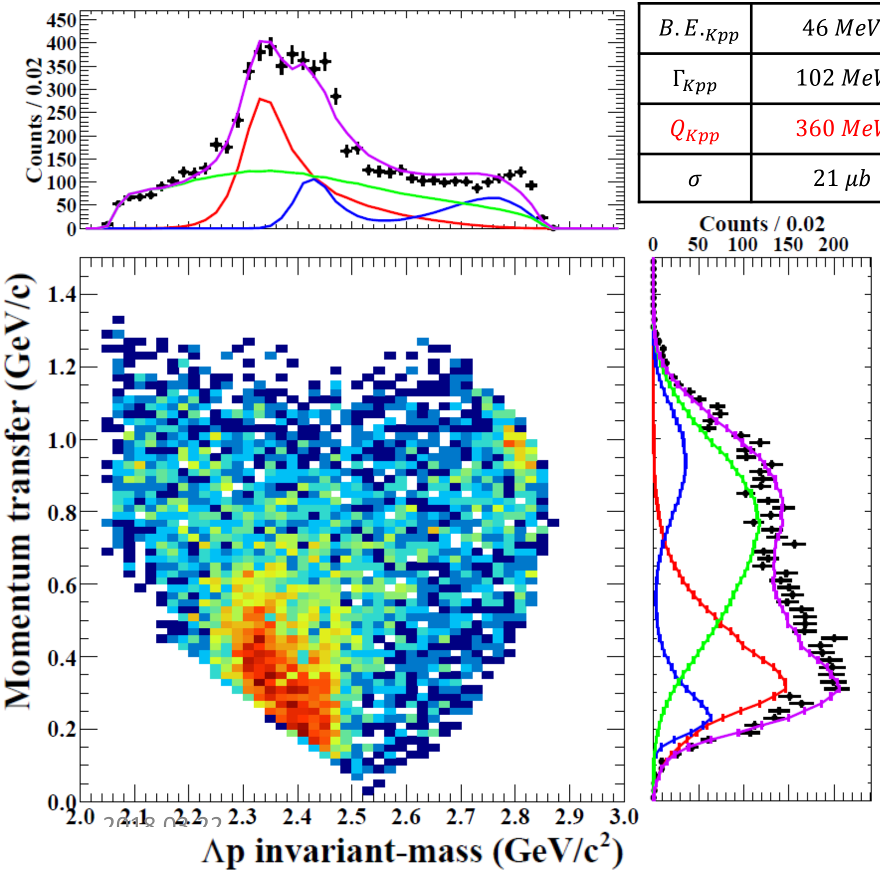


$B.E._{Kpp}$	44 MeV
Γ_{Kpp}	93 MeV
Q_{Kpp}	340 MeV
σ	11 μb



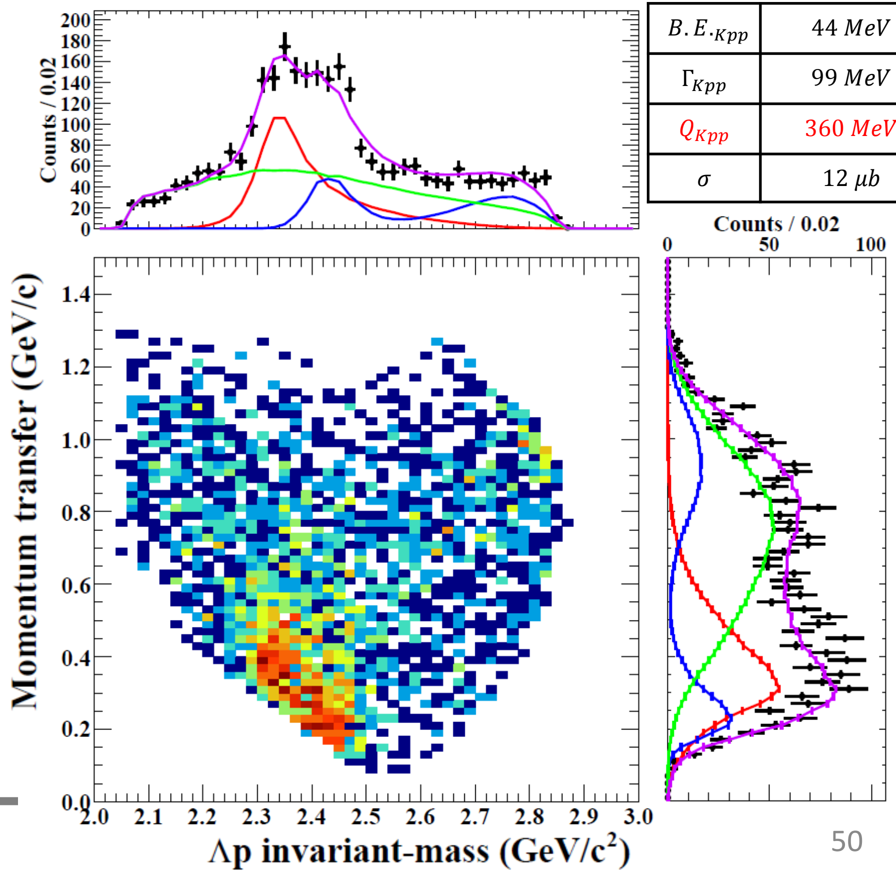
Fitting result :: Fix $Q_{Kpp} = 360$ MeV

"n"-window : 0.85 – 1.03 GeV



$B.E._{Kpp}$	$46\ MeV$
Γ_{Kpp}	$102\ MeV$
Q_{Kpp}	$360\ MeV$
σ	$21\ \mu b$

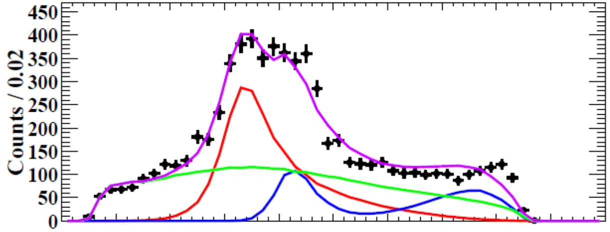
"n"-window : 0.85 – 0.94 GeV



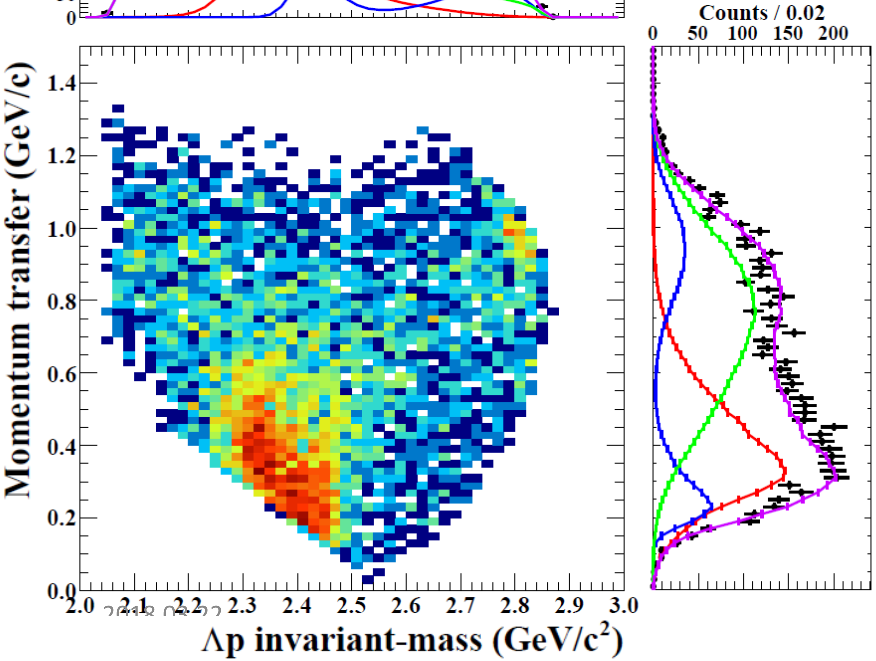
$B.E._{Kpp}$	$44\ MeV$
Γ_{Kpp}	$99\ MeV$
Q_{Kpp}	$360\ MeV$
σ	$12\ \mu b$

Fitting result :: Fix $Q_{Kpp} = 380$ MeV

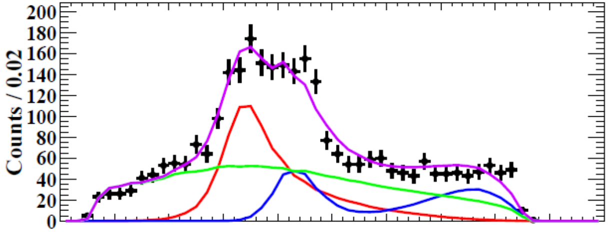
"n"-window : 0.85 – 1.03 GeV



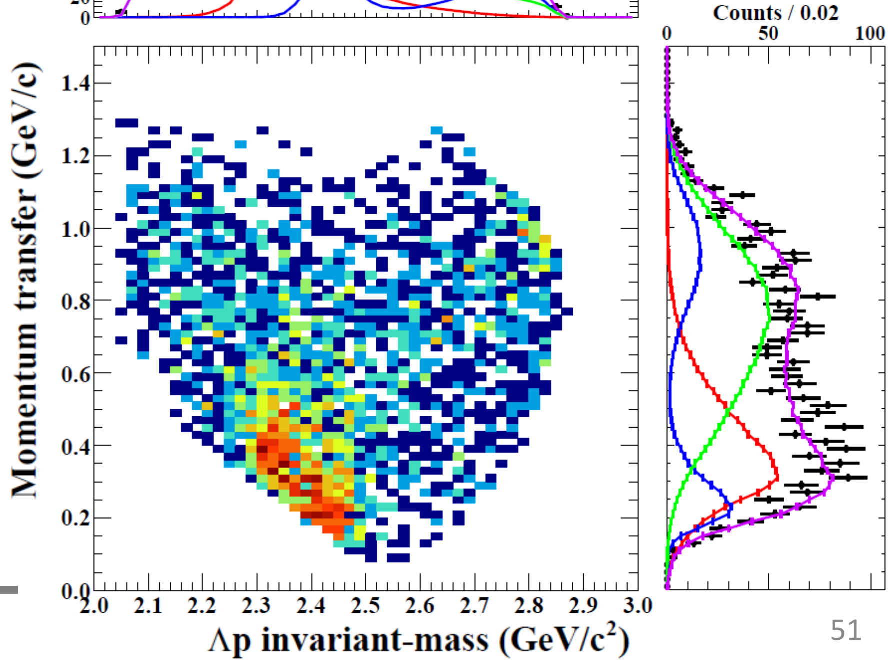
$B.E._{Kpp}$	$47\ MeV$
Γ_{Kpp}	$108\ MeV$
Q_{Kpp}	$380\ MeV$
σ	$22\ \mu b$



"n"-window : 0.85 – 0.94 GeV

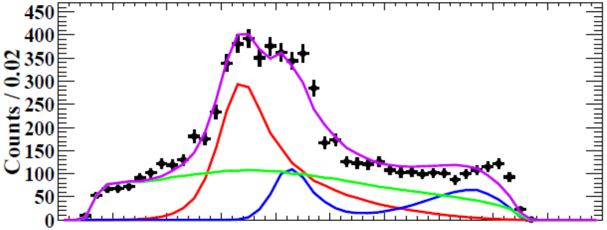


$B.E._{Kpp}$	$44\ MeV$
Γ_{Kpp}	$104\ MeV$
Q_{Kpp}	$380\ MeV$
σ	$13\ \mu b$

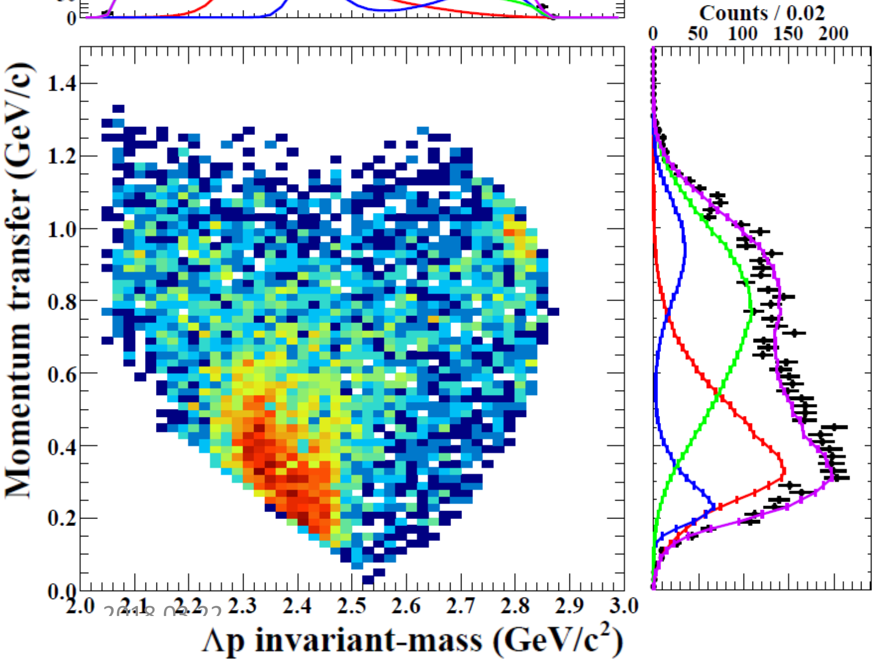


Fitting result :: Fix $Q_{Kpp} = 400$ MeV

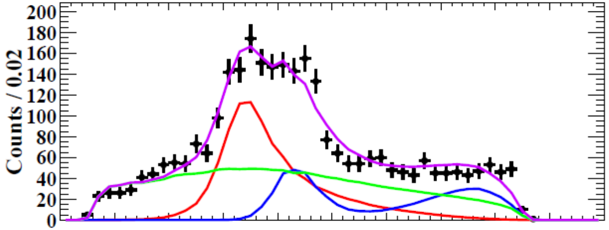
"n"-window : 0.85 – 1.03 GeV



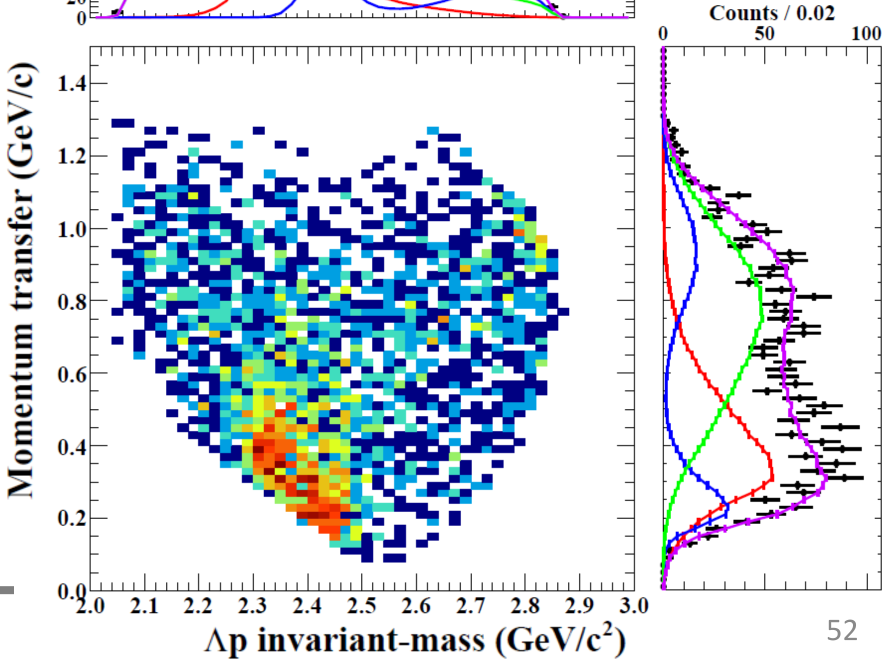
$B.E._{Kpp}$	$48\ MeV$
Γ_{Kpp}	$113\ MeV$
Q_{Kpp}	$400\ MeV$
σ	$24\ \mu b$



"n"-window : 0.85 – 0.94 GeV

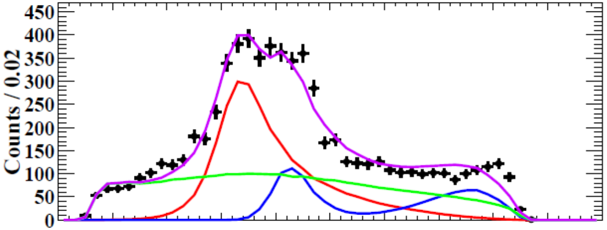


$B.E._{Kpp}$	$44\ MeV$
Γ_{Kpp}	$109\ MeV$
Q_{Kpp}	$400\ MeV$
σ	$14\ \mu b$

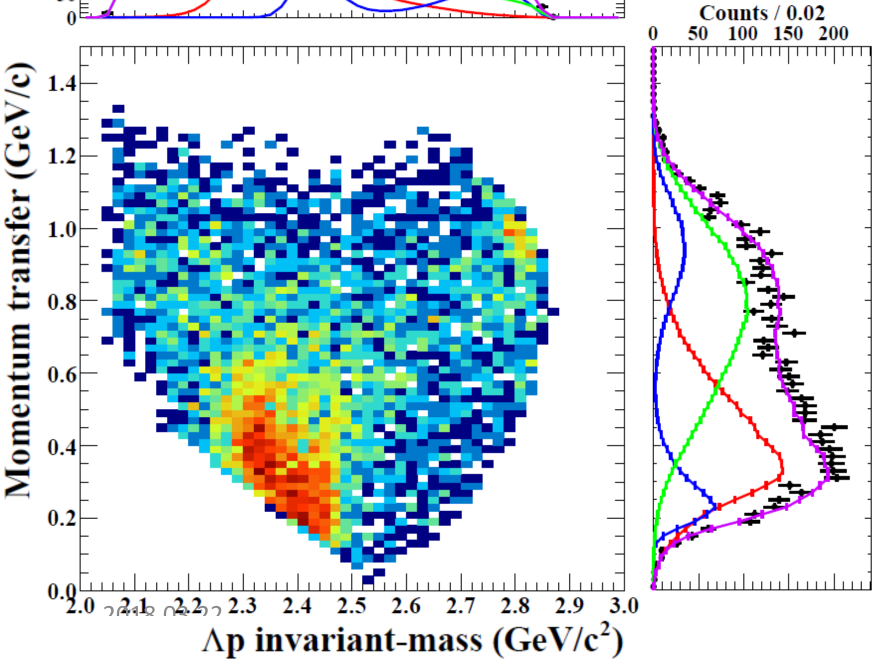


Fitting result :: Fix $Q_{Kpp} = 420$ MeV

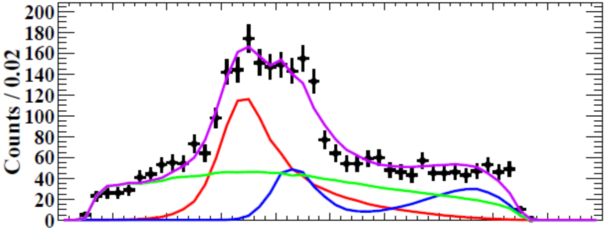
"n"-window : 0.85 – 1.03 GeV



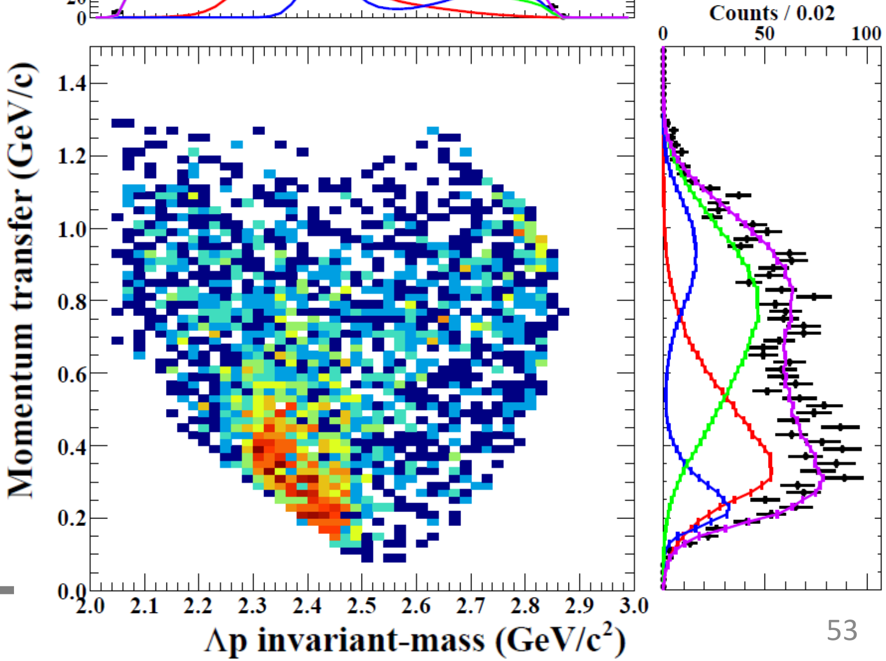
$B.E._{Kpp}$	$49\ MeV$
Γ_{Kpp}	$119\ MeV$
Q_{Kpp}	$420\ MeV$
σ	$26\ \mu b$



"n"-window : 0.85 – 0.94 GeV

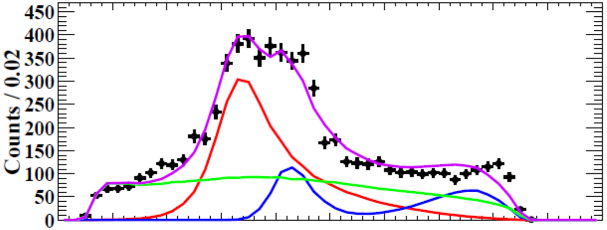


$B.E._{Kpp}$	$44\ MeV$
Γ_{Kpp}	$114\ MeV$
Q_{Kpp}	$420\ MeV$
σ	$15\ \mu b$

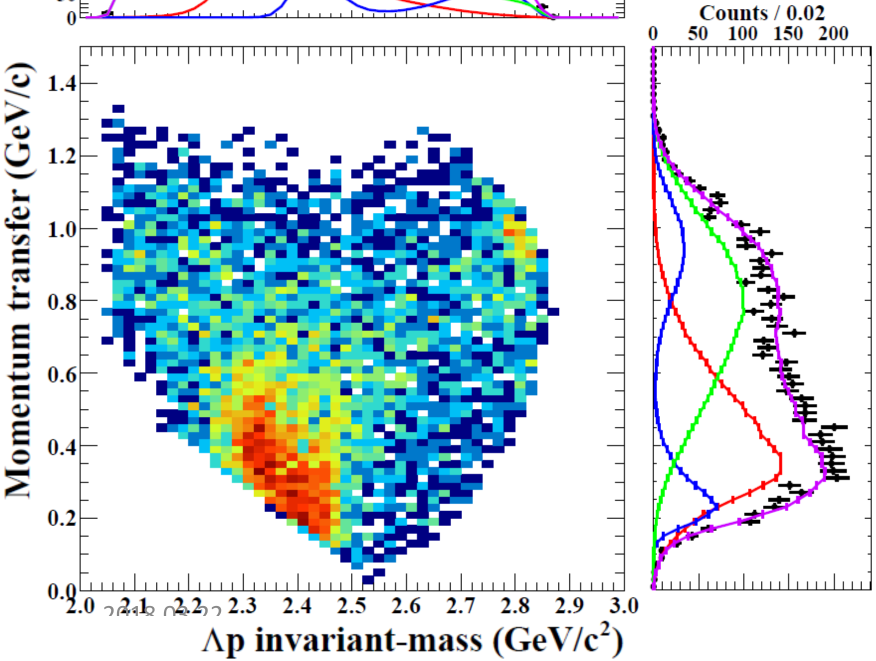


Fitting result :: Fix $Q_{Kpp} = 440$ MeV

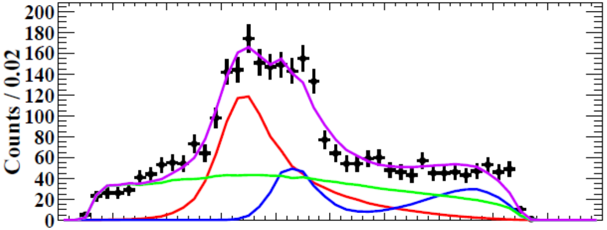
"n"-window : 0.85 – 1.03 GeV



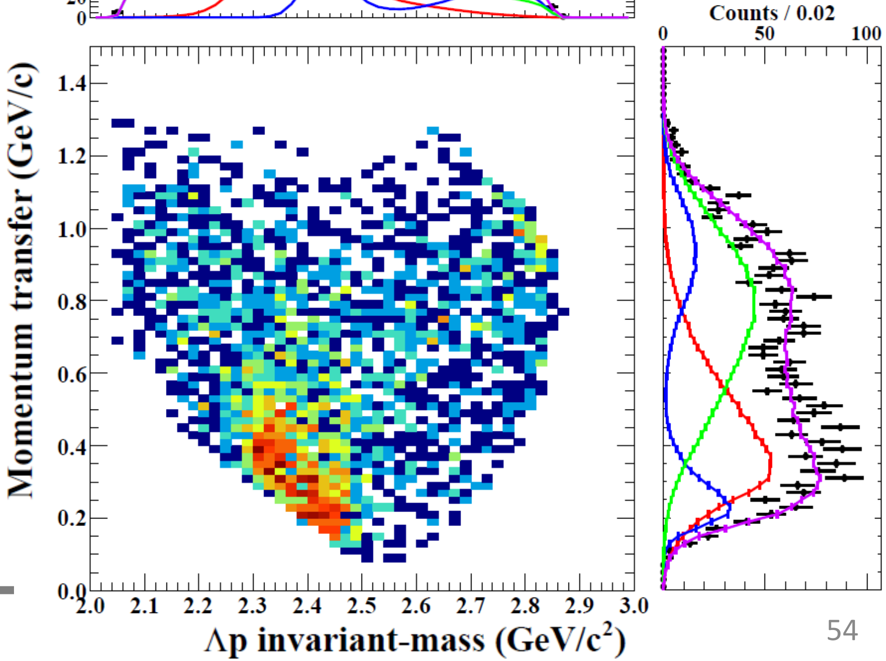
$B.E._{Kpp}$	50 MeV
Γ_{Kpp}	125 MeV
Q_{Kpp}	440 MeV
σ	27 μb



"n"-window : 0.85 – 0.94 GeV

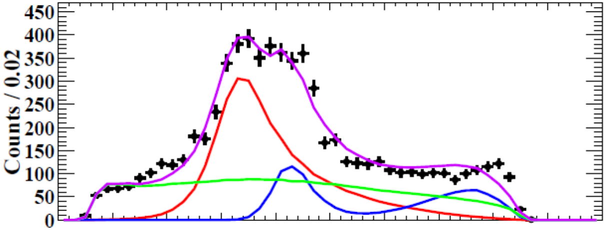


$B.E._{Kpp}$	45 MeV
Γ_{Kpp}	119 MeV
Q_{Kpp}	440 MeV
σ	15 μb

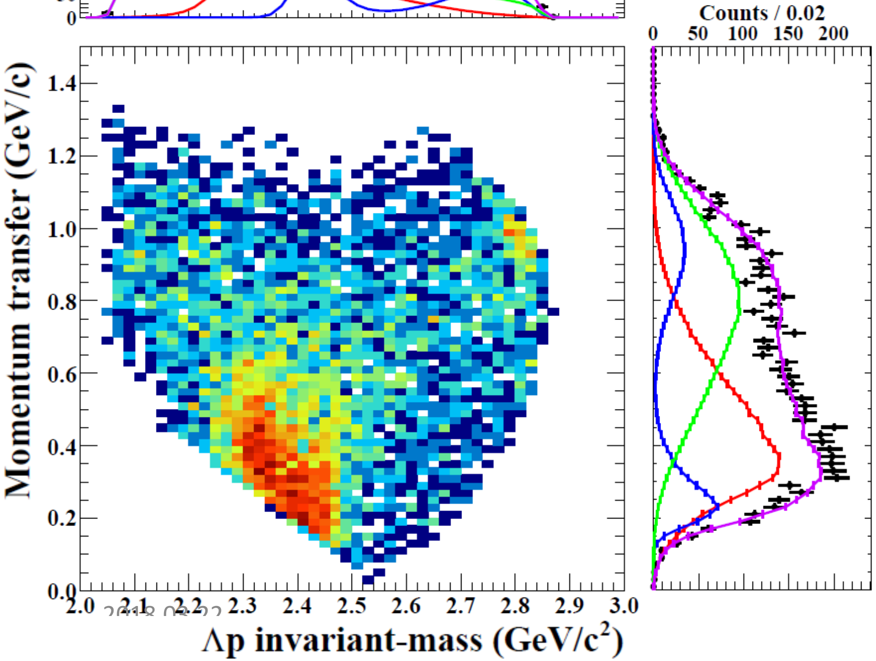


Fitting result :: Fix $Q_{Kpp} = 460$ MeV

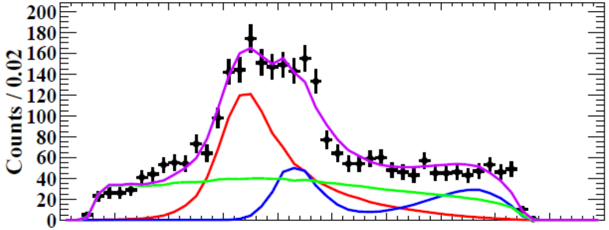
"n"-window : 0.85 – 1.03 GeV



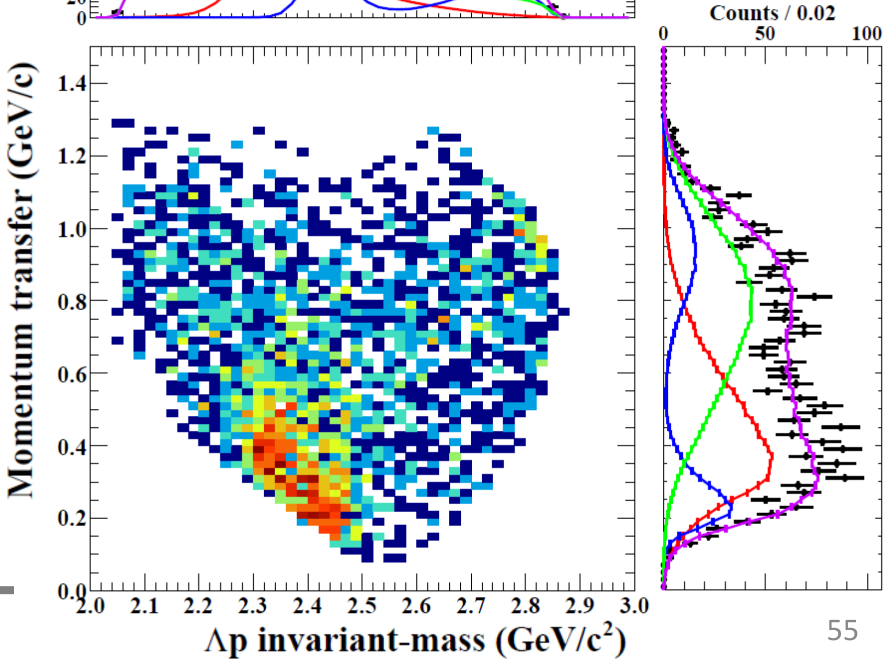
$B.E._{Kpp}$	$50\ MeV$
Γ_{Kpp}	$130\ MeV$
Q_{Kpp}	$460\ MeV$
σ	$28\ \mu b$



"n"-window : 0.85 – 0.94 GeV

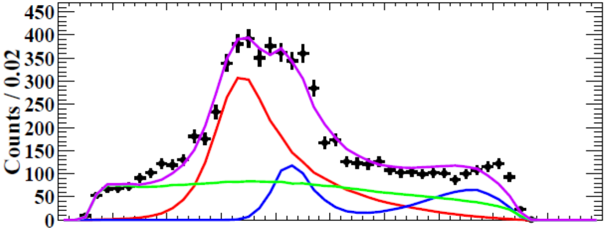


$B.E._{Kpp}$	$46\ MeV$
Γ_{Kpp}	$124\ MeV$
Q_{Kpp}	$460\ MeV$
σ	$16\ \mu b$

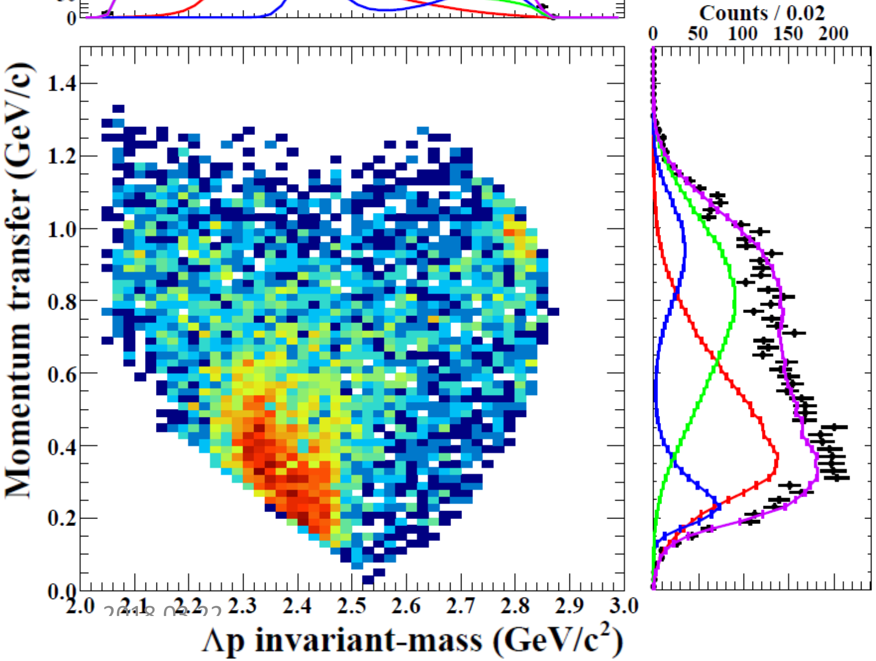


Fitting result :: Fix $Q_{Kpp} = 480$ MeV

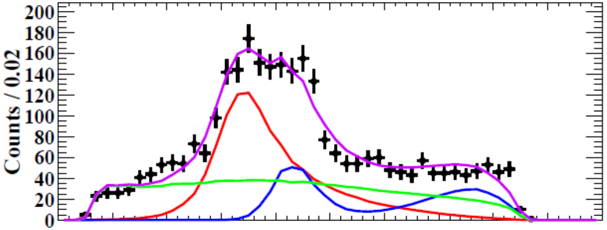
“n”-window : 0.85 – 1.03 GeV



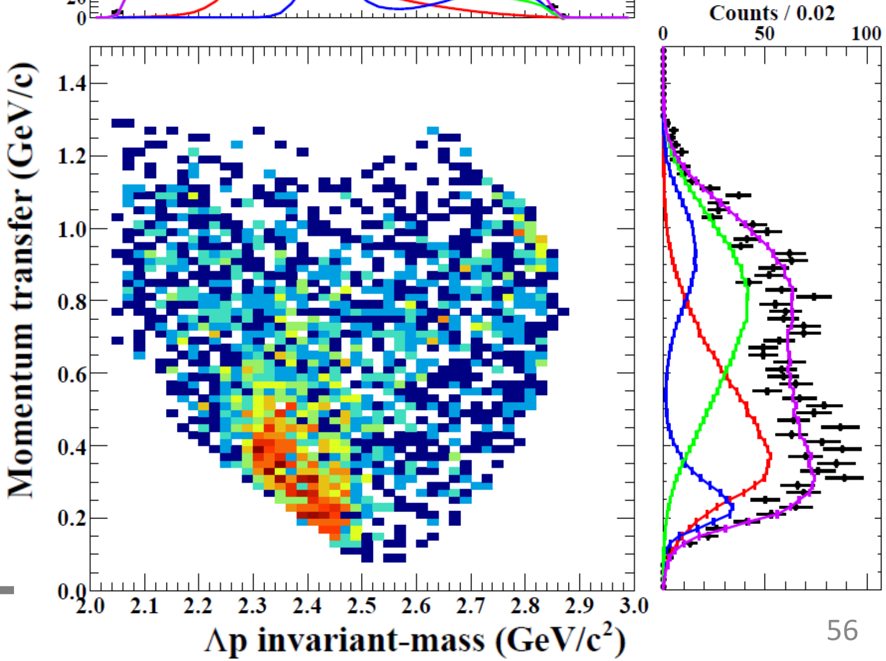
$B.E._{Kpp}$	$51\ MeV$
Γ_{Kpp}	$135\ MeV$
Q_{Kpp}	$480\ MeV$
σ	$30\ \mu b$



“n”-window : 0.85 – 0.94 GeV

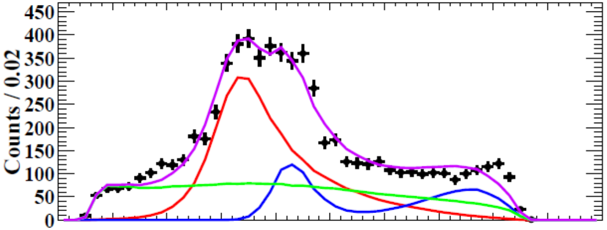


$B.E._{Kpp}$	$46\ MeV$
Γ_{Kpp}	$129\ MeV$
Q_{Kpp}	$480\ MeV$
σ	$17\ \mu b$

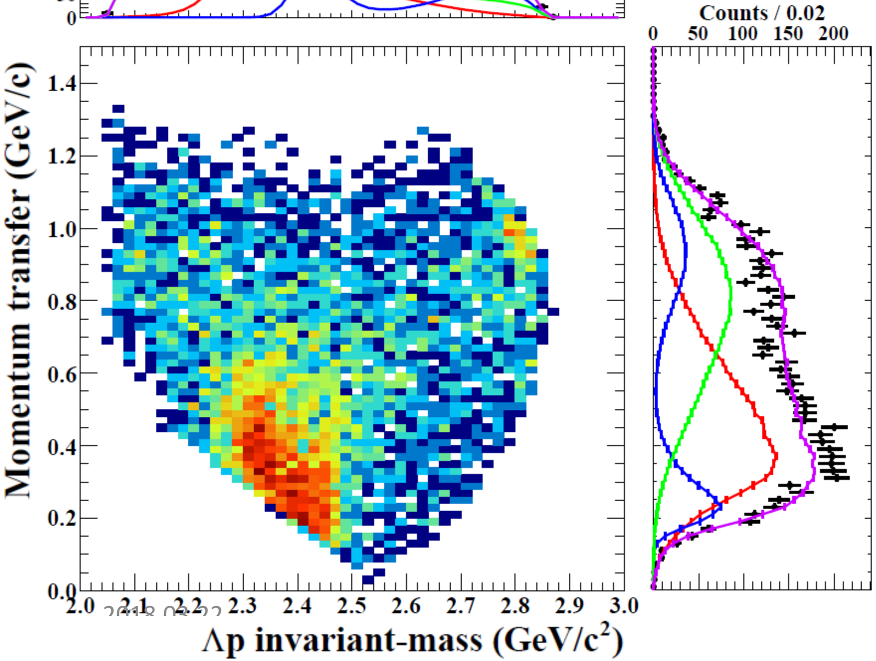


Fitting result :: Fix $Q_{Kpp} = 500$ MeV

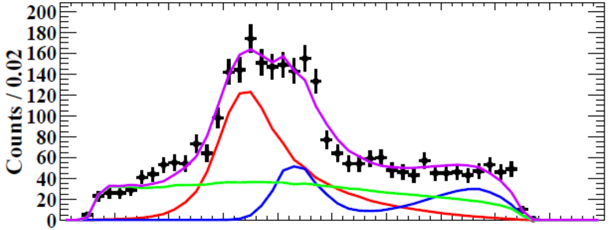
"n"-window : 0.85 – 1.03 GeV



$B.E._{Kpp}$	$51\ MeV$
Γ_{Kpp}	$141\ MeV$
Q_{Kpp}	$500\ MeV$
σ	$31\ \mu b$



"n"-window : 0.85 – 0.94 GeV



$B.E._{Kpp}$	$47\ MeV$
Γ_{Kpp}	$134\ MeV$
Q_{Kpp}	$500\ MeV$
σ	$18\ \mu b$