πη production from the Shimada model

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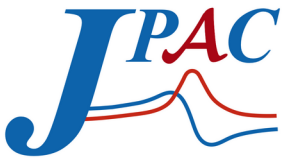


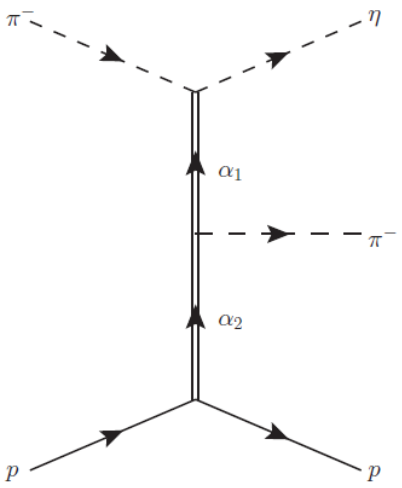
Caveats

- Shimada model pertains directly to 5 external (pseudo-)scalar particles
- Direct numerical comparison does not make sense – γ coupling to Rπ/Rη is different than that of π
- Helicity dependence in upper vertex largely ignored
- This is not so bad in the lower vertex – since isoscalar(pomeron) coupling to nucleon is mostly non-flip. Conversely – isovector exchange is mostly spin flip.

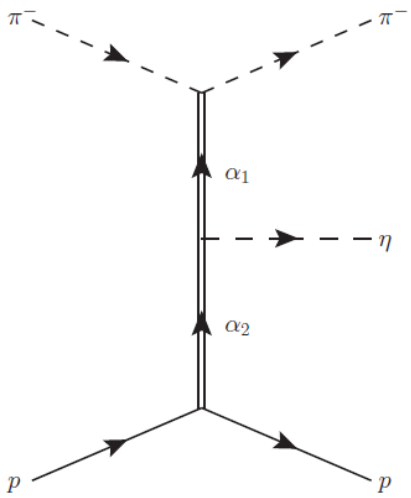
Caveats

- For the photoproduction the f_2/a_2 trajectories should be replaced by ρ/ω trajectories but this should not change dramatically the shape of $d\sigma/dt_\eta$ and $d\sigma/dt_\pi$ since the trajectories basically are the same.

Components of the model



Type I



Type II

Type of diagram	α_1	α_2
I (fast η)	α_{a_2}	$\alpha_{I\!P}$
II (fast π)	α_{f_2}	$\alpha_{I\!P}$

- **Each diagram corresponds to amplitude of the form:**

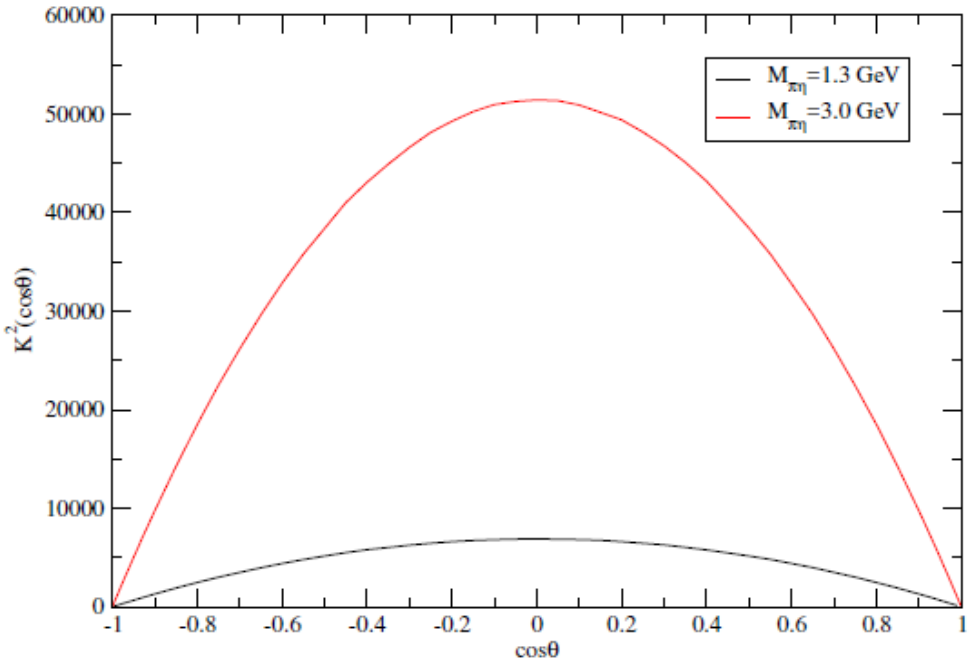
$$T = K\Gamma(1-\alpha_1)\Gamma(1-\alpha_2)\left[(-\alpha' s)^{\alpha_1-1}(-\alpha' s_2)^{\alpha_2-\alpha_1}\hat{V}_1 + (-\alpha' s)^{\alpha_2-1}(-\alpha' s_1)^{\alpha_1-\alpha_2}\hat{V}_2\right]$$

- **K contains all kinematical singularities:**

$$K = 4\sqrt{s_1}|\mathbf{p_2}||\mathbf{q}||\mathbf{k}|\sin\theta_2\sin\theta\sin\phi.$$

Small $M_{\pi\eta}$ region

- $T \sim K$
- K is purely P-wave



$d\sigma/dt_\eta$ and $d\sigma/dt_\pi$ distributions

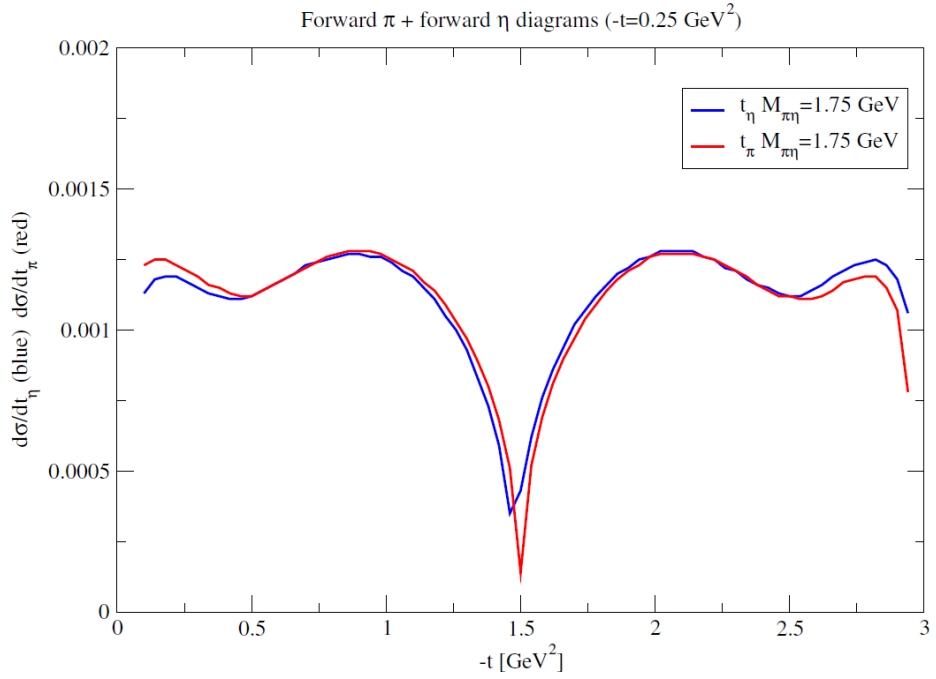
- Caveat:
- The plots I'm going to show below cannot be compared directly to Colin's distributions which are integrated over t while mines are t-fixed.
- Still I put them side by side to "guide the eye".

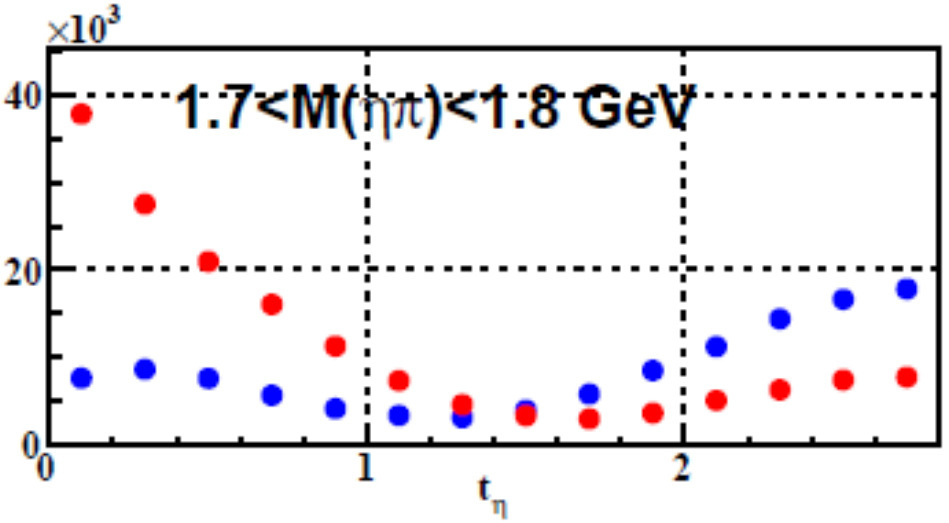
$d\sigma/dt_\eta$ and $d\sigma/dt_\pi$ distributions

- Good messages:
  - The “smaller/larger” relation between $d\sigma/dt_\eta$ and $d\sigma/dt_\pi$ distributions is generally conserved
  - The minima of $d\sigma/dt_\eta$ and $d\sigma/dt_\pi$ are shifted in right directions
- To be done:
  - Integrate over t (chance to smoothen the dips)
  - Normalize Type I and II amplitudes (couplings)

$d\sigma/dt_\eta$ and $d\sigma/dt_\pi$ (t=-0.25 GeV^2)

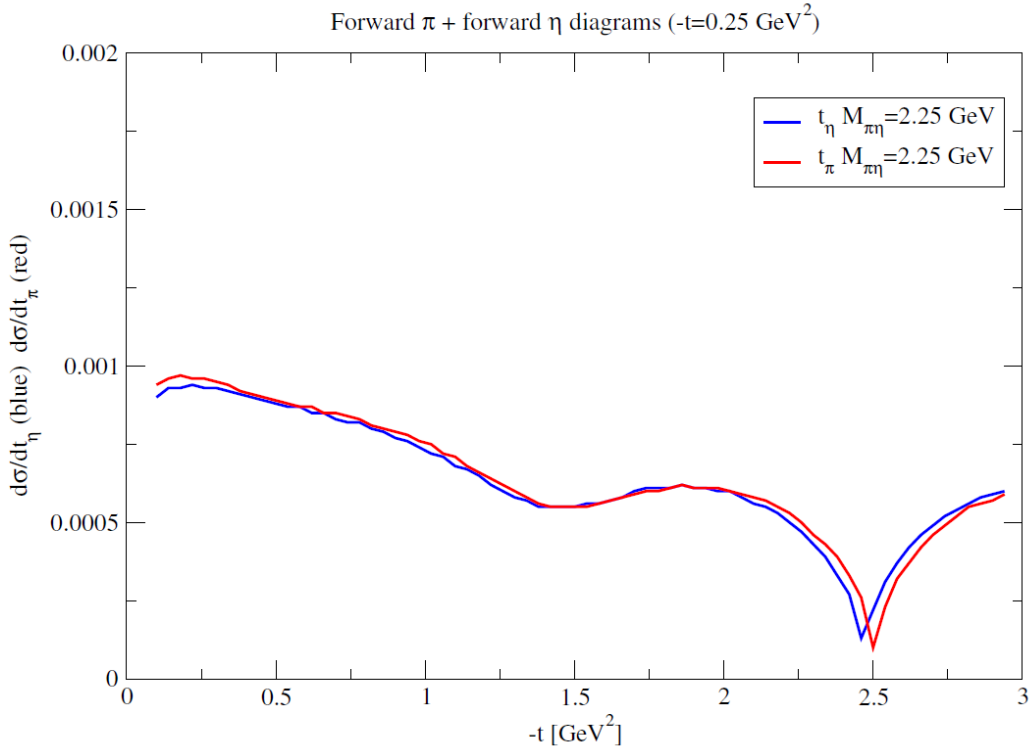
- $M_{\pi\eta}$ =1.75 GeV

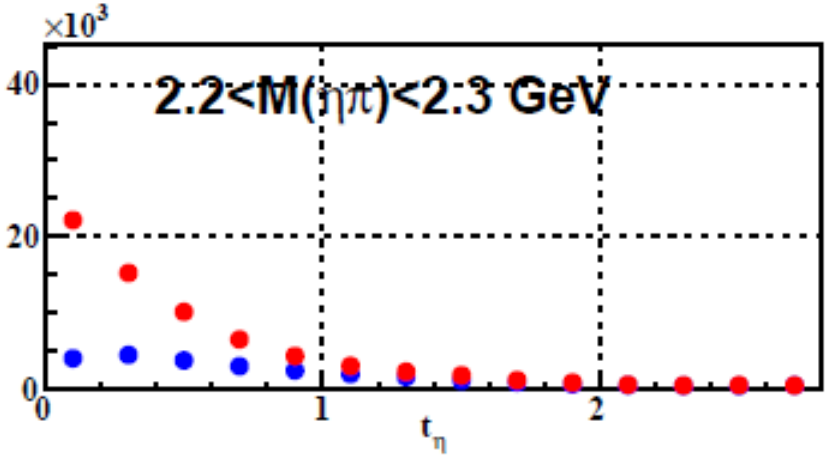




$d\sigma/dt_\eta$ and $d\sigma/dt_\pi$ (t=-0.25 GeV^2)

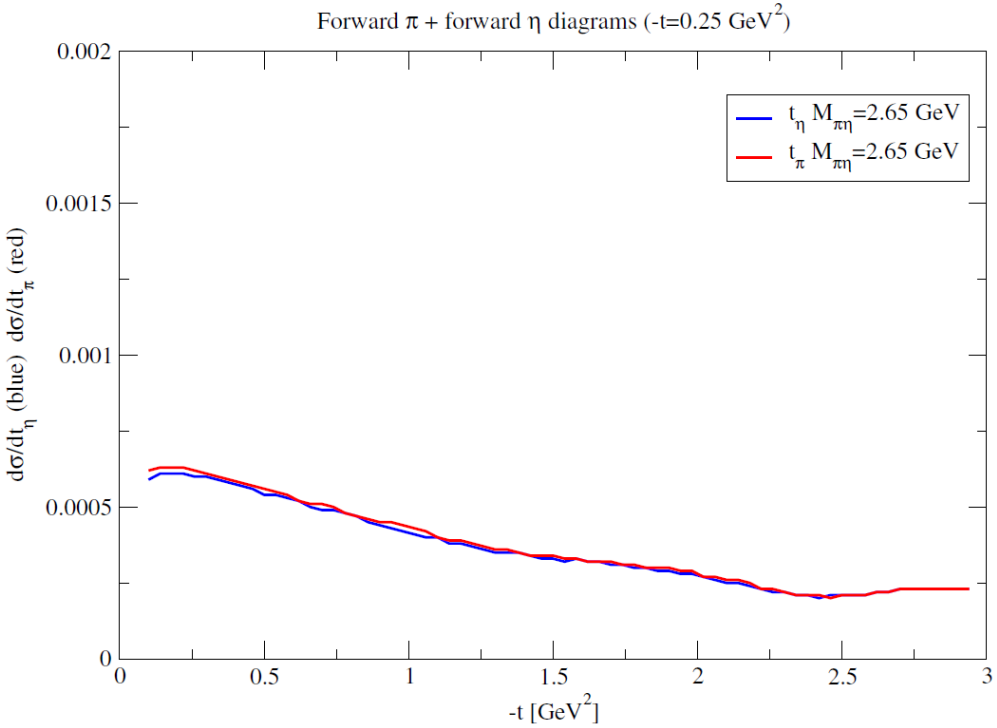
- $M_{\pi\eta}$ =2.25 GeV

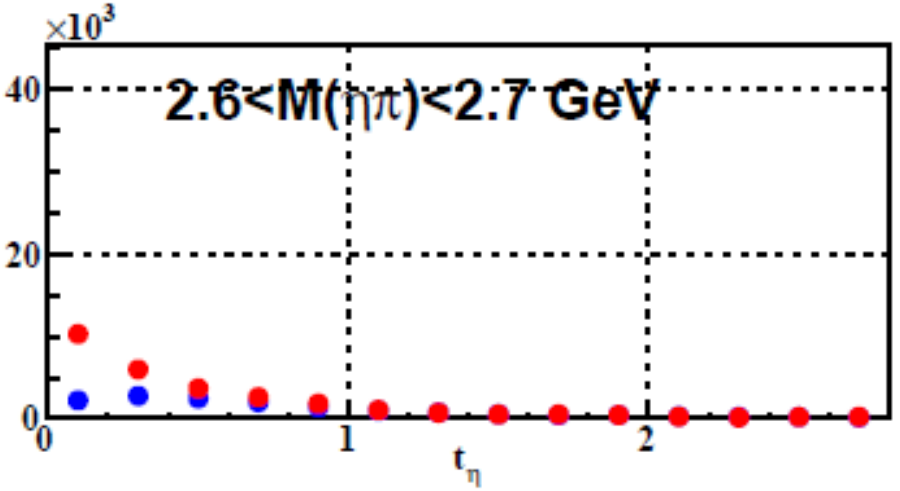




$d\sigma/dt_\eta$ and $d\sigma/dt_\pi$ (t=-0.25 GeV^2)

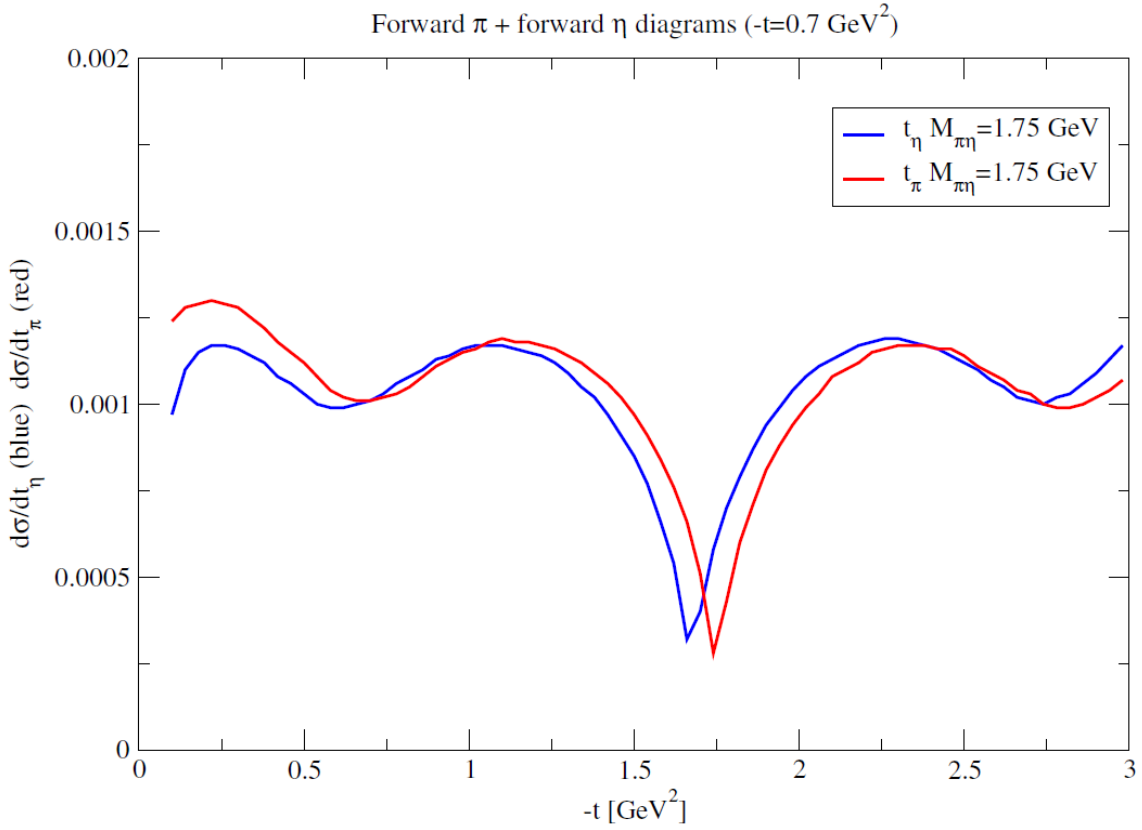
- $M_{\pi\eta}$ =2.65 GeV

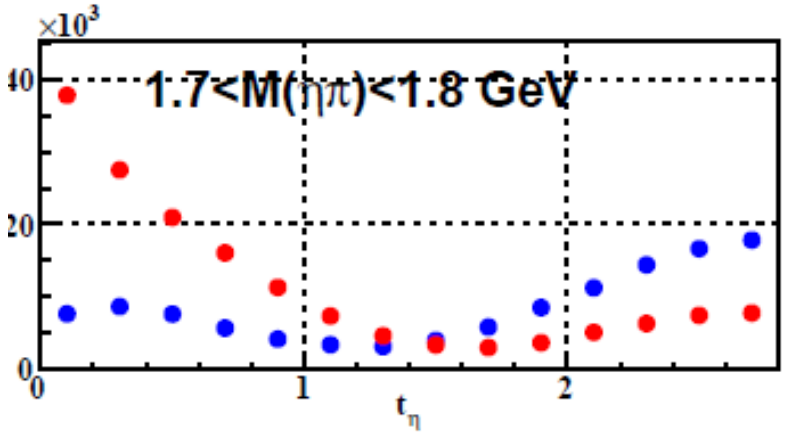




$d\sigma/dt_\eta$ and $d\sigma/dt_\pi$ ($t=-0.7$ GeV^2)

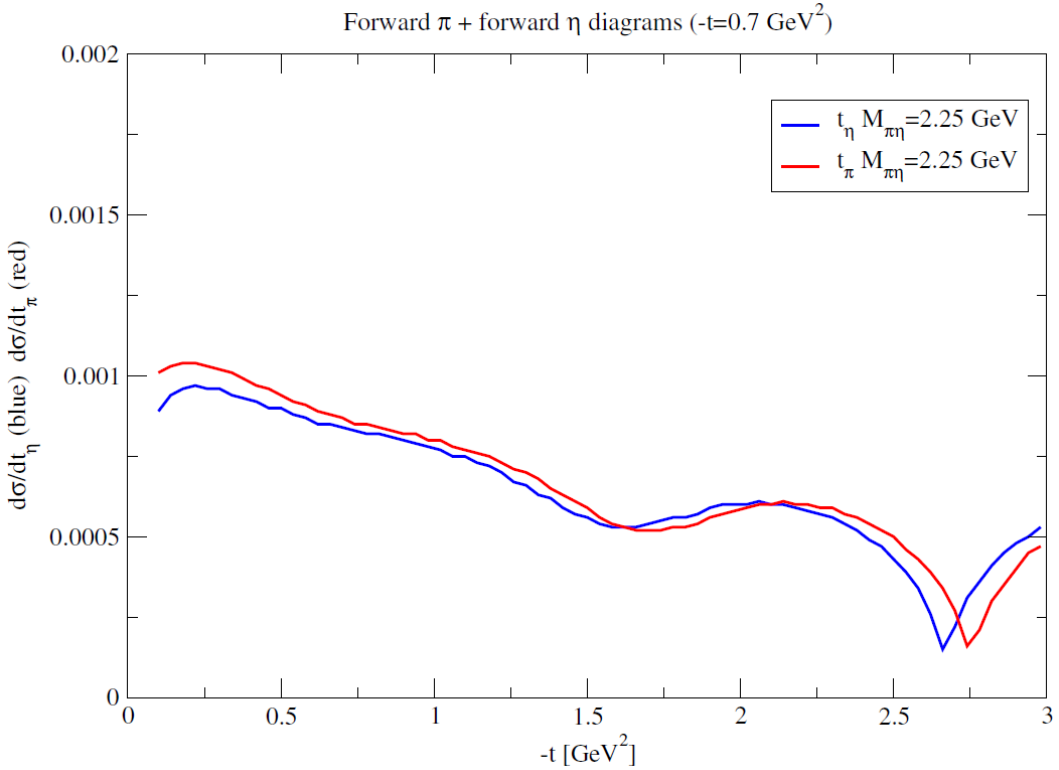
- $M_{\pi\eta}$ =1.75 GeV

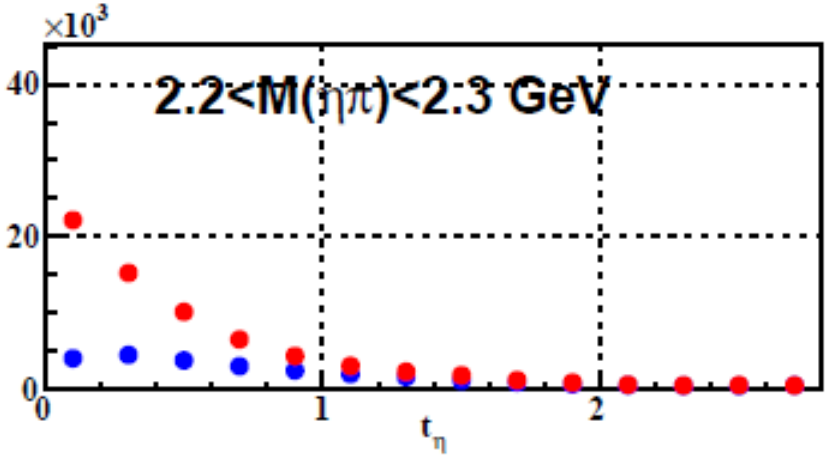




$d\sigma/dt_\eta$ and $d\sigma/dt_\pi$ ($t=-0.7$ GeV^2)

- $M_{\pi\eta}$ =2.25 GeV





$d\sigma/dt_\eta$ and $d\sigma/dt_\pi$ ($t=-0.7$ GeV^2)

- $M_{\pi\eta}$ =2.65 GeV