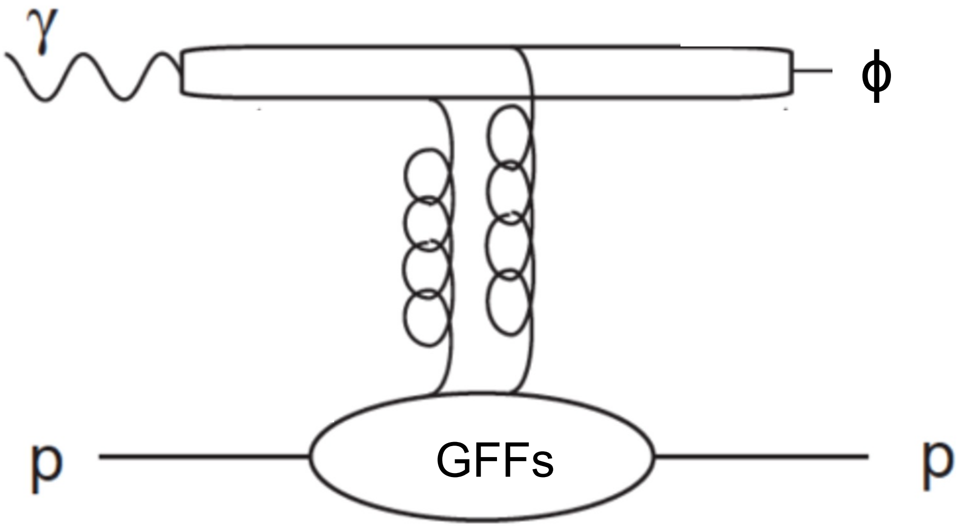
Introduction and objectives

Analysis objective :

- Measurement of the cross section and diferential cross section of the electroproduction of ϕ in the K_s K_L channel

- Datas : nSidis RG-A inbending and outbending fall 2018



Update on Ks Kl analysis

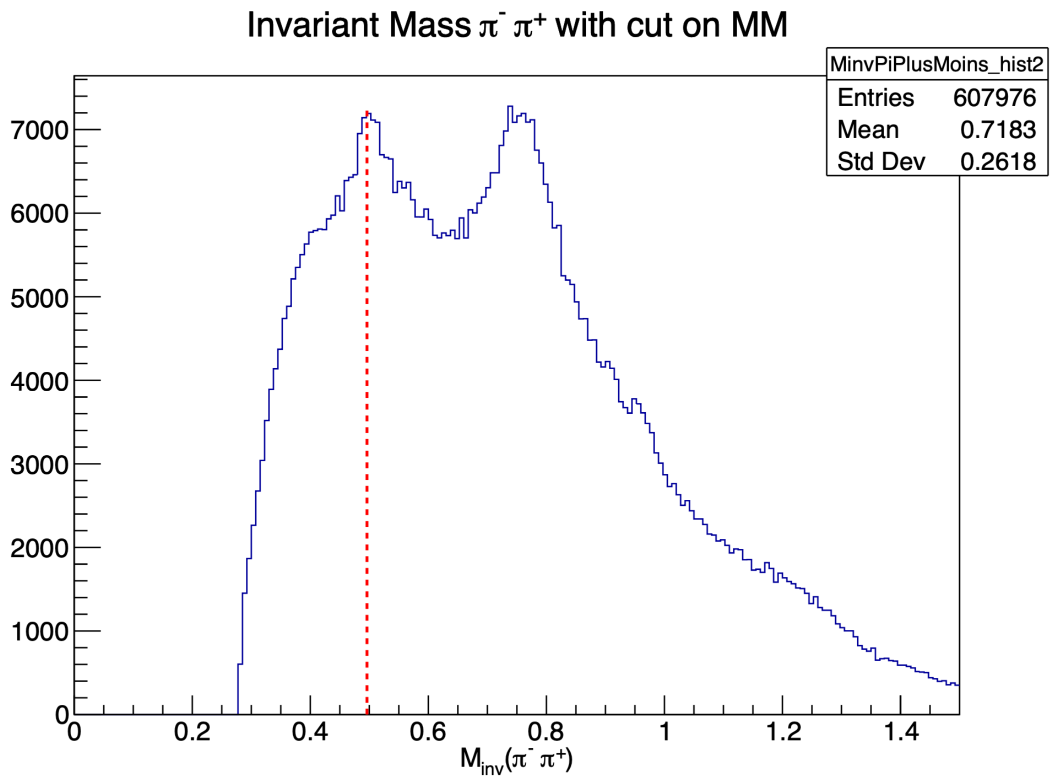
$\phi \to$ Ks Kl and Ks $\to \pi^+ \ \pi^-$

Vertex of $\pi^+ \ \pi^-$ are recalculated with the code of Veronique Ziegler

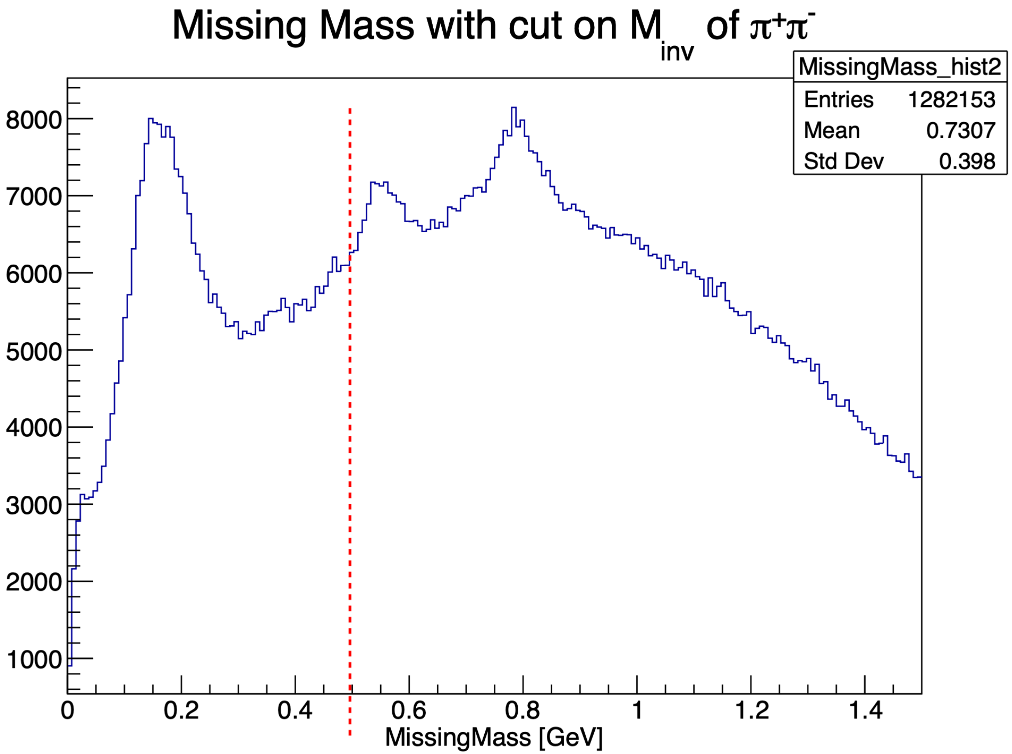
$\to$ Add some cut on :

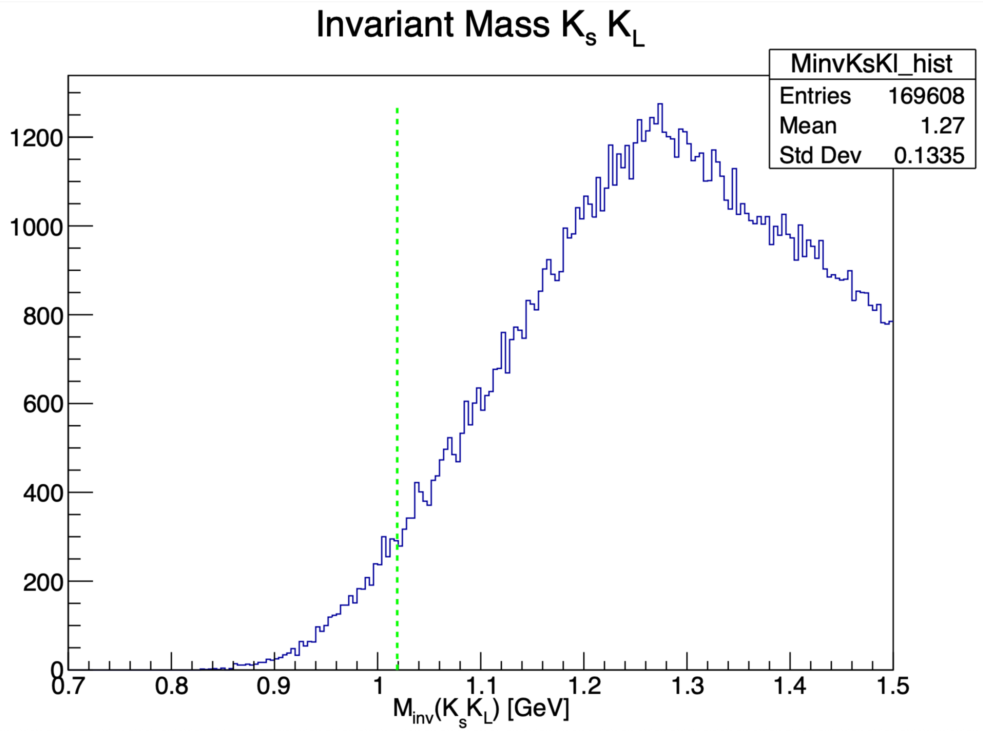
Distance between vertex of $\pi^+ \ \pi^- < 2$ cm

Distance between vertex Ks and e^- (1.5 < Dist < 5.0 cm)



Update on Ks Kl analysis





Generator with TGenPhaseSpace

Step 1 : e p $\rightarrow$ ϕ e' p'

Target :
p = (0, 0, 0, m_p)

Beam :
e = (0, 0, E_b, E_b)

Decay of p + e $\rightarrow$ ϕ e' p'
with TGenPhaseSpace

Vertex :
$V_x = 0$
$V_y = 0$
V_z = random(-5.5, -0,5)

Cross section :

$$\frac{d^3\sigma}{dQ^2 dx_B dt}$$

Implemented from

Proposal to Jefferson Lab PAC39 Exclusive Phi Meson Electroproduction with CLAS12

Generator with TGenPhaseSpace

Details on cross section :

σ_T and σ_L ($\gamma^* p \to \phi\ p$) :

$$\sigma_T(W, Q^2) = \frac{c_T(W)}{(1 + Q^2/m_\phi^2)^{\nu_T}}$$

$$R = \sigma_L(W, Q^2)/\sigma_T(W, Q^2)$$

$$R(W, Q^2) = \frac{c_R Q^2}{m_\phi^2}$$

t-dependence (dipole) :

$$\frac{d\sigma_{L,T}}{dt} = \frac{\sigma_{L,T}\, F(t)}{F_{\text{int}}}$$

$$F(t) = \frac{m_g^8}{(m_g^2 - t)^4}$$

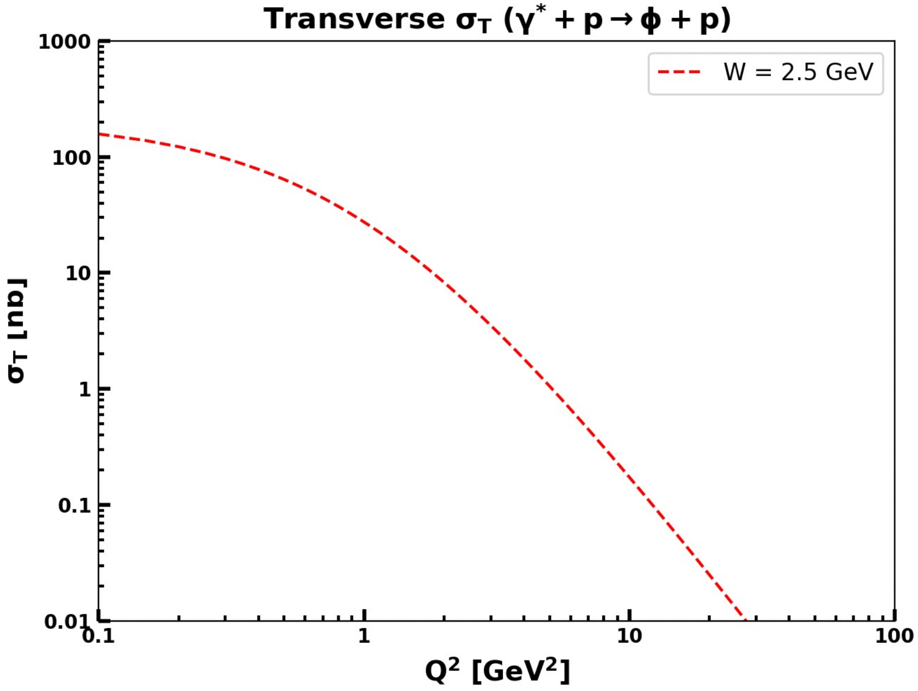
Generator with TGenPhaseSpace

Cross section (ep → ϕ p) :

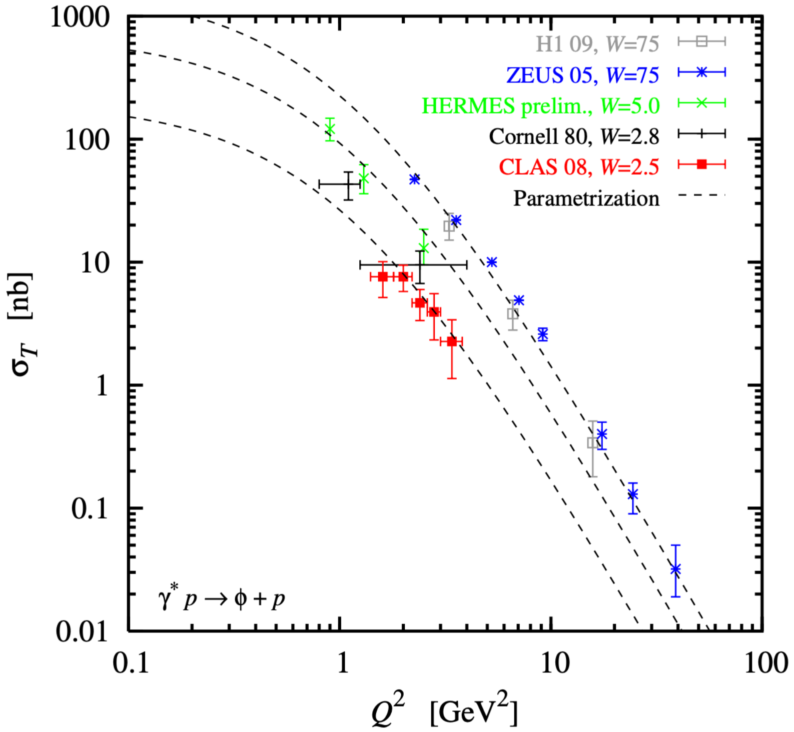
$$\frac{d^3\sigma}{dQ^2 dx_B dt} = \Gamma(Q^2, x_B, E)\left[\frac{d\sigma_T}{dt}(Q^2, x_B, t) + \epsilon\frac{d\sigma_L}{dt}(Q^2, x_B, t)\right]$$

The virtual photon flux : $\Gamma \equiv \frac{\alpha}{8\pi}\frac{Q^2}{m_N^2 E^2}\frac{1-x_B}{x_B^3}\frac{1}{1-\epsilon}$

Generator with TGenPhaseSpace

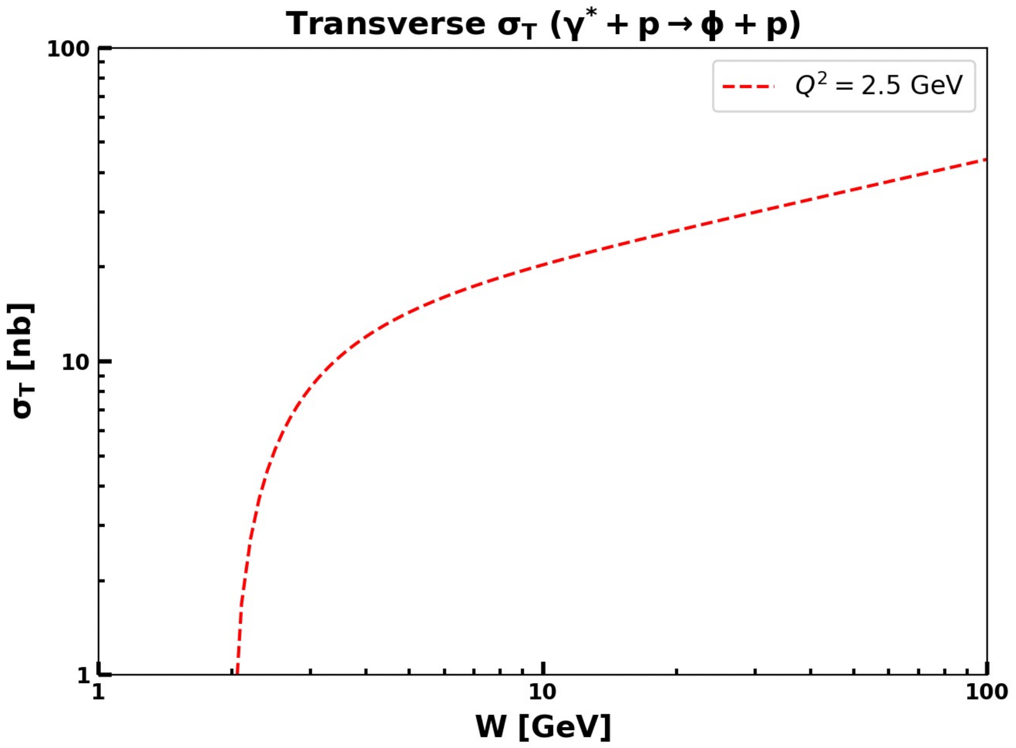


Implemented in the generator

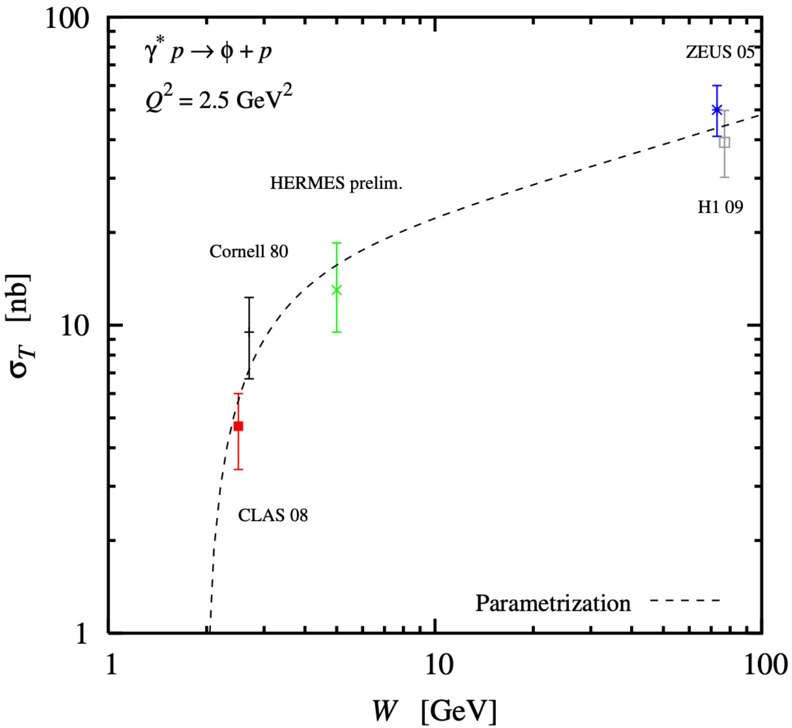


From Proposal to Jefferson Lab PAC39

Generator with TGenPhaseSpace

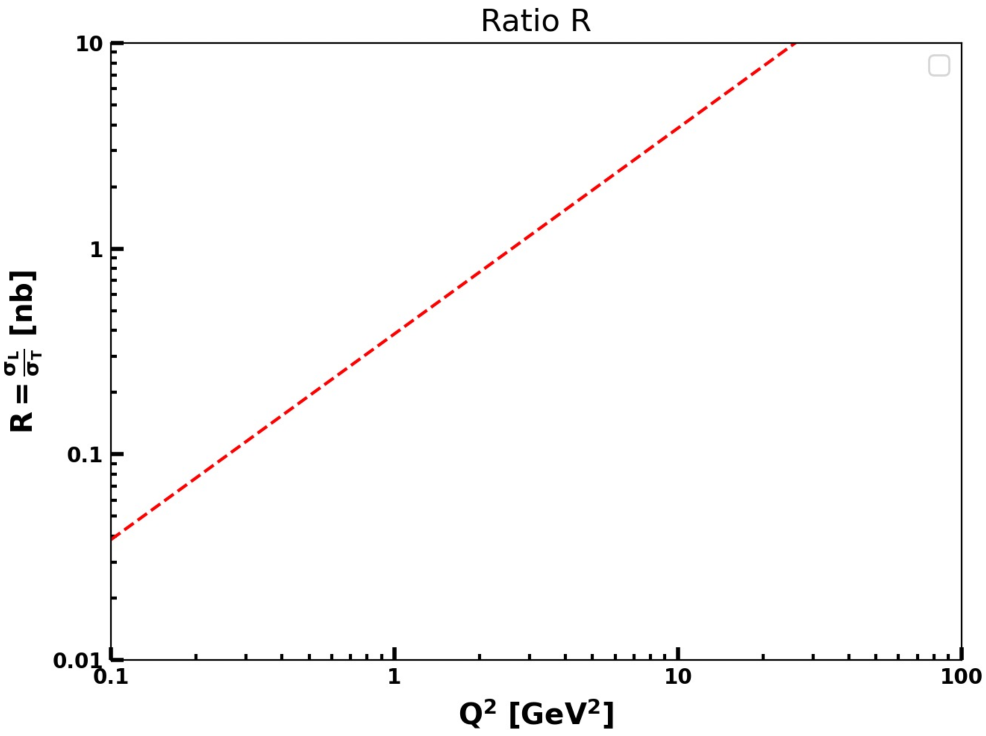


Implemented in the generator

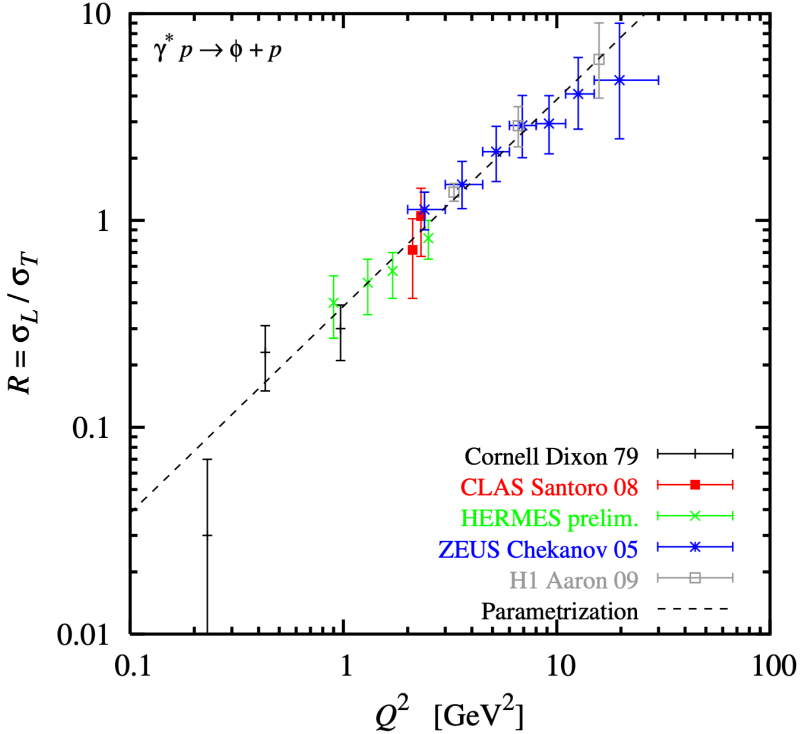


From Proposal to Jefferson Lab PAC39

Generator with TGenPhaseSpace

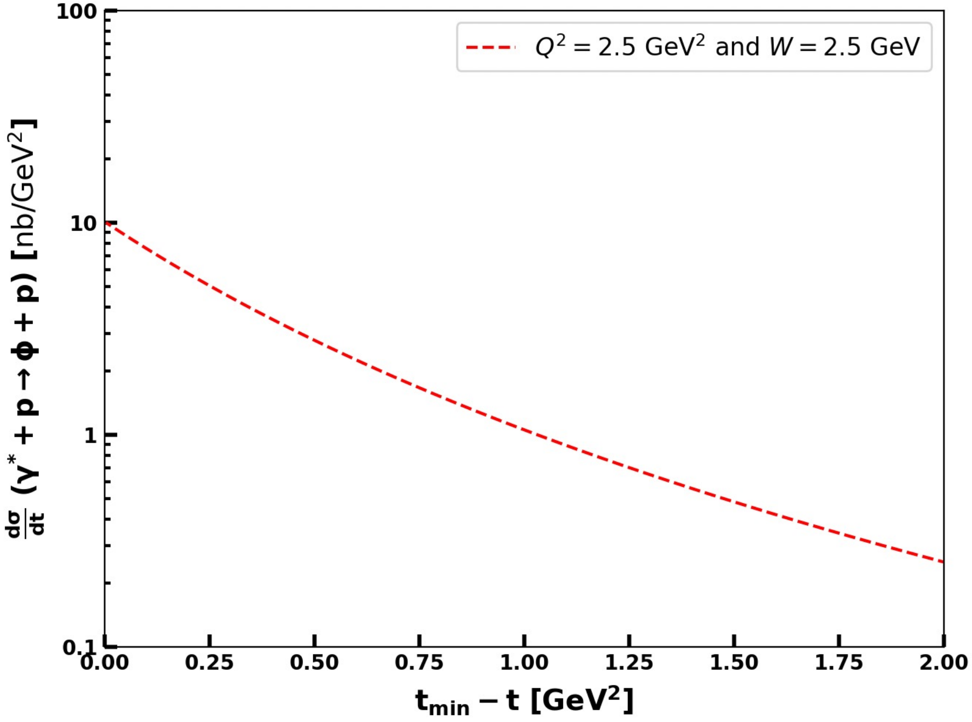


Implemented in the generator

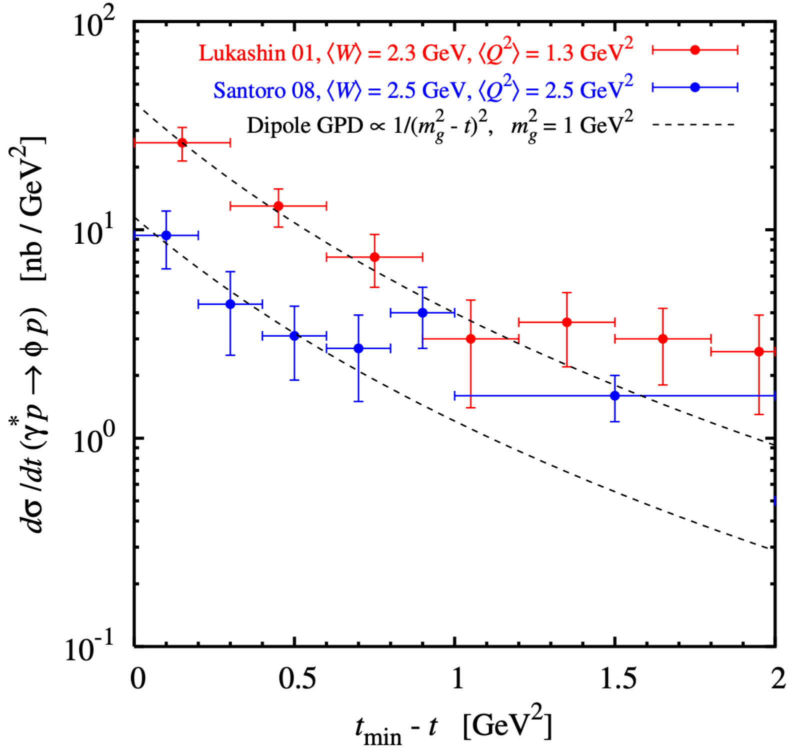


From Proposal to Jefferson Lab PAC39

Generator with TGenPhaseSpace



Implemented in the generator



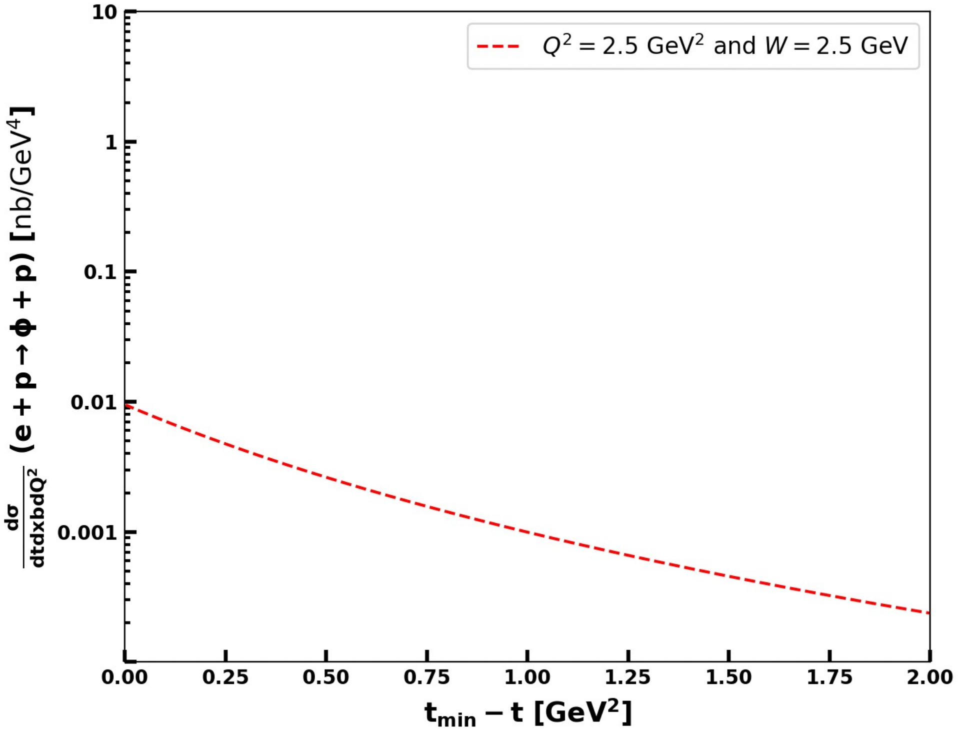
From Proposal to Jefferson Lab PAC39

Generator with TGenPhaseSpace

Cross section (ep → ϕ p) (with the virtual photon flux) :

$$\frac{d^3\sigma}{dQ^2 dx_B dt} = \Gamma(Q^2, x_B, E)\left[\frac{d\sigma_T}{dt}(Q^2, x_B, t) + \epsilon \frac{d\sigma_L}{dt}(Q^2, x_B, t)\right]$$

$$\Gamma \equiv \frac{\alpha}{8\pi} \frac{Q^2}{m_N^2 E^2} \frac{1 - x_B}{x_B^3} \frac{1}{1-\epsilon}$$



Implemented in the generator

Generator with TGenPhaseSpace

Step 2 : $\phi \rightarrow$ KsKl

Branching ratio = 34%

Uniform decay in θ in first approximation

Same V_x V_y V_z as in the previous decay

Step 3 : Ks $\rightarrow$ π^+ π^-

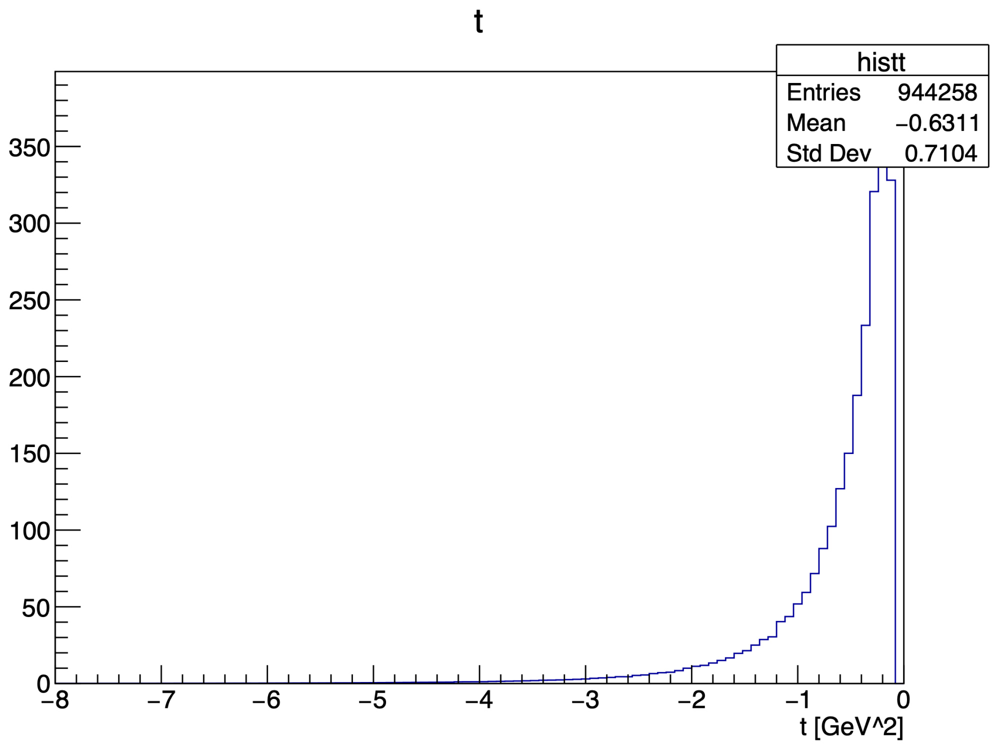
Branching ratio = 69%

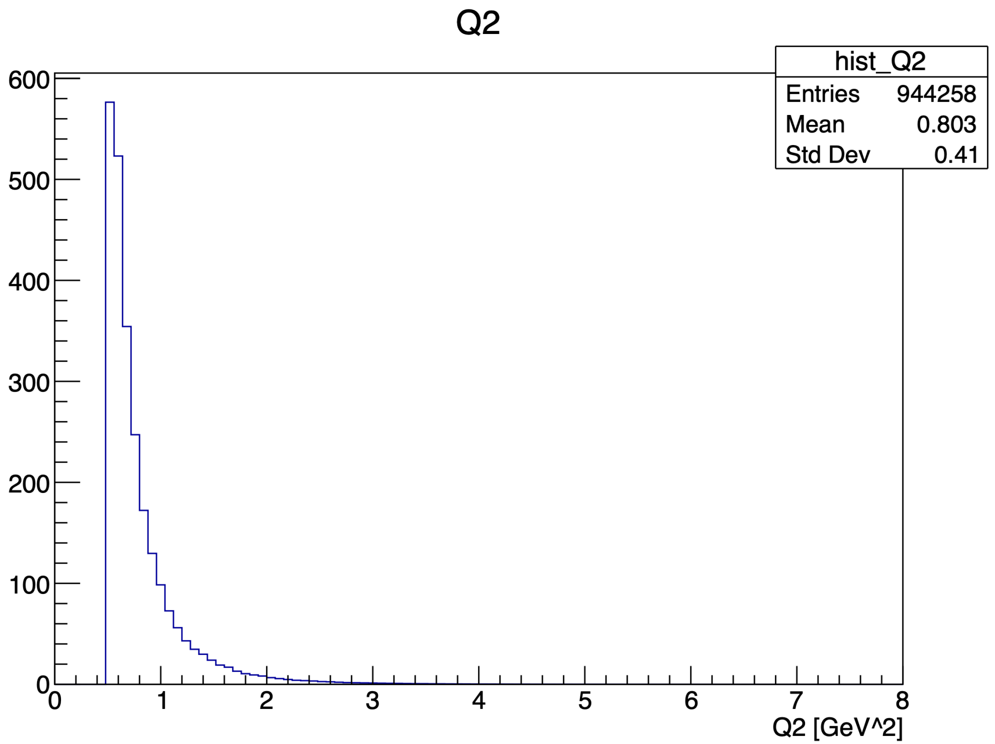
Uniform decay in θ in first approximation

V_x V_y V_z shifted by 2.8 cm in the direction of Ks emmision to simulate the flight of Ks

Total weight = $\text{weight}_{\text{SpacePhase}} * \sigma * \text{BR}_{\text{KsKl}} * \text{BR}_{\pi+\ \pi-}$

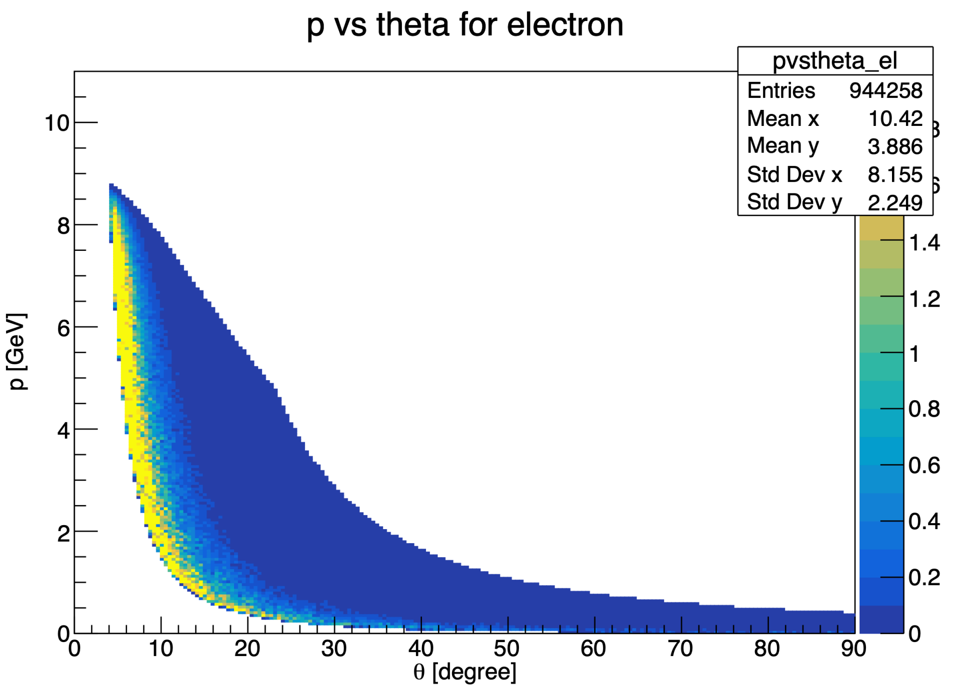
Generator with TGenPhaseSpace

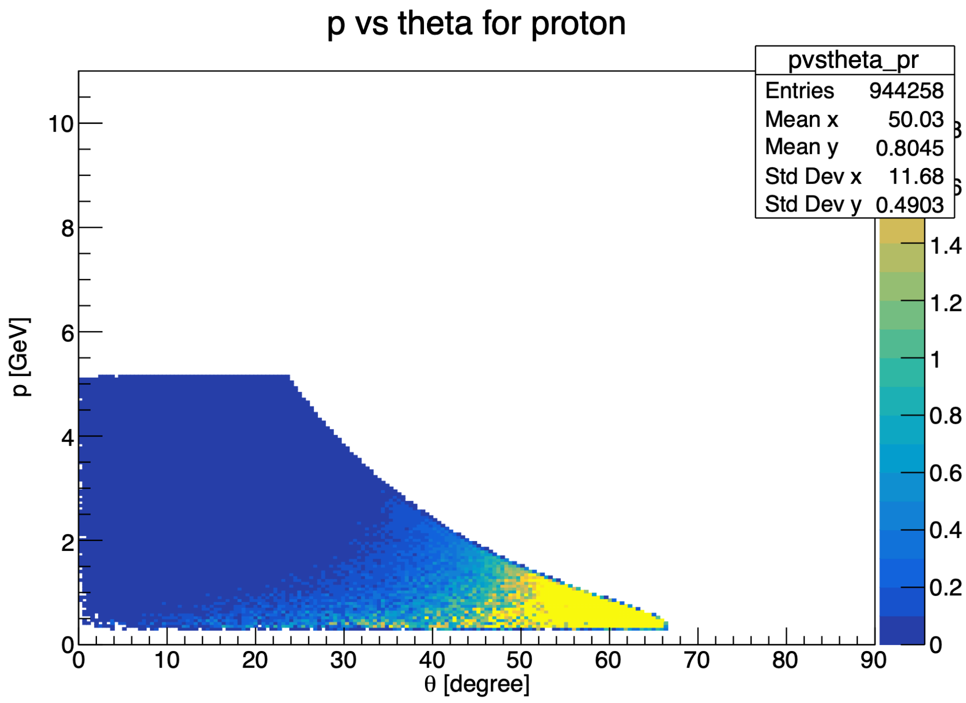




Generator with TGenPhaseSpace

Cuts : -8 < t < -0.1 GeV^2 and 0.5 < Q^2 < 8 GeV





Generator with TGenPhaseSpace