

SPIN@U-70 Event Rates

Beam intensity: $I = 10^{11}$ protons s^{-1}

Target thickness: $T = N_0(\rho)t$

$= 6.02 \cdot 10^{23}/\text{gm} (0.1 \text{ gm/cm}^3) 3.6 \text{ cm} = 2.1 \cdot 10^{23}$ polarized protons cm^{-2}

Luminosity: $L = I \times T = 2.1 \cdot 10^{34} \text{ cm}^{-2}\text{s}^{-1}$

$$\text{Rate}\left(\frac{\text{Events}}{\text{hour}}\right) = L \frac{d\sigma}{dt} \Delta t \cdot \frac{\Delta\phi}{2\pi} \epsilon \frac{3600 \text{ s}}{\text{hr}} = 6 \frac{d\sigma}{dt} [\text{nb}] \Delta t \cdot \Delta\phi[\text{mrad}],$$

where $\epsilon = \text{efficiency} = 50\%$

P_1^2 (GeV/c) ²	Δt (GeV/c) ²	$\Delta\phi$ mr	$\frac{d\sigma}{dt}$ $\frac{\text{nb}}{(\text{GeV}/c)^2}$	Events per hour	hours	Events (N)	ΔA_n [.85 \sqrt{N}] ⁻¹	
1.0	0.06	159	4000	230000	100	2.3 10^8	0.01%	
2.0	0.09	177	90	8600	100	8.6 10^5	0.1%	
3.0	0.25	194	19	5500	100	5.5 10^5	0.2%	
4.0	0.35	210	4.0	1800	100	1.8 10^5	0.3%	
5.0	0.45	225	0.9	550	100	5.5 10^4	0.5%	
6.0	0.56	240	0.22	180	200	3.6 10^4	0.6%	
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7.0	0.67	254	0.055	56	200	1.1 10^4	1.1%	Super Q ₁
8.0	0.79	268	0.016	20	300	6.0 10^3	1.5%	
9.0	0.92	282	0.0047	7.3	400	2.9 10^3	2.2%	
10.0	1.06	296	0.0017	3.2	600	1.9 10^3	2.7%	
12.0	1.25	324	0.0003	0.73	800	5.8 10^2	4.9%	
Total hours =					3000	+ 500 (tune-up)		

Table C2 Event rates and errors in A_n for $p-p$ elastic scattering at U-70.