Azimuthal distributions with linearly polarized photons

$$\gamma A \to \pi\pi A$$

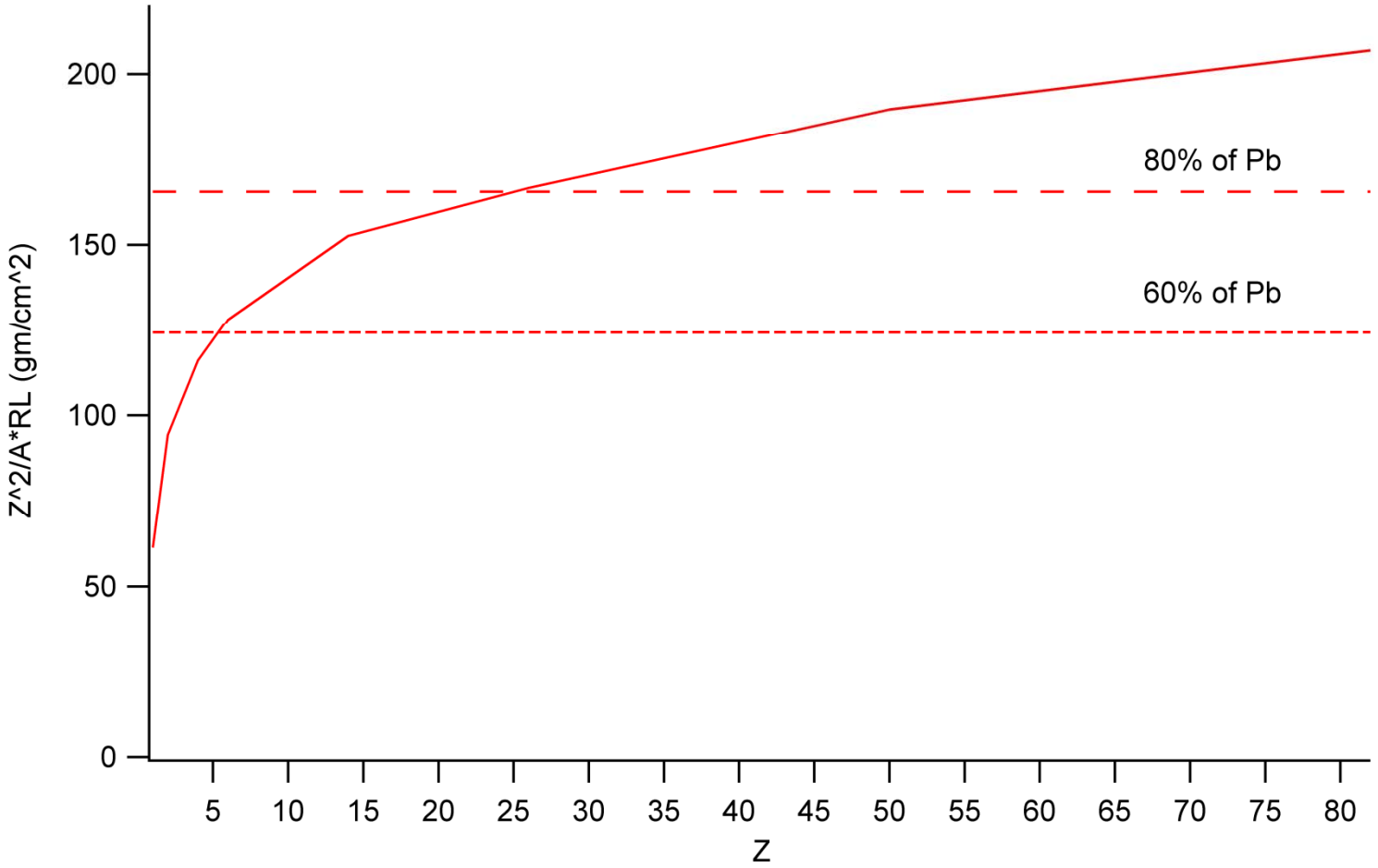
$$\frac{d\sigma}{d\Omega_{\pi\pi}} \propto \left|\vec{\varepsilon}\cdot\vec{q}\right|^2 \approx \sin^2\phi_{\pi\pi} = 1-\cos 2\phi_{\pi\pi}$$

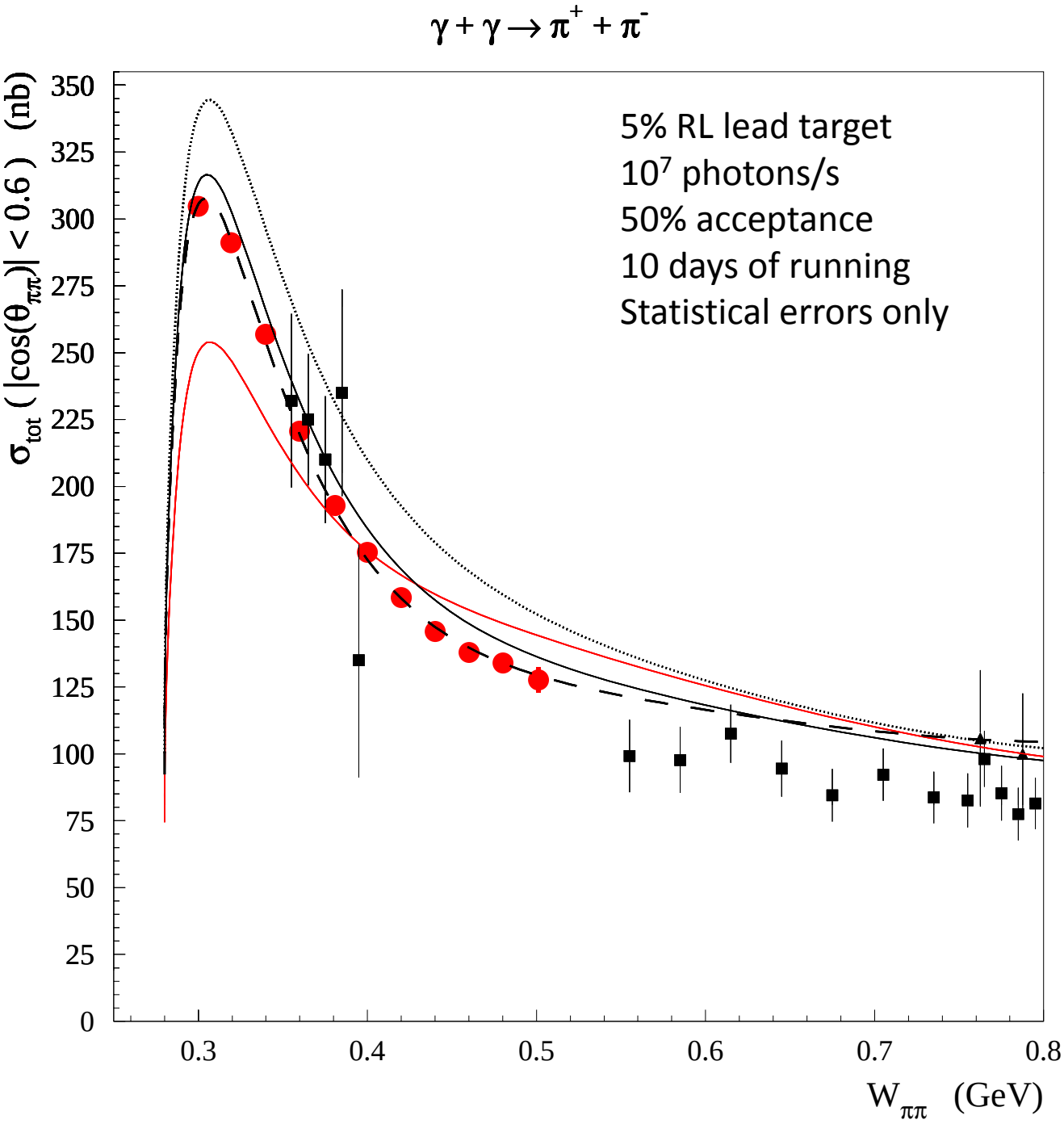
$$\gamma A \to \mu\mu A$$

$$\frac{d\sigma}{d\Omega_{\mu\mu}} \propto \left|\left(\vec{\varepsilon}\times\vec{q}\right)\cdot\vec{q}\right|^2 \approx \cos^2\phi_{\mu\mu} = 1+\cos 2\phi_{\mu\mu}$$

$$\gamma A \to \rho A$$

$$\frac{d\sigma}{d\Omega_{\pi}} \propto \left|\vec{\varepsilon}\cdot\vec{k}_{\pi}\right|^2 \approx \cos^2\phi_{\pi} = 1+\cos 2\phi_{\pi}$$


200
150
100
50
0
Z^2/A*RL (gm/cm^2)
80% of Pb
60% of Pb
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
Z


$\gamma + \gamma \rightarrow \pi^+ + \pi^-$
$\sigma_{tot}(|\cos(\theta_{\pi\pi})| < 0.6)$ (nb)
350
325
300
275
250
225
200
175
150
125
100
75
50
25
0
0.3
0.4
0.5
0.6
0.7
0.8
$W_{\pi\pi}$ (GeV)
5% RL lead target
10^7 photons/s
50% acceptance
10 days of running
Statistical errors only

Source of Uncertainty	$\Delta\sigma(\gamma\gamma\rightarrow\pi\pi)$
Statistical error in $M_{\gamma\gamma}$ bin @ 400 MeV	1.7%
(target thickness)·(photon flux)·(tracking eff.)·(trigger eff.)·(DT correction)	1% †
ρ^0 background	?
$\mu^+\mu^-$ background (assume 5:1 muon/pion)	0.2%
Efficiency for pion pair identification (98% efficiency)	0.2%
One or both pions decay in flight (8% of events)	0.4%
accidental subtraction	?

† Preliminary estimated theoretical uncertainty in $\sigma(\gamma A\rightarrow\mu^+\mu^- A)$