Beamline specifications for spectroscopy, prompt photons and Primakoff

RF-separated beams for Amber- Kick Off Meeting

A. Guskov (JINR, Dubna)
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Physics with RF-separated hadron beam

	Beam-dump setup		Open setup		
Name	Drell-Yan	Charmonia	Primakoff	Spectro-scopy	Prompt photons
Underlying physics	partonic structure of K	partonic structure of K	γ-K interaction at low-t	hadron spectro-scopy	partonic structure of K
Process	hard	hard	electromag-netic	diffraction	hard
Signal	μ+μ− pairs	μ+μ− pairs	hard γ	charged hadrons and photons	high-p_T γ
Type of measurement	inclusive	inclusive	exclusive	exclusive	inclusive

Beam energy & intensity

$$\sigma_{Prim} \sim logE$$
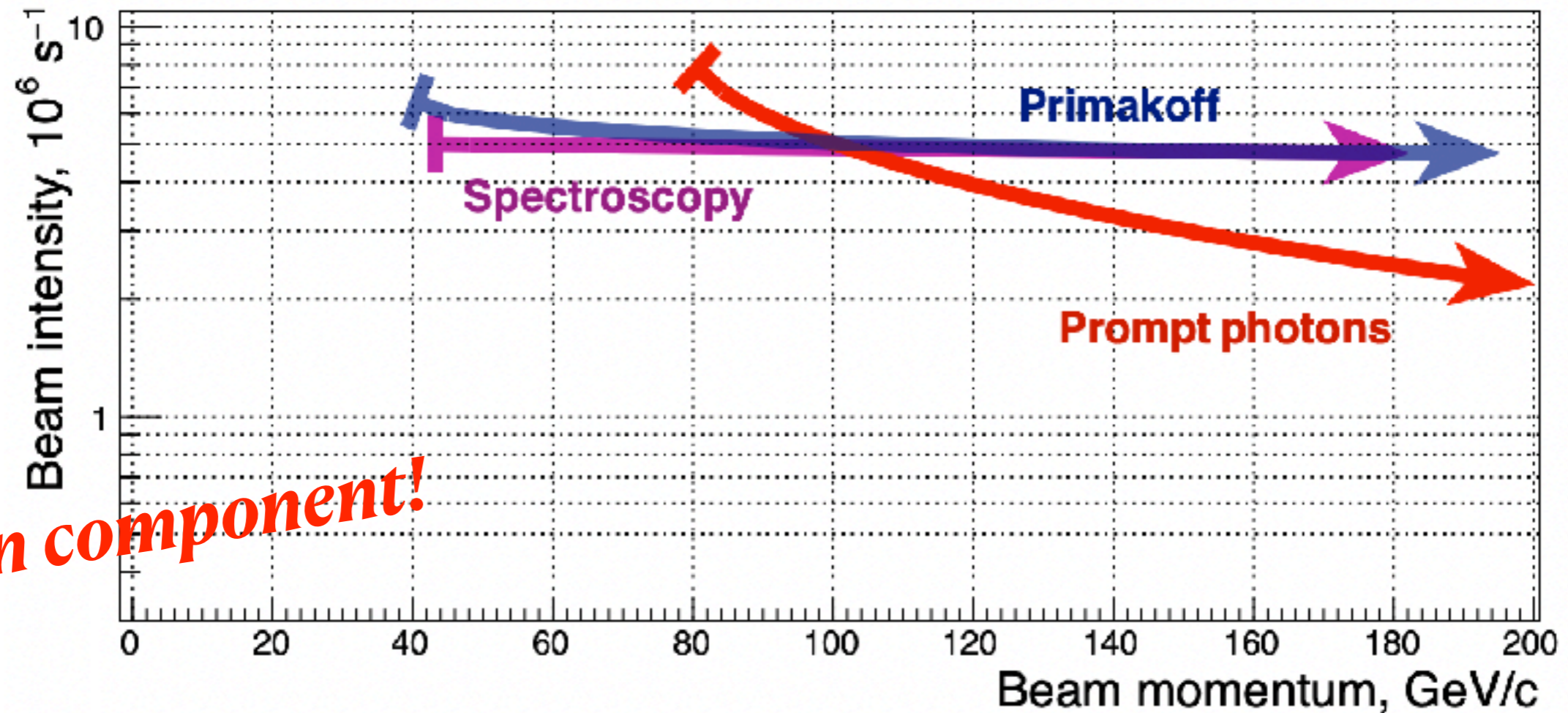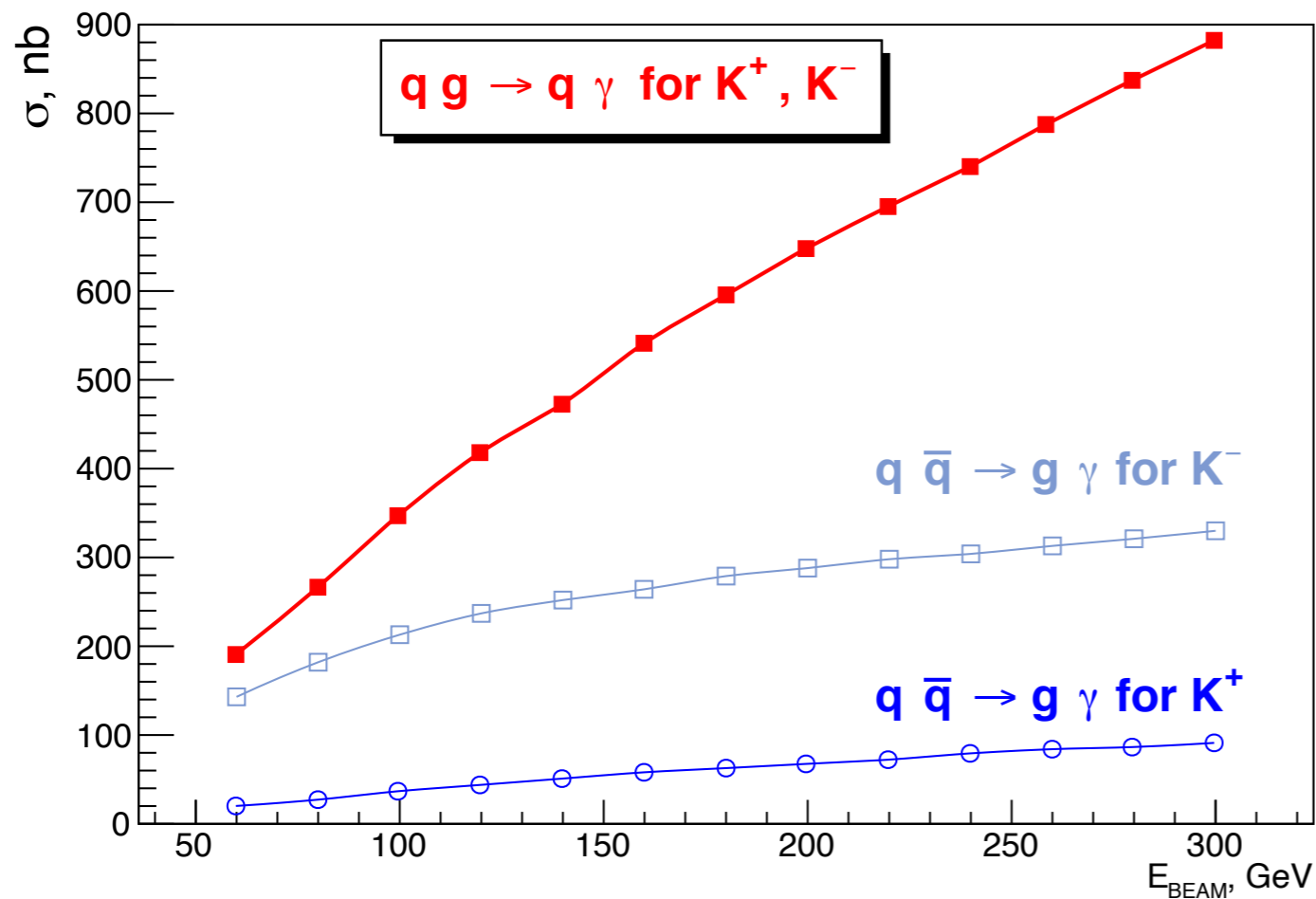
$$\sigma_{diff} \sim const$$

$$\sigma_{prompt\ \gamma} \sim (E - 40\ GeV)$$

Lower limit in energy is defined by setup acceptance

Lower limit is defined by cross section!

Beam charge

Prompt photons:

Positive K is preferable due to absence of light antiquark , **negative K** is required for

gg and $q\bar{q}$ separation

Spectroscopy and Primakoff:
Negative K is required to avoid antiproton contribution

Beam purity

Spectroscopy: not critical in case of good identification by CEDARs.

Prompt photons: not critical if there is good identification by CEDARs. Some fraction of pions is even welcome for some reference.

Primakoff: pion contribution is critical !

$$\sigma_{Primakoff} \sim 1/m^2$$

$$\sigma_\pi / \sigma_K = 12.5$$

$$n_K/n_\pi \times 1/R_{\pi \text{ suppression by CEDAR}} > 10^3$$

Beam divergence and momentum spread

Beam divergency is directly related to the performance of CEDARs

Beam momentum spread dp/p at 100 GeV:

~1% for spectroscopy and Primakoff for exclusivity control

not critical for prompt photons

Summary

	Spectroscopy	Primakoff	Prompt photons
E=80 GeV	perfect	perfect	minimal possible
E=100 GeV	perfect	perfect	tolerant
E=120 GeV	perfect	perfect	perfect
Intensity (K), 10^6 s^{-1}	5	5	8(80), 5(100), 4(120)
Beam sign	neg.	neg.	pos. + neg.
Beam purity, K/π after CEDARs	>10^2	>10^3	>10^2, ~3 before CEDARS
Beam momentum spread, %	1	1	<5
Beam divergence	low	low	low