



Some estimations for exclusive and semi-inclusive gamma-gamma production for 300 pb⁻¹

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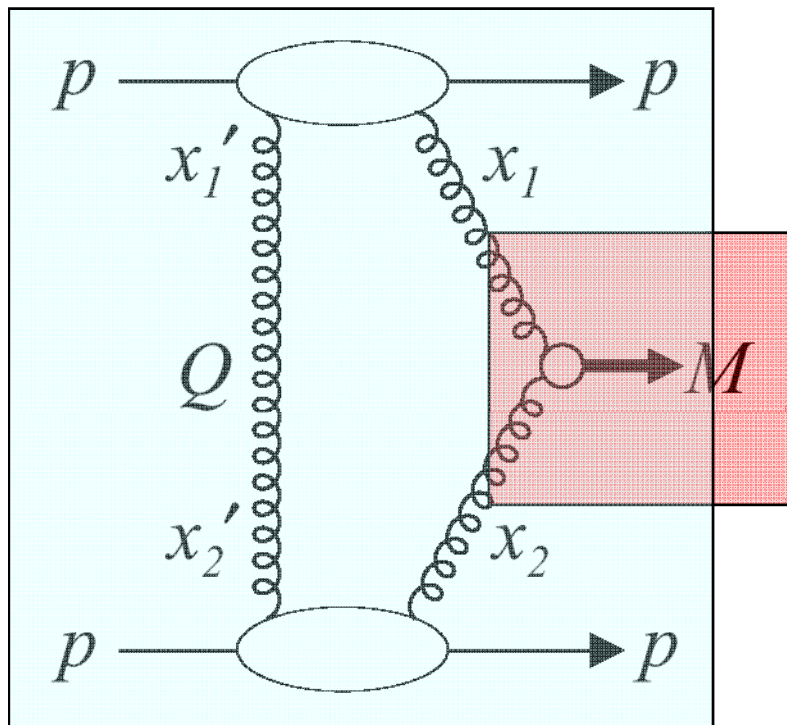
Motivations

Double Diffractive central production

exclusive

$$pp \rightarrow p + M + p$$

$$M \Rightarrow \{Higgs, jj, \gamma, \dots\}$$



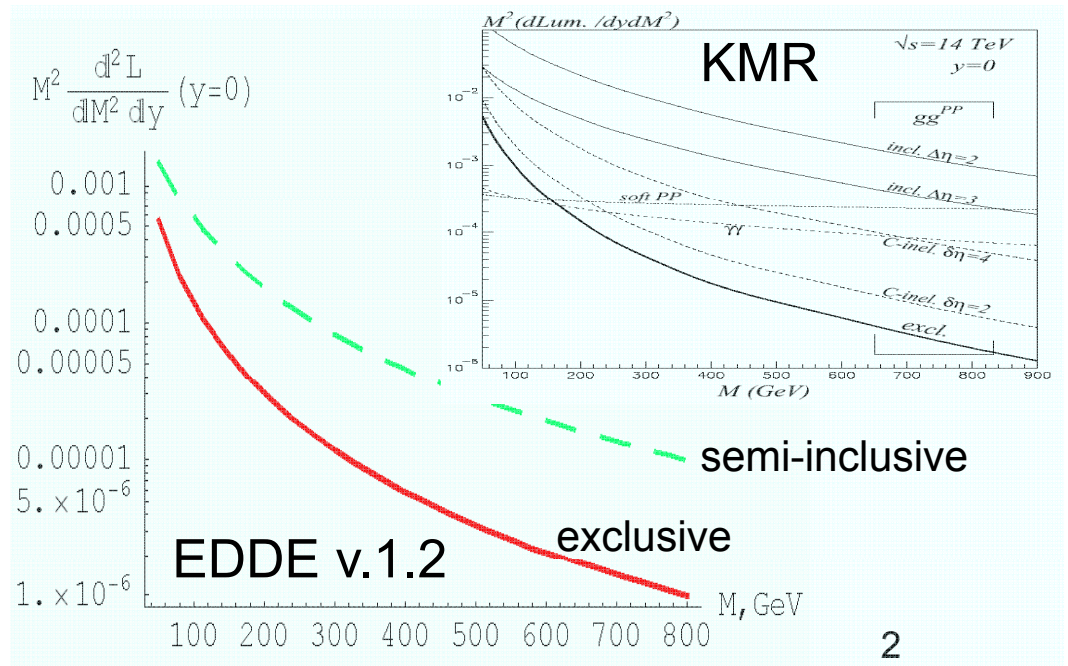
semi-inclusive

$$pp \rightarrow p + X + M + Y + p$$

$$\sigma = L(M^2, y) \hat{\sigma}(M^2)$$

Effective luminosity
at rapidity y

Cross section for
the hard subprocess

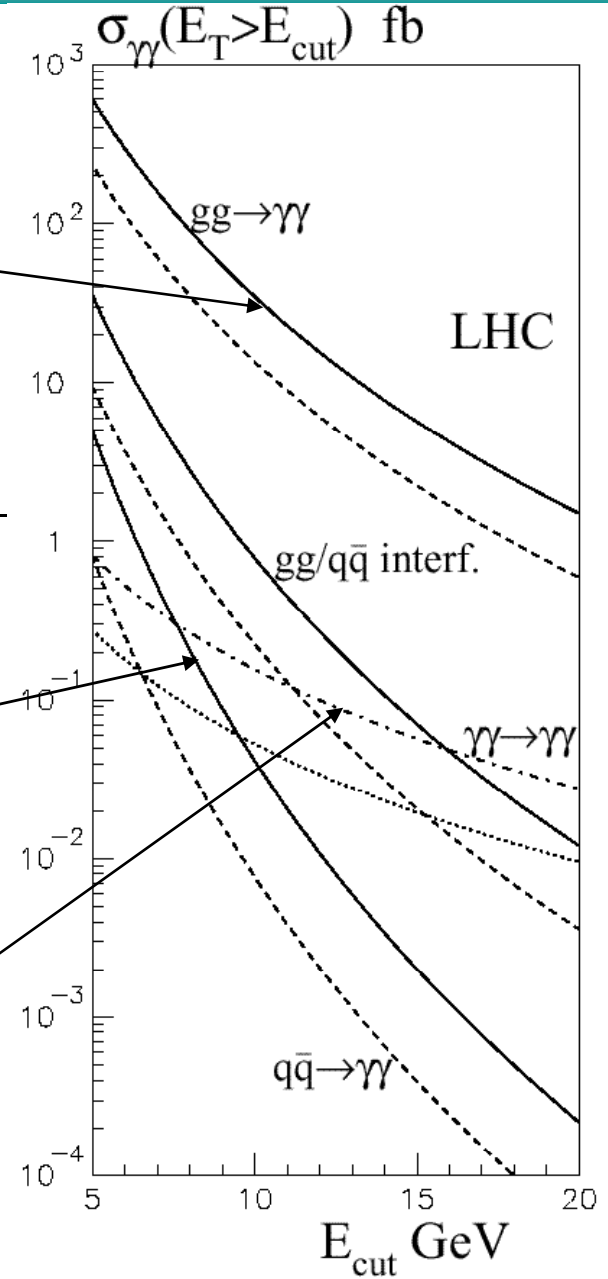
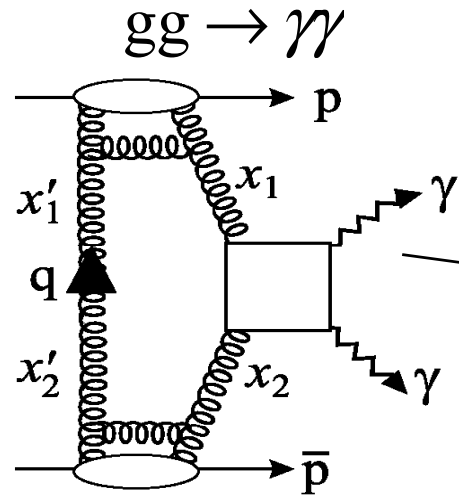


KMR estimations

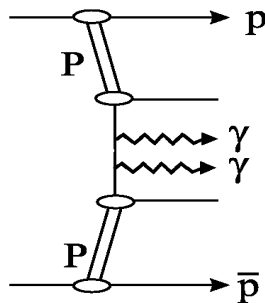
V.A.Khoze et al, hep-ph/0409037

$$pp \rightarrow p \mathcal{N} p$$

$\sigma(pp \rightarrow p \mathcal{N} p)_{ \eta_\gamma < 2}$	$E_T^\gamma \text{ min}$
600 fb	5 GeV
40 fb	10 GeV
6 fb	15 GeV

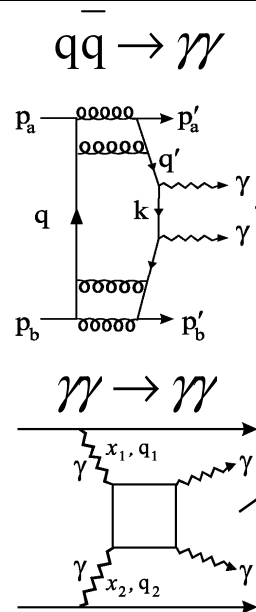


$\gamma\gamma + \text{hadrons}$



$$\frac{\sigma(pp \rightarrow p (\gamma + \text{hadrons}) p)}{\sigma(pp \rightarrow p \mathcal{N} p)} \sim \text{several tens}$$

(from POMWIG)



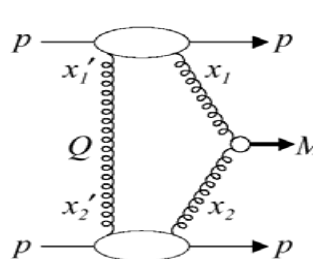
ExHuMe (hep-ph/0502077) is based on KMR calculations

Regge-eikonal approach

(Petrov&Ryutin, hep-ph/0311024)

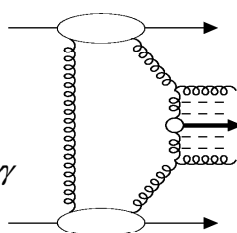
EDDE v.1.2 (hep-ph/0409180) is based on P&R calculations

exclusive
 $pp \rightarrow p \gamma \gamma p$

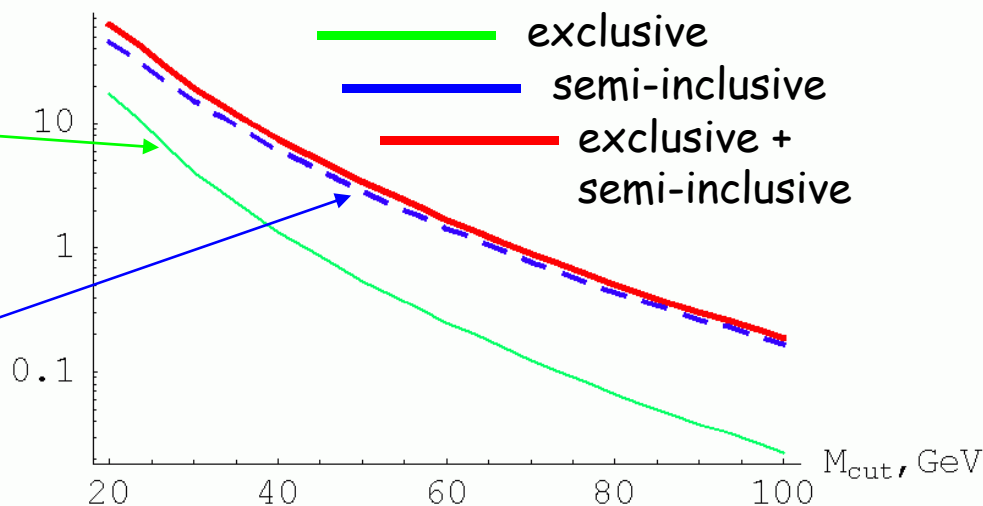


$\sigma(M_{\gamma\gamma} > M_{\text{cut}})$, fb

semi-inclusive
 $pp \rightarrow p (\gamma + \text{soft hadrons}) p$



"soft hadrons" $\Leftrightarrow M_{\text{hadrons}} \ll M_{\gamma}$



Cross sections for $\gamma\gamma$ production at LHC energy, in fb, calculated in $\eta < 2$

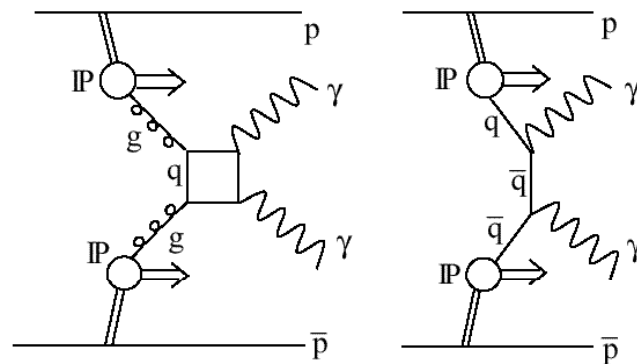
$M_{\text{cut}}, \text{ GeV}$	KMR exclusive	EDDE exclusive	EDDE semi-inclusive	EDDE total
20	40	18	46	64
30	6	4	15	19
40	1.8	1.3	6	7.3

Generators for $\gamma\gamma$ DPE production

EDDE exclusive and semi-inclusive

ExHuMe exclusive

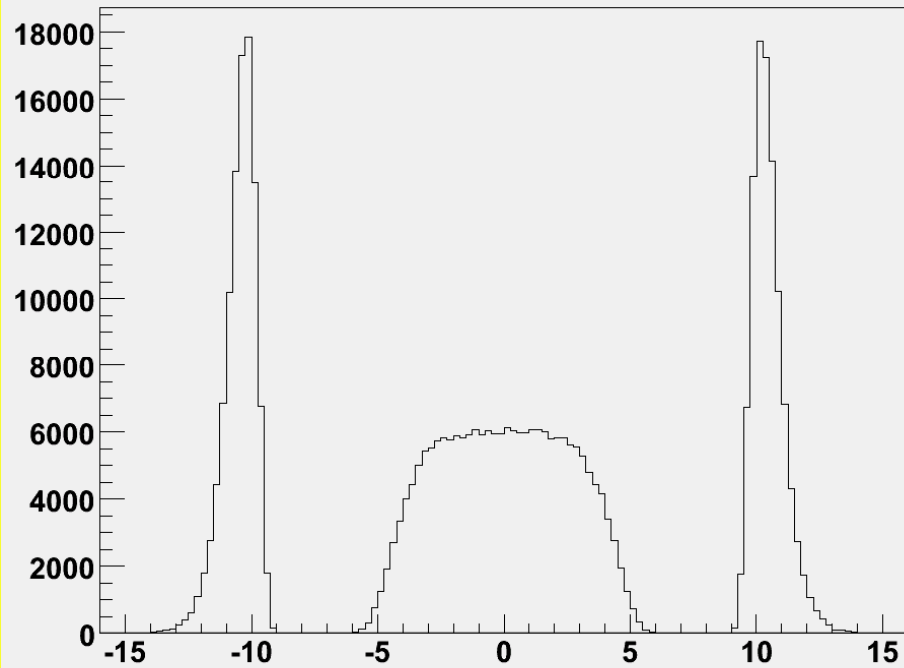
POMWIG semi-inclusive



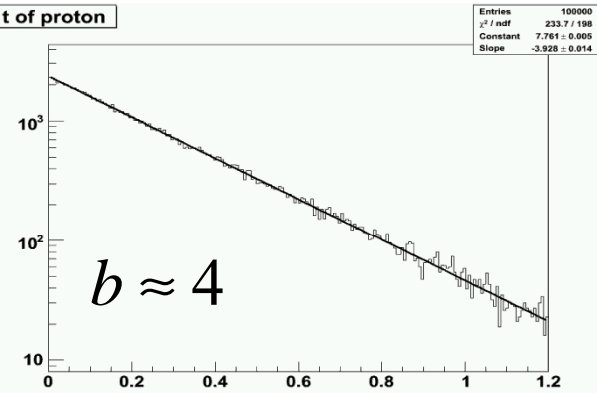
POMWIG diagrams
for $\gamma\gamma$ production

pp→p γγ p generator level EDDE 1.2

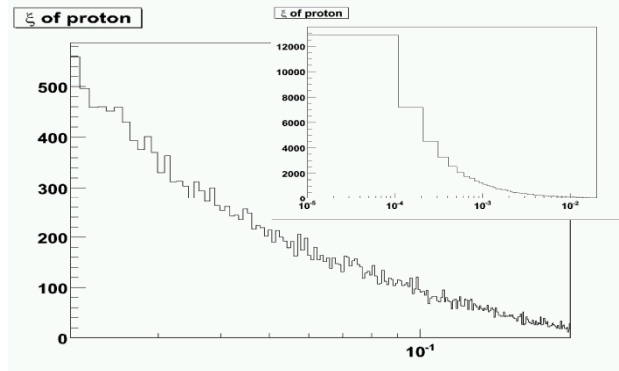
η of protons and gammas



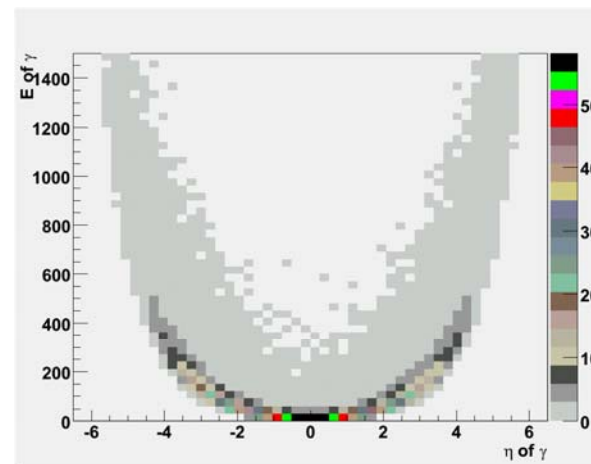
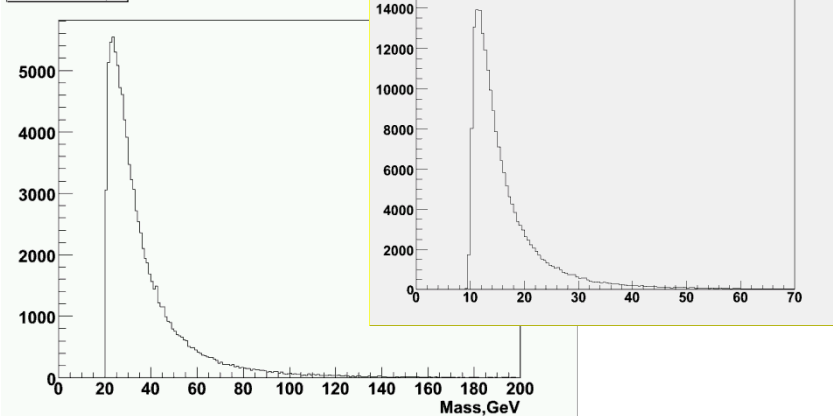
t of proton



ξ of proton



Mass of 2γ

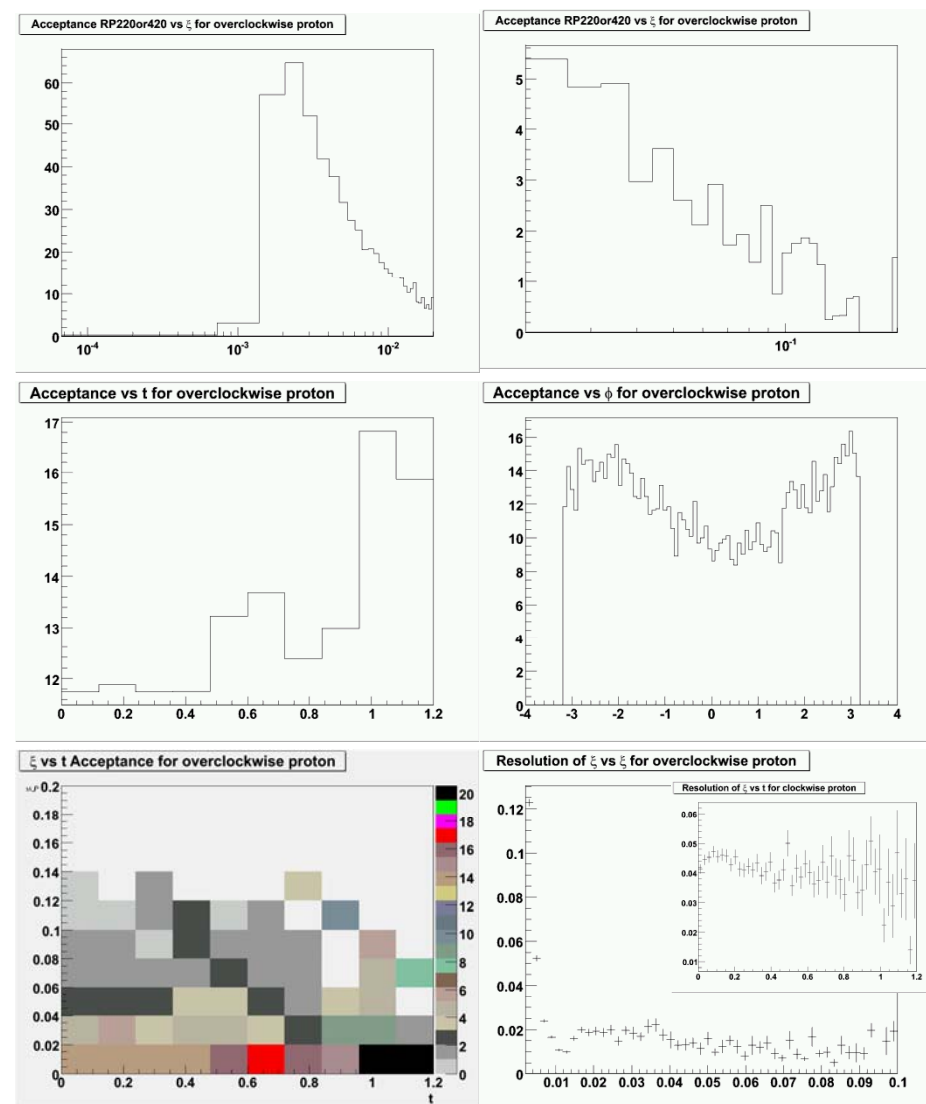
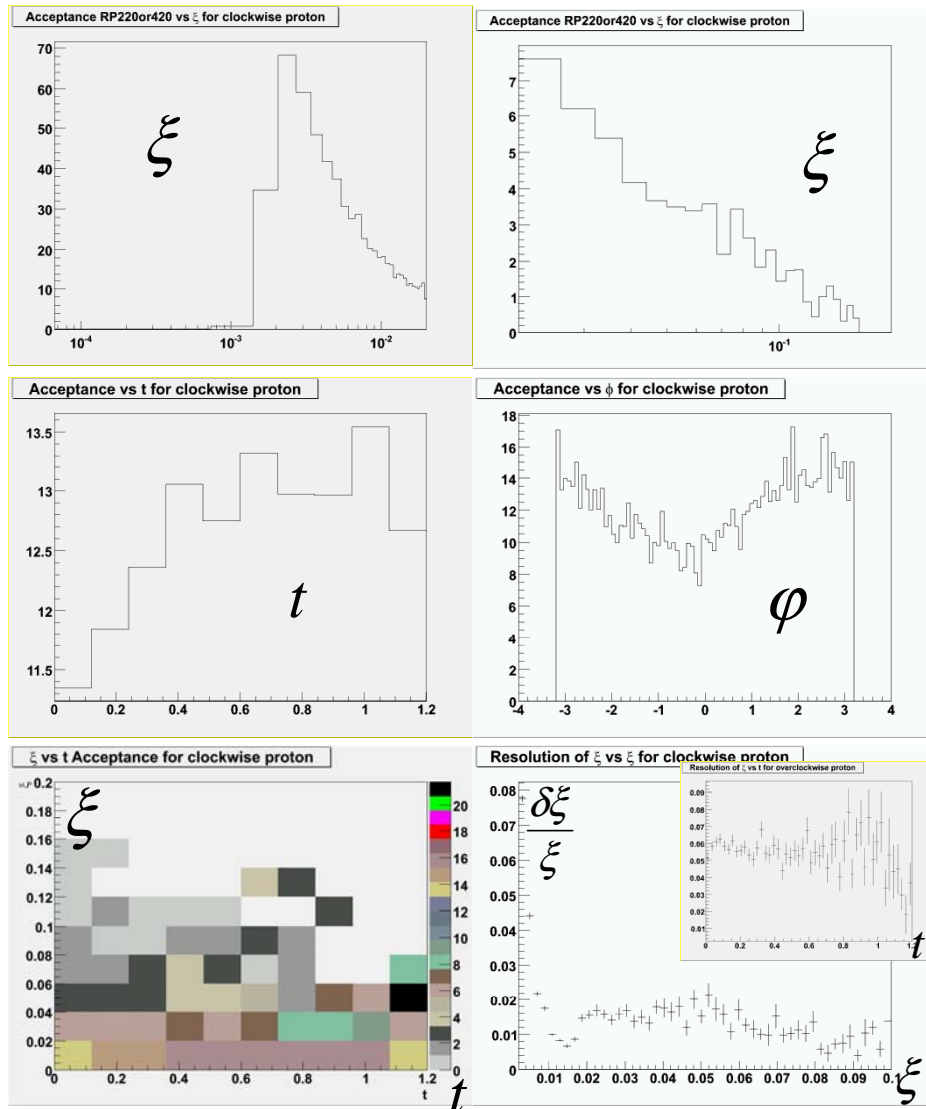


RPs acceptance and resolution

All plots calculated for diffractive protons produced in $pp \rightarrow p\gamma p$ reaction (EDDE v.1.2)
 It is required that both protons should be detected by RP220 or RP420

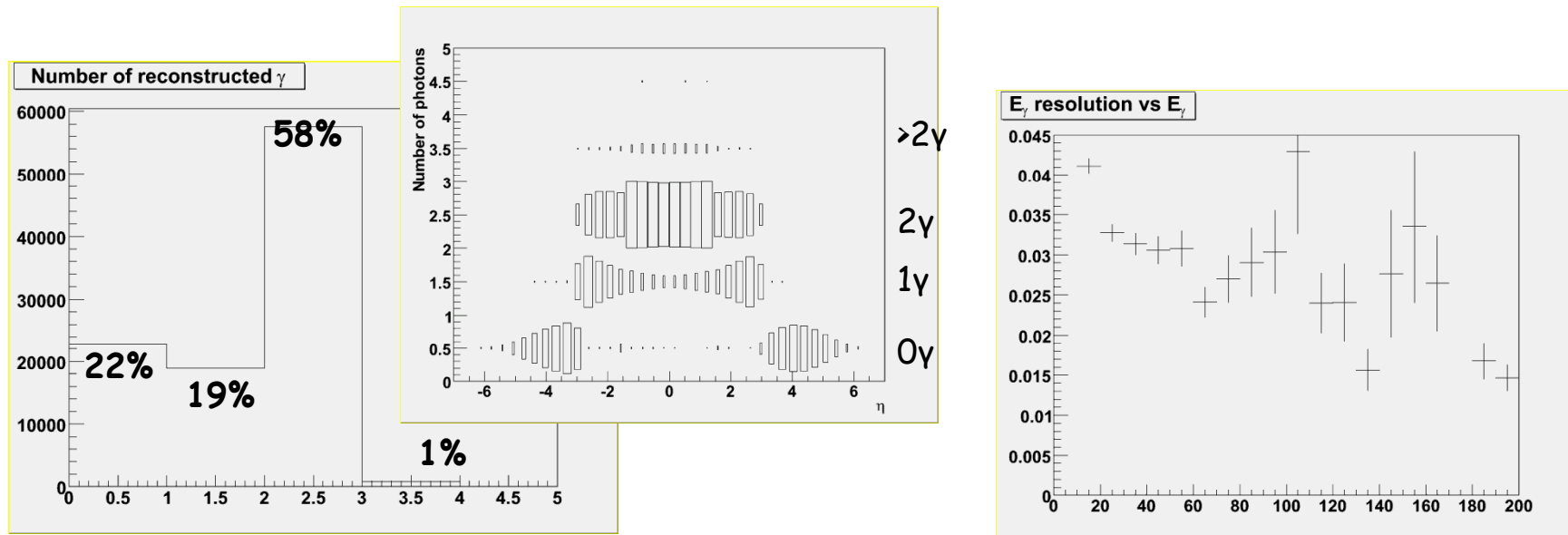
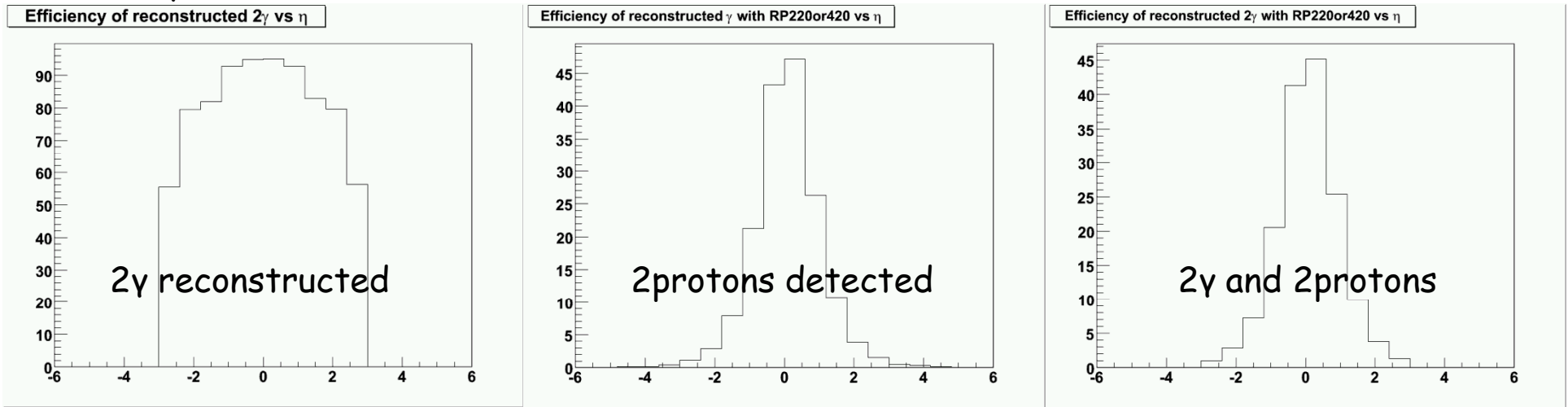
clockwise

anticlockwise

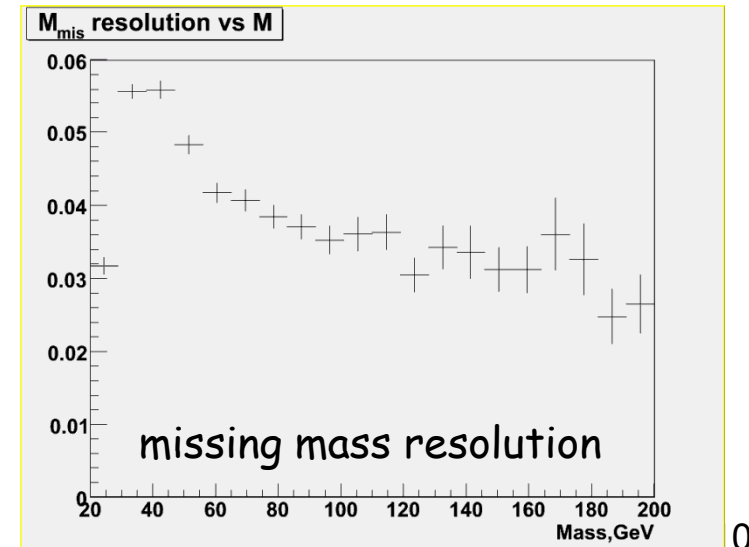
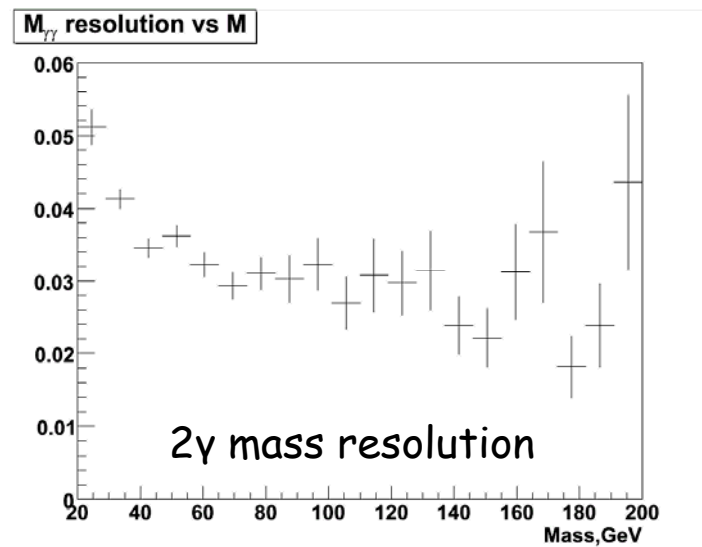
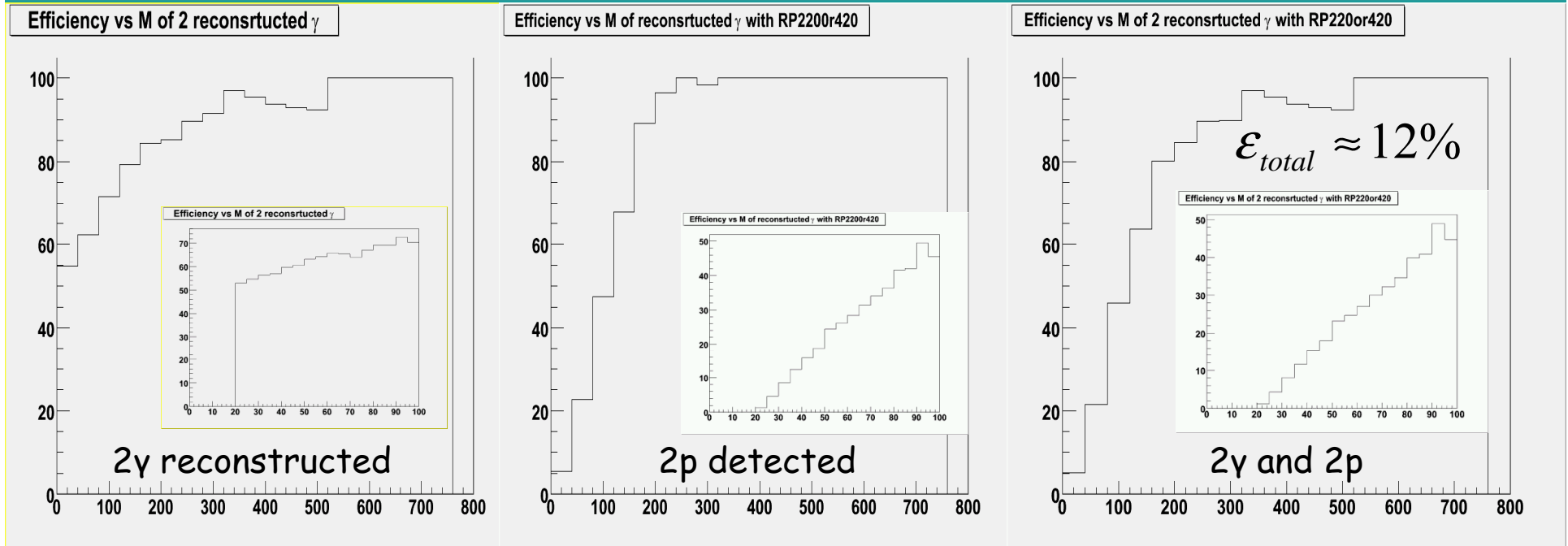


Gamma reconstruction

Efficiency of γ measurements vs η_γ at different conditions:



Central mass acceptance and resolution



Some ideal estimations for 300 pb^{-1}

Idealization:

- no trigger information => trigger efficiency 100 %
- no signal/background study => no selection cuts
- no pile-up
- efficiency of gamma reconstruction (including acceptance) is taken 60 %

Expected events for exclusive and semi-inclusive $\gamma\gamma$ production at 300 pb^{-1}

$E_{\text{tcut}}, \text{ GeV}$	Exclusive $\sigma, \text{ fb} / N \text{ expected events}$	Semi-inclusive $\sigma, \text{ fb} / N \text{ expected events}$
5	900 / 162	1260 / 227
10	60 / 11	96 / 17
15	9 / 1.6	28.5 / 5
20	2.7 / 0.5	11 / 2

Notes:

- cross sections for gammas with $|\eta| < 3$
- exclusive cross sections are the most optimistic (from KMR)