Extrapolated Yields from 8 to 13 TeV for Exclusive and Diffractive Processes

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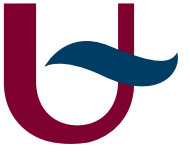

Outline

- Extrapolations based on generator level studies
- Definition of the analysis phase space
- Ratio of the visible cross sections
- Expected effective luminosities
- Ratio of the expected yields

Single-Diffractive dijet Production

→ Signal Monte Carlo: POMWIG

→ Phase space: 2 jets with $p_T > 30$ GeV and $|\eta| < 4.4$ (central CMS detector)

$\xi < 0.1$ (TOTEM Roman Pots)

→ Visible cross sections: $\sigma_{vis}(8\text{ TeV}) \sim 50$ nb - $\sigma_{vis}(13\text{ TeV}) \sim 130$ nb ($S^2 \sim 0.07$ included)

$\sigma_{vis}(13\text{ TeV})/\ \sigma_{vis}(8\text{ TeV}) \sim 2.5$

→ Expected effective luminosities: $\mathcal{L}_{eff}(8\text{ TeV}) \sim 50\ \text{nb}^{-1}$ - $\mathcal{L}_{eff}(13\text{ TeV}) \sim 1\ \text{pb}^{-1}$

$\mathcal{L}_{eff}(13\text{ TeV})/\mathcal{L}_{eff}(8\text{ TeV}) \sim 20$

→ Expected yields: $\text{N}(8\text{ TeV}) \sim 2.5 \cdot 10^3$ - $\text{N}(13\text{ TeV}) \sim 130 \cdot 10^3$

$\text{N}(13\text{ TeV})/\text{N}(8\text{ TeV}) \sim 50$

Single-Diffractive Z Production

→ Signal Monte Carlo: POMPYT - dimuon and dielectron decay channels

→ Phase space: central CMS detector only

2 muons/electrons with $p_T > 10$ GeV, $|\eta| < 2.5$ and $60 < M_{ee/\mu\mu} < 110$ GeV

veto on forward calorimeters HF- and CASTOR: $E_{tot} = 0$ in $-6.6 < \eta < -3$

with E_{tot} defined as the sum of the energies of the generated particles

→ Visible cross sections: $\sigma_{vis}(7\text{ TeV}) \sim 2.7$ pb - $\sigma_{vis}(13\text{ TeV}) \sim 4.1$ pb ($\sim$ for e/μ channels)

$\sigma_{vis}(13\text{ TeV})/\ \sigma_{vis}(7\text{ TeV}) \sim 1.5$ ($\sim$ for e/μ channels)

→ Expected effective luminosities: $\mathcal{L}_{eff}(7\text{ TeV}) \sim 5\ \text{pb}^{-1}$ - $\mathcal{L}_{eff}(13\text{ TeV}) \sim 10\ \text{pb}^{-1}$

$\mathcal{L}_{eff}(13\text{ TeV})/\mathcal{L}_{eff}(7\text{ TeV}) \sim 2$

→ Expected yields: N(7 TeV) $\sim$ 15 - N(13 TeV) $\sim$ 40 ($\sim$ for e/μ channels)

N(13 TeV)/N(7 TeV) $\sim$ 3 ($\sim$ for e/μ channels)

Exclusive Υ Photoproduction

→ Signal Monte Carlo: STARLIGHT - dimuon decay channel

→ Phase space: 2 muons with $p_T > 3$ GeV, $|\eta| < 2.4$ (central CMS detector only)

→ Visible cross sections: $\sigma_{vis}(7\text{ TeV}) \sim 2.4$ pb - $\sigma_{vis}(13\text{ TeV}) \sim 4.8$ pb (branching included)

$$\sigma_{vis}(13\text{ TeV})/\ \sigma_{vis}(7\text{ TeV}) \sim 2$$

→ Expected effective luminosities: $\mathcal{L}_{eff}(7\text{ TeV}) \sim 1\text{ fb}^{-1}$ - $\mathcal{L}_{eff}(13\text{ TeV}) = \sim 1\text{ fb}^{-1}$

$$\mathcal{L}_{eff}(13\text{ TeV})/\mathcal{L}_{eff}(7\text{ TeV}) \sim 1$$

→ Expected yields: N(7 TeV) $\sim$ 2500 - N(7 TeV) $\sim$ 5000

$$\text{N}(13\text{ TeV})/\text{N}(7\text{ TeV}) \sim 2$$

Exclusive dijet Production

→ Signal Monte Carlo: ExHuMe

→ Phase space: central CMS detector only

2 jets with $p_T > 60$ GeV and $|\eta| < 2.5$ (p_T threshold will be lowered)

veto on forward calorimeters HF+ and HF-: $E_{tot} = 0$ in $3 < |\eta| < 5.2$

→ Visible cross sections: $\sigma_{vis}(7\text{ TeV}) \sim 1.3$ pb - $\sigma_{vis}(13\text{ TeV}) \sim 3.6$ pb

$\sigma_{vis}(13\text{ TeV})/\ \sigma_{vis}(7\text{ TeV}) \sim 3$

→ Expected effective luminosities: $\mathcal{L}_{eff}(7\text{ TeV}) \sim 5\ \text{pb}^{-1}$ - $\mathcal{L}_{eff}(13\text{ TeV}) \sim 10\ \text{pb}^{-1}$

$\mathcal{L}_{eff}(13\text{ TeV})/\mathcal{L}_{eff}(7\text{ TeV}) \sim 2$

→ Expected yields: N(7 TeV) ~ 5 - N(13 TeV) ~ 30

N(13 TeV)/N(7 TeV) ~ 6