

# Summary of the activities in Ferrara

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$$\bar{p}p \rightarrow \chi_{12} \rightarrow J/\psi\gamma \rightarrow l^+l^-\gamma$$

$$\bar{p}p \rightarrow \chi_{12} \rightarrow J/\psi\gamma \rightarrow l^+l^-\gamma$$

$$\bar{p}p \rightarrow \chi_1 \rightarrow J/\psi\gamma \rightarrow l^+l^-\gamma$$

$$\text{Significance} = \sqrt{\mathcal{L}t} \times \frac{\sigma_s \epsilon_s f_{BR}}{\sqrt{\sigma_s \epsilon_s f_{BR} + \sigma_b \epsilon_b}}$$

$\sigma_s = 2 \text{ nb}$  [Nucl.Phys.B 717,34(2005)]

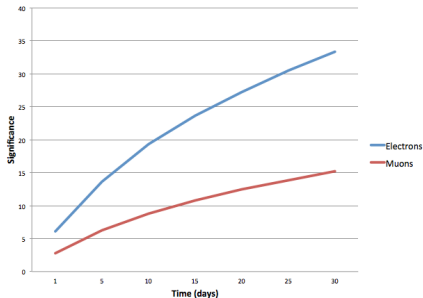
$\epsilon_s$ : 48.1% for electrons, 63.5% for muons

$f_{BR} = BR(\chi_1 \rightarrow J/\psi\gamma) \times BR(J/\psi \rightarrow l^+l^-)$ :  $0.34 \times 0.0593 = 0.020$  [PDG]

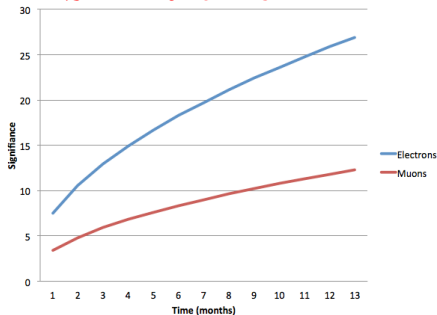
$\sigma_b = 0.12 \text{ mb}$  [CERN-HERA 70-03 (1970)]

$\epsilon_b = 1.3 \cdot 10^{-6}$  for electrons,  $1.2 \cdot 10^{-5}$  for muons.

$$\mathcal{L} = 2 \cdot 10^{32} \text{cm}^{-2} \text{s}^{-1}$$



$$\mathcal{L} = 1 \cdot 10^{31} \text{cm}^{-2} \text{s}^{-1}$$



$$\bar{p}p \rightarrow \chi_2 \rightarrow J/\psi\gamma \rightarrow l^+l^-\gamma$$

$$\text{Significance} = \sqrt{\mathcal{L}t} \times \frac{\sigma_s \epsilon_s f_{BR}}{\sqrt{\sigma_s \epsilon_s f_{BR} + \sigma_b \epsilon_b}}$$

$\sigma_s = 2$  nb [Nucl.Phys.B 717,34(2005)]

$\epsilon_s$ : 48.6% for electrons, 63.7% for muons

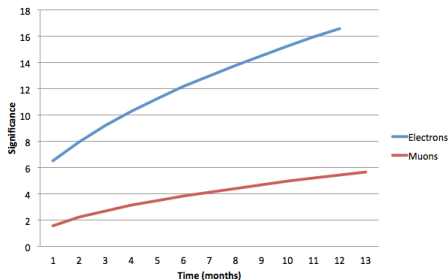
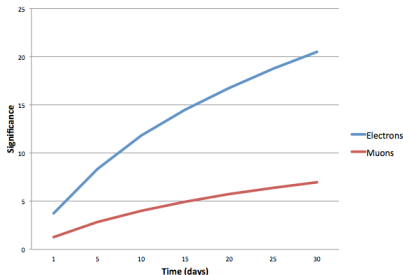
$f_{BR} = BR(\chi_1 \rightarrow J/\psi\gamma) \times BR(J/\psi \rightarrow l^+l^-)$ :  $0.195 \times 0.0593 = 0.020$  [PDG]

$\sigma_b = 0.12$  mb [CERN-HERA 70-03 (1970)]

$\epsilon_b = 1.2 \cdot 10^{-6}$  for electrons,  $1.9 \cdot 10^{-5}$  for muons.

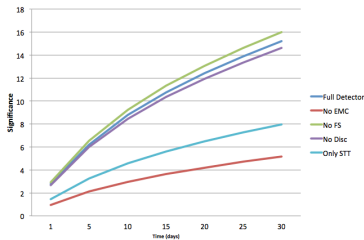
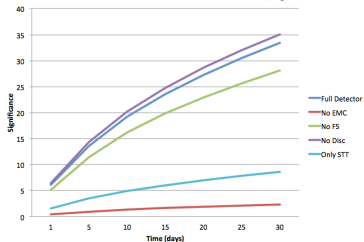
$$\mathcal{L} = 2 \cdot 10^{32} \text{cm}^{-2} \text{s}^{-1}$$

$$\mathcal{L} = 1 \cdot 10^{31} \text{cm}^{-2} \text{s}^{-1}$$

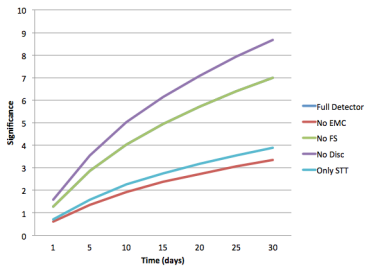
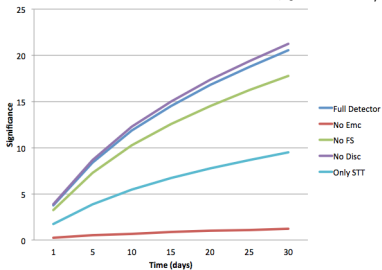


$$\bar{p}p \rightarrow \chi_{1,2} \rightarrow J/\psi\gamma \rightarrow l^+l^-\gamma$$

$$\chi_{c1} \rightarrow J/\psi\gamma$$



$$\chi_{c2} \rightarrow J/\psi\gamma$$



$$J/\psi \rightarrow e^+e^-$$

$$J/\psi \rightarrow \mu^+\mu^-$$

$$\bar{p}p \rightarrow X(3872) \rightarrow J/\psi\pi\pi$$

$$\bar{p}p \rightarrow X(3872) \rightarrow J/\psi\pi\pi$$

Cross section: 50 nb

I have already run the signal events and the different detector options

$$X(3872) \rightarrow J/\psi\pi^0\pi^0$$

Background:  $\pi^+\pi^-\pi^0\pi^0$

Cross section: 50  $\mu\text{b}$

$$X(3872) \rightarrow J/\psi\pi^+\pi^-$$

Background:  $\pi^+\pi^-\pi^+\pi^-$

Cross section: 0.046 mb