

PYTHIA - ÖDEV

- Kütle merkezi enerjisi $\sqrt{s}=1$ TeV olan bir Lineer Çarpıştırıcıda, $e^+e^- \rightarrow \gamma/Z^0/Z'^0 \rightarrow \mu^+\mu^-$ sürecinde $m_{Z'}=0.8$ TeV alarak fotonun, Z^0 bozonun ve Z'^0 bozonun toplam tesir kesitine katkılarını PYTHIA ile hesaplayınız. Bunların girişimlerinin de hangi durumlarda önemli olabileceğini araştırınız.

PYTHIA 0->C

```
PROGRAM ZPRIME
IMPLICIT DOUBLE PRECISION(A-H, O-Z)
INTEGER PYK,PYCHGE,PYCOMP
EXTERNAL PYDATA
COMMON/PYJETS/N,NPAD,K(4000,5),P(4000,5),V(4000,5)
COMMON/PYDAT1/MSTU(200),PARU(200),MSTJ(200),PARJ(200)
COMMON/PYDAT2/KCHG(500,4),PMAS(500,4),PARF(2000),VCKM(4,4)
COMMON/PYDAT3/MDCY(500,3),MDME(8000,2),BRAT(8000),KFDP(8000,5)
COMMON/PYSUBS/MSEL,MSELPD,MSUB(500),KFIN(2,-40:40),CKIN(200)
COMMON/PYPARS/MSTP(200),PARP(200),MSTI(200),PARI(200)
```

C...Baslangic

```
ECM=1000D0
NEV=1000
```

C...Surec secimi

```
MSEL=0
MSUB(141)=1
MSTP(44)=3 ! 1:g,2:Z,3:Zp,4:Z/g,5:Zp/g,6:Zp/Z,7:Zp/Z/g
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C...Zprime kutlesi

```
PMAS(32,1)=800D0
```

C...Zprime bozunum sadece muonlara bozunmasi

```
DO IDC=289,310
MDME(IDC,1)=0
ENDDO
MDME(299,1)=1 ! Zprime-->mu+ mu-
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C...Hazirlik

```
CALL PYINIT('CMS','e+','e-',ECM)
```

C...Zprime bozunum kanallari listesi

```
CALL PYSTAT(2)
```

C...Olay cevrimi

```
DO 200 IEV=1,NEV
CALL PYEVNT
```

C...Ilk uc olayin listelenmesi

```
IF(IEV.LE.3) CALL PYLIST(1)
```

200 CONTINUE

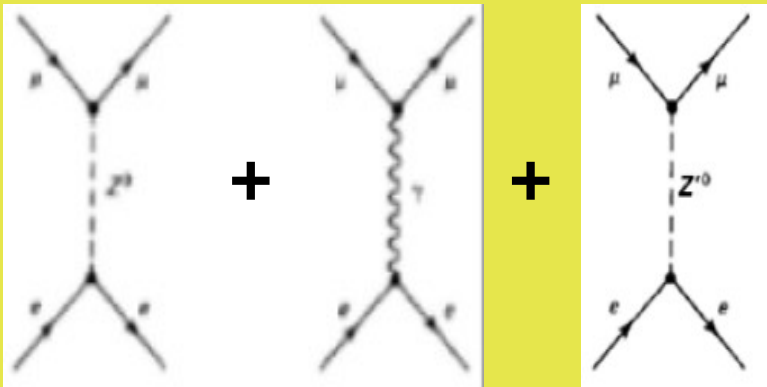
C...Sonuclarin yazilmasi

```
CALL PYSTAT(1)
END
```

$(e+e \rightarrow \gamma/Z/Z' \rightarrow m+m) @ \sqrt{s}=1000 \text{ GeV}$

$M(Z')=800 \text{ GeV}$

MSTP(44)=1 $\rightarrow \sigma=0.1733 \text{ pb} - \gamma$
MSTP(44)=2 $\rightarrow \sigma=0.1006 \text{ pb} - Z$
MSTP(44)=3 $\rightarrow \sigma=0.3995 \text{ pb} - Z'$
MSTP(44)=4 $\rightarrow \sigma=0.2848 \text{ pb} - Z/\gamma$
MSTP(44)=5 $\rightarrow \sigma=0.5881 \text{ pb} - Z'/\gamma$
MSTP(44)=6 $\rightarrow \sigma=0.5779 \text{ pb} - Z'/Z$
MSTP(44)=7 $\rightarrow \sigma=0.7573 \text{ pb} - Z'/Z/\gamma$



$M(Z')=1000 \text{ GeV}$

MSTP(44)=1 $\rightarrow \sigma=0.1763 \text{ pb} - \gamma$
MSTP(44)=2 $\rightarrow \sigma=0.1036 \text{ pb} - Z$
MSTP(44)=3 $\rightarrow \sigma=9.0230 \text{ pb} - Z'$
MSTP(44)=4 $\rightarrow \sigma=0.2809 \text{ pb} - Z/\gamma$
MSTP(44)=5 $\rightarrow \sigma=9.036 \text{ pb} - Z'/\gamma$
MSTP(44)=6 $\rightarrow \sigma=9.021 \text{ pb} - Z'/Z$
MSTP(44)=7 $\rightarrow \sigma=9.031 \text{ pb} - Z'/Z/\gamma$