```
*==> sem.f <==
****************************************************************
*                                                              *
*    Give masses for superheavies , threshold coefficients     *
*    SEM(k),k=1...LO , are masses for the superheavies         *
*                                                              *
****************************************************************
      FUNCTION SEM(I)
      IMPLICIT DOUBLE PRECISION (A-H,O-Z)
      PARAMETER (LO=10)
      DIMENSION SSEM(LO)
      COMMON/FUTURE/SMVECTOR,SMHCOLOR,SMSIGMA,SMHFPRIME
CC
      DO   JAMPO=1,LO
          SSEM(JAMPO)=0.D0
      ENDDO
CC
      SSEM(1)=SMVECTOR*1.D+16
      SSEM(2)=SMHCOLOR*1.D+16
      SSEM(3)=SMSIGMA*1.D+16
C--------------------------------
C     SSEM(4)=0.8D0*SSEM(3)
C     SSEM(5)=0.2D0*SSEM(3)
C     SSEM(6)=0.4D0*SSEM(3)
C     SSEM(7)=SMHFPRIME*1.D+10
C--------------------------------
      SEM=SSEM(I)
      RETURN
      END

*==> na.f <==
      FUNCTION NA(I)
      IMPLICIT DOUBLE PRECISION (A-H,O-Z)
      PARAMETER (LO=10)
      INTEGER NAA(LO)
      COMMON/LEP/NAIH
C-----------------------------------------------------------------
C
C              1    the "Kth" particle has mass M_gut
C             /
C   NA(K)=--
C             \
C              2    the "Kth" particle has mass less than M_gut
C
C-----------------------------------------------------------------
      DO   KIA=1,LO
          NAA(KIA)=NAIH
      ENDDO
C-----------------------------------------------------------------
C  Just below put equal to one the NAA for the particles
C  having mass=Mgut. Note that if all NAA's are put equal
C  to 1 then the program acts as if there are no superheavies.
C  Actually in that case the threshold corrections to the
C  RGE's vanish
C-----------------------------------------------------------------
      NAA(1)=1
      NA=NAA(I)
      RETURN
      END

*==> prd.f <==
      FUNCTION PRD(X,Y,Z)
```



```
      IMPLICIT DOUBLE PRECISION (A-H, O-Z)
CC
      PRD=(X/(Y**2.D0-Z**2.D0))*
     #(Y**2.D0*DLOG(Y**2.D0/X**2.D0)/
     #(Y**2.D0-X**2.D0)-
     #Z**2.D0*DLOG(Z**2.D0/X**2.D0)/(Z**2.D0-X**2.D0))
      RETURN
      END

*==> het.f <==
      FUNCTION HET(I,X)
      IMPLICIT DOUBLE PRECISION (A-H, O-Z)
      PARAMETER(LO=10)
CC
      FAKIR=0.D0
        DO  K=1,LO
           FAKIR=FAKIR+DE(I,K)*HIT(NA(K),SEM2(K),X)
        ENDDO
        HET=FAKIR
      RETURN
      END

*==> hit.f <==
***********************************************
C   THETA FUNCTION FOR HIGH ENERGY THRESHOLDS *
***********************************************
      FUNCTION HIT(I,X,Y)
      IMPLICIT DOUBLE PRECISION (A-H, O-Z)
      IF(I.EQ.1) THEN
        HIT=0.D0
      ELSE IF(I.EQ.2.AND.X.GE.Y) THEN
        HIT=0.D0
      ELSE
        HIT=1.D0
      ENDIF
      RETURN
      END

*==> de.f <==
************************************************************
*  DE(i,k) i=1..3 , k=1..LO, are the High energy threshold  *
*  coefficients                                             *
*  FOR SU(5): SEM(1)=M_VECTOR, SEM(2)=M_H_COLOR,            *
*             SEM(3)=M_SIGMA                                *
************************************************************
      FUNCTION DE(I,J)
      IMPLICIT DOUBLE PRECISION (A-H,O-Z)
      PARAMETER (LO=10)
      DOUBLE PRECISION SDE(3,LO)
CC
      DO   KAL=1,3
          DO   KAK=1,LO
              SDE(KAL,KAK)=0.0D0
          ENDDO
      ENDDO
C-------------------------------------------------
C   MISSING DOUBLET MODEL + PECCEI QUIN Symmetry
C-------------------------------------------------
C     SDE(1,1)=-10.D0
C     SDE(1,2)=4.D0/5.D0
C     SDE(1,3)=0.D0
C     SDE(1,4)=10.D0
```

```
C      SDE(1,5)=0.D0
C      SDE(1,6)=10.D0
C      SDE(1,7)=3.D0/5.D0
C      SDE(2,1)=-6.D0
C      SDE(2,2)=0.D0
C      SDE(2,3)=16.D0
C      SDE(2,4)=0.D0
C      SDE(2,5)=0.D0
C      SDE(2,6)=6.D0
C      SDE(2,7)=1.D0
C      SDE(3,1)=-4.D0
C      SDE(3,2)=2.D0
C      SDE(3,3)=9.D0
C      SDE(3,4)=1.D0
C      SDE(3,5)=3.D0
C      SDE(3,6)=10.D0
C------------------------------------------
C        MISSING DOUBLET MODEL
C------------------------------------------
C      SDE(1,1)=-10.D0
C      SDE(1,2)=2.D0/5.D0
C      SDE(1,3)=0.D0
C      SDE(1,4)=10.D0
C      SDE(1,5)=0.D0
C      SDE(1,6)=10.D0
C      SDE(2,1)=-6.D0
C      SDE(2,2)=0.D0
C      SDE(2,3)=16.D0
C      SDE(2,4)=0.D0
C      SDE(2,5)=0.D0
C      SDE(2,6)=6.D0
C      SDE(3,1)=-4.D0
C      SDE(3,2)=1.D0
C      SDE(3,3)=9.D0
C      SDE(3,4)=1.D0
C      SDE(3,5)=3.D0
C      SDE(3,6)=10.D0
C-------------------------------------
C          MINIMAL SU(5)
C-------------------------------------
      SDE(1,1)=-10.D0
      SDE(1,2)=2.D0/5.D0
      SDE(1,3)=0.D0
      SDE(2,1)=-6.D0
      SDE(2,2)=0.D0
      SDE(2,3)=2.D0
      SDE(3,1)=-4.D0
      SDE(3,2)=1.D0
      SDE(3,3)=3.D0
CC
      DE=SDE(I,J)
      RETURN
      END

*==> sem2.f <==
***************************************
* SEM2(I=1,LO)=mass of superheavy ^2  *
***************************************
      FUNCTION SEM2(I)
      IMPLICIT DOUBLE PRECISION (A-H,O-Z)
      SEM2=SEM(I)**2.D0
      RETURN
```



```
      END
```