ADAS Subroutine nwripv

```
       SUBROUTINE NWRIPV(IZ,WI,EI,WJ,EJ,M,PHI,EPS,OMEG,N,TVA,EM,IZC,RAT,
     &QI,QJ,GA)
C-----------------------------------------------------------------------
C   PURPOSE: CALCULATES ELECTRON & POSITIVE ION COLL. EXCITATION AND
C            DEEXCITATION RATE COEFFICIENTS FOR DIPOLE TRANSITIONS
C            IN THE IMPACT PARAMETER APPROXIMATION
C
C   (BURGESS AND SUMMERS,1976,MON.NOT.R.AST.SOC.,174,345)
C
C   OPTIONALLY A SET OF INCIDENT PARTICLE ENERGIES AND COLLISION
C   STRENGTHS MAY BE PROVIDED, IN WHICH CASE THE IMPACT PARAMETER THEORY
C   IS USED TO CALCULATE THE COLLISION STRENGTHS AT HIGH ENERGY
C   WITH VALUES SCALED TO THE HIGHEST ENERGY INPUT COLLISION STRENGTH.
C  *************** H.P. SUMMERS, JET   22 JAN 1985  ******************
C
C  ****************   ORIGINAL VERSION WITHOUT THE   ******************
C  ****************  STATISTICAL WEIGHT (WT) CHANGE  ******************
C
C  INPUT
C       IZ=ION CHARGE
C       WI=STATISTICAL WEIGHT OF STATE I
C       EI=BINDING ENERGY OF STATE I (RYD)
C       WJ=STATISTICAL WEIGHT OF STATE J
C       EJ=BINDING ENERGY OF STATE J (RYD)
C       M=NUMBER OF TABULAR VALUES OF COLLISION STRENGTH
C       PHI=FIJ/EIJ WITH FIJ ABSORPTION OSCILLATOR STRENGTH
C                        EIJ=EI-EJ THE TRANSITION ENERGY (RYD)
C       EPS(K)=INCIDENT ELECTRON ENERGIES (RYDBERGS)
C       OMEG(K)=COLLISION STRENGTHS
C       N=NUMBER OF TEMPERATURES
C       TVA(I)=TEMPERATURES (EV) (INCIDENT PARTICLE DISTRIBUTION)
C       EM=REDUCED MASS FOR COLLIDING PARTICLE (ELECTRON MASSES)
C       IZC=CHARGE OF COLLIDING PARTICLE
C  OUTPUT
C       RAT=RATIO OF OMEG(M) TO I.P. OMEGA.
C       QI(I)=COLLISIONAL EXCITATION RATE COEFFICIENTS  (CM**3 SEC-1)
C       QJ(I)=COLLISIONAL DEEXCITATION RATE COEFFICIENTS.
C       GA(I)=GAMMA RATE PARAMETERS
C-----------------------------------------------------------------------
C  AUTHOR
C   HUGH SUMMERS     1977/5/20
C  UPDATES
C       1983/9/1, 1984/6/25
C  COMMENTS
C   I IS THE LOWER LEVEL OF THE TRANSITION.
C   M MAY BE ZERO, IN WHICH CASE NO EPS AND OMEG VALUES ARE REQUIRED.
C   UNDERFLOW IS NOT TRAPPED. THIS MAY BE ACHEIVED IN IBM FORTRAN WITH T
C   MODIFIED IPRATE TO ALLOW PROTON RATES. EM TAKEN AS INPUT AND
C   PHI ACCEPTED INPLACE OF AJI ON INPUT.
C-----------------------------------------------------------------------
C VERSION  : 1.1
C DATE     : 18-03-1999
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C MODIFIED : ???
C
C VERSION  : 1.2
C DATE     : 05-10-2000
C MODIFIED : ???
C             - Removed junk from columns > 72
C
C VERSION  : 1.3
C DATE     : 16-05-2007
C MODIFIED : Allan Whiteford
C             - Updated comments as part of subroutine documentation
C               procedure.
C
C-----------------------------------------------------------------------
       IMPLICIT REAL*8(A-H,O-Z)
      INTEGER             IZ,           IZC,          M,            N
      REAL*8              EI,           EJ,           EM,           EPS(20)
      REAL*8              GA(40),       OMEG(20),     PHI,          QI(40)
      REAL*8              QJ(40),       RAT,          TVA(40),      WI
      REAL*8              WJ
```