ADAS Subroutine c8tbqm

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      SUBROUTINE C8TBQM( MXNSHL , IZ0    , IZ1    , NBOT   ,
     &                   NTOP   , TEV    , DENS   , ZP     ,
     &                   TPV    , EMP    , TBLF   , TBQMEP ,
     &                   TBQMEM , TBQMIP , TBQMIM
     &                 )
C
C
C-----------------------------------------------------------------------
C
C  ****************** FORTRAN77 SUBROUTINE: C8TBQM *********************
C
C  PURPOSE:  SETS UP TABLES OF ELECTRON AND POSITIVE ION IMPACT RATE
C            COEFFICIENTS BETWEEN NEARLY DEGENERATE L STATES OF THE
C            SAME N FOR HYDROGENIC IONS.
C
C  CALLING PROGRAM: ADAS308
C
C  INPUT : (I*4)  MXNSHL   = MAXIMUM VALUE OF PRINCIPAL QUANTUM NUMBER.
C  INPUT : (I*4)  IZ0      = NUCLEAR CHARGE OF TARGET ION.
C  INPUT : (I*4)  IZ1      = ION CHARGE.
C  INPUT : (I*4)  NBOT     = MINIMUM PRINCIPAL QUANTUM NUMBER.
C  INPUT : (I*4)  NTOP     = MAXIMUM PRINCIPAL QUANTUM NUMBER.
C  INPUT : (R*8)  TEV      = ELECTRON TEMPERATURE.
C                            UNITS: EV
C  INPUT : (R*8)  DENS     = ELECTRON DENSITY.
C                            UNITS: CM-3
C  INPUT : (R*8)  ZP       = CHARGE OF COLLIDING POSITIVE ION.
C  INPUT : (R*8)  TPV      = TEMPERATURE (COLLIDING POSITIVE ION
C                            DISTRIBUTION).
C                            UNITS: EV
C  INPUT : (R*8)  EMP      = REDUCED MASS FOR COLLIDING POSITIVE ION.
C                            UNITS: ELECTRON MASSES
C  INPUT : (R*8)  ZP       = CHARGE OF COLLIDING POSITIVE ION.
C  INPUT : (R*8)  TPV      = POSITIVE ION TEMPERATURE.
C                            UNITS: EV
C  INPUT : (R*8)  EMP      = REDUCED MASS FOR COLLIDING POSITIVE ION.
C                            UNITS: ELECTRON MASSES
C  INPUT : (R*8)  TBLF()   = TABLE OF RADIATIVE LIFETIMES.
C                            UNITS: SECS
C                            DIMENSION: REFERENCED BY FUNC I4IDFL(N,L).
C
C  OUTPUT: (R*8)  TBQMEP() = ELECTRON RATE COEFFT. FOR NL->NL+1.
C                            INDEX FOR NL->NL+1 TRANSITION GIVEN BY
C                            I4IDFL(N,L).
C                            DIMENSION: REFERENCED BY FUNC I4IDFL(N,L).
C  OUTPUT: (R*8)  TBQMEM() = ELECTRON RATE COEFFT. FOR NL+1->NL.
C                            INDEX FOR NL+1->NL TRANSITION GIVEN BY
C                            I4IDFL(N,L+1).
C                            DIMENSION: REFERENCED BY FUNC I4IDFL(N,L).
C  OUTPUT: (R*8)  TBQMIP() = POSITIVE ION RATE COEFFT. FOR NL->NL+1.
C                            INDEX FOR NL->NL+1 TRANSITION GIVEN BY
C                            I4IDFL(N,L).
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C                              DIMENSION: REFERENCED BY FUNC I4IDFL(N,L).
C  OUTPUT: (R*8)  TBQMIM() = POSITIVE ION RATE COEFFT. FOR NL+1->NL.
C                            INDEX FOR NL+1->NL TRANSITION GIVEN BY
C                            I4IDFL(N,L+1).
C                            DIMENSION: REFERENCED BY FUNC I4IDFL(N,L).
C
C  PARAM : (I*4)  MXJ     = MAXIMUM NUMBER OF J SUB-SHELLS.
C  PARAM : (R*8)  P1      =
C  PARAM : (R*8)  P2      =
C
C          (I*4)  NI      = VALENCE ELECTRON PRINCIPAL QUANTUM NUMBER
C                           IN STATE I.
C          (I*4)  NJ      = VALENCE ELECTRON PRINCIPAL QUANTUM NUMBER
C                           IN STATE J.
C          (I*4)  LI      = VALENCE ELECTRON ORBITAL QUANTUM NUMBER IN
C                           STATE I.
C          (I*4)  LJ      = VALENCE ELECTRON ORBITAL QUANTUM NUMBER IN
C                           STATE J.
C          (I*4)  IDLI    = TABLE INDEX.
C          (I*4)  IDLJ    = TABLE INDEX.
C          (I*4)  I       = LOOP INDEX.
C
C          (R*8)  FACE    =
C          (R*8)  FACI    =
C          (R*8)  WI      = STATISTICAL WEIGHT OF STATE I.
C          (R*8)  WJ      = STATISTICAL WEIGHT OF STATE J.
C          (R*8)  GAE     = GAMA RATE PARAMETER FOR ELECTRON COLLISIONS.
C          (R*8)  GAP     = GAMA RATE PARAMETER FOR POSITIVE ION
C                           COLLISIONS.
C          (R*8)  QEP()   = ELECTRON RATE COEFFT. FOR NLJ->NL+1J'
C                           DIMENSION: J->J' TRANSITION INDEX.
C          (R*8)  QEM()   = ELECTRON RATE COEFFT. FOR NLJ->NL-1J'
C                           DIMENSION: J->J' TRANSITION INDEX.
C          (R*8)  QIP()   = POSITIVE ION RATE COEFFT. FOR NLJ->NL+1J'
C                           DIMENSION: J->J' TRANSITION INDEX.
C          (R*8)  QIM()   = POSITIVE ION RATE COEFFT. FOR NLJ->NL-1J'
C                           DIMENSION: J->J' TRANSITION INDEX.
C
C NOTES:
C       1) THE J->J' TRANSITION INDEX IS AS FOLLOWS:
C              1 : J=L+0.5 -> J'=L'+0.5
C              2 : J=L+0.5 -> J'=L'-0.5
C              3 : J=L-0.5 -> J'=L'+0.5
C              4 : J=L-0.5 -> J'=L'-0.5
C
C       2) BEFORE CALLING C8TBQM THE LIFETIME TABLE MUST BE FILLED
C          WITH A CALL TO CXTBLF.
C
C ROUTINES:
C          ROUTINE    SOURCE    BRIEF DESCRIPTION
C          ------------------------------------------------------------
C          I4IDFL     ADAS      RETURNS UNIQUE INDEX GIVEN QUANTUM
C                               NUMBERS N AND L.
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C          CXCRDG     ADAS      CALCULATES COLLISIONAL RATE COEFFICIENTS
C                               BETWEEN NEARLY DEGENERATE LEVELS OF
C                               H-, LI- OR NA-LIKE IONS.
C
C AUTHOR:  JONATHAN NASH (TESSELLA SUPPORT SERVICES PLC)
C          K1/0/81
C          JET EXT. 5183
C
C DATE:    12/10/93
C
C-----------------------------------------------------------------------
C
C-----------------------------------------------------------------------
      INTEGER             IZ0,          IZ1,          MXNSHL,       NBOT
      INTEGER             NTOP
      REAL*8              DENS,         EMP
      REAL*8              TBLF((MXNSHL*(MXNSHL+1))/2)
      REAL*8              TBQMEM((MXNSHL*(MXNSHL+1))/2)
      REAL*8              TBQMEP((MXNSHL*(MXNSHL+1))/2)
      REAL*8              TBQMIM((MXNSHL*(MXNSHL+1))/2)
      REAL*8              TBQMIP((MXNSHL*(MXNSHL+1))/2),          TEV
      REAL*8              TPV,          ZP
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