ADAS Subroutine b8getp

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C
      SUBROUTINE B8GETP(
     &                   IZ0    , IZ1    , DSNEXP, DSNSPF ,
     &                   NDLEV  , NDMETI , NDTEMI , NDDENI ,
     &                   MAXD   , MAXT   , DENSA  , TEA    ,
     &                   LPDATA , LIOSEL , LRSEL  , LHSEL  ,
     &                   IL     , ITIN   , IDIN   ,
     &                   PCC    , PCIE   , PCIEPR , PV3PR  ,
     &                   PVCRPR , PVECR  , IUNT27 , OPEN27 ,
     &                   PR
     &                  )
C-----------------------------------------------------------------------
C
C  ****************** FORTRAN77 SUBROUTINE: B8GETP ********************
C
C  PURPOSE:  TO FETCH DATA FROM EXPANSION FILE AND CONDENSED BUNDLE-N
C            MATRIX FILE AND COMBINE WITH COLLISIONAL-RADIATIVE
C            DATA FOR IN THE LOW LEVEL POPULATION SOLUTION.
C
C  CALLING PROGRAM: ADAS208
C
C  DATA:
C
C  SUBROUTINE:
C
C  INPUT : (I*4)  IZ0    = NUCLEAR CHARGE
C  INPUT : (I*4)  IZ1    = ION CHARGE+1 (=CHARGE OF PARENT)
C  INPUT : (C*80) DSNEXP = FULL NAME OF EXPANSION FILE INCLUDING '/UID'
C  INPUT : (C*80) DSNSPF = FULL NAME OF SPEC. ION FILE READ IN MAIN
C                          PROGRAM INCLUDING '/UID'
C  INPUT : (I*4)  NDLEV  = MAX. NUMBER OF ENERGY LEVELS ALLOWED
C                          IN MAIN PROGRAM
C  INPUT : (I*4)  NDMETI = MAX. NUMBER OF METASTABLE LEVELS ALLOWED
C                          IN MAIN PROGRAM
C  INPUT : (I*4)  NDTEMI = MAX. NUMBER OF TEMPERATURES ALLOWED
C                          IN MAIN PROGRAM
C  INPUT : (I*4)  NDDENI = MAX. NUMBER OF DENSITIES ALLOWED
C                          IN MAIN PROGRAM
C  INPUT : (I*4)  MAXD   = NUMBER OF DENSITIES IN MAIN PROGRAM
C  INPUT : (I*4)  MAXT   = NUMBER OF TEMPERATURES IN MAIN PROGRAM
C  INPUT : (R*8)  DENSA() = SET OF DENSITIES (CM-3) IN MAIN PROGRAM
C  INPUT : (R*8)  TEA()  = SET OF TEMPERATURES (K) IN MAIN PROGRAM
C  INPUT : (L*4)  LPDATA = .TRUE. - EXPANSION DATA EXISTS AND IS SET
C                          .FALSE.- NO EXPANSION DATA OR NOT SET
C  INPUT : (L*4)  LIOSEL = .TRUE. - INCLUDE DIRECT IONISATION ON OUTPUT
C                          .FALSE.- DO NOT INCLUDE
C  INPUT : (L*4)  LHSEL  = .TRUE. - INCLUDE ELECTRON RECOM  ON OUTPUT
C                          .FALSE.- DO NOT INCLUDE
C  INPUT : (L*4)  LRSEL  = .TRUE. - INCLUDE CHARGE EXCHANGE ON OUTPUT
C                          .FALSE.- DO NOT INCLUDE
C  INPUT : (I*4)  IL     = INPUT COPASE FILE - NUMBER OF ENERGY LEVELS
C  INPUT : (I*4)  ITIN   = INDEX OF REQUIRED TEMPERATURE IN TEA() SET
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C  INPUT : (I*4)  IDIN   = INDEX OF REQUIRED DENSITY IN DENSA() SET
C
C  INPUT : (I*4)  IUNT27 = UNIT FOR PAPER.TEXT OUTPUT
C  INPUT : (L*4)  OPEN27 = .TRUE. - PAPER.TEXT HAS BEEN OPENED
C     .FALSE.- PAPER.TEXT HAS NOT BEEN OPENED
C
C  OUTPUT: (R*8)  PCC(,) = PROJETED COLL. RAD. LOW LEVEL MATRIX
C                            1ST DIM: ENERGY LEVEL INDEX
C                            2ND DIM: ENERGY LEVEL INDEX
C  OUTPUT: (R*8)  PCIE() = PROJECTED COLL. RAD. ION. COEFFT. VECTOR
C                            1ST DIM: ENERGY LEVEL INDEX
C  OUTPUT: (R*8)  PCIEPR(,)=PROJECTED PARENT RESOLVED COLL. RAD. ION
C                        MATRIX
C                            1ST DIM: ENERGY LEVEL INDEX
C                            2ND DIM: PARENT INDEX
C  OUTPUT: (R*8)  PV3PR(,)= DIRECT PARENT RESOLVED THREE
C                        BODY RECOMB. COEFFT MATRIX
C                            1ST DIM: ENERGY LEVEL INDEX
C                            2ND DIM: PARENT INDEX
C                            UNITS : CM3S-1
C  OUTPUT: (R*8)  PVECR(,)= PROJECTED PARENT RESOLVED COLL. RAD.
C                        RECOMB. COEFFT MATRIX ( RR + DR + 3B )
C                            1ST DIM: ENERGY LEVEL INDEX
C                            2ND DIM: PARENT INDEX
C                            UNITS : CM3S-1
C  OUTPUT: (R*8)  PR( ,,) = RECOM/BREMS. COEFFT (ERG S-1)
C                            1ST DIM: PARENT INDEX
C                            2ND DIM: TEMPERATURE INDEX
C                            3RD DIM: DENSITY INDEX
C
C
C          (C*80) DSNCPM  = FULL NAME OF COND.MAT. FILE INCLUDING '/UID'
C                            EXPANDED IF NECESSARY FROM SYMBOLIC FILENAME
C                            IN NAMELIST IN EXPANSION FILE
C          (C*80) DSNREF  = FULL NAME OF SPEC. ION FILE INCLUDING '/UID'
C                            EXPANDED IF NECESSARY FROM SYMBOLIC FILENAME
C                            IN NAMELIST IN EXPANSION FILE
C          (C*80) DSHORT  = TEMPORARY STRING
C          (C*11) PTSYMA()= PARENT SYMMETRY (2SP+1 LP) AS CHARACTERS
C                            1ST DIMENSION: PARENT INDEX
C          (I*4)  NPTSPA()= PARENT SPIN (2SP+1)
C                            1ST DIMENSION: PARENT INDEX
C          (I*4)  NSPSYS()= NO. OF SPIN SYSTEMS ASSOCIATED WITH PARENT
C                            1ST DIMENSION: PARENT INDEX
C          (I*4)  NCUTP() = N-SHELL CUT-OFF ASSOCIATED WITH AUGER
C                            PROCESSES FOR THE PARENT
C                            1ST DIMENSION: PARENT INDEX
C          (R*8)  DEPA()  = BINDING ENERGY (RYD) OF LOWEST AUGER
C                            N-SHELL FOR THE PARENT
C                            1ST DIMENSION: PARENT INDEX
C          (I*4)  NSHEL   = NUMBER OF N-SHELLS INVOLVED IN EXPANSION
C          (I*4)  NSHELA()= N-SHELLS INVOLVED IN THE EXPANSION
C                            1ST DIMENSION: SHELL INDEX (<= NSHEL)
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C               (I*4)  NSPIN   = NUMBER OF SPIN SYSTEMS FOR CURRENT PARENT
C               (I*4)  NSPNA(,)= SPIN OF SYSTEM (2S+1)
C                               1ST DIMENSION: SPIN SYSTEM INDEX
C                               2ND DIMENSION: PARENT INDEX
C               (I*4)  NLWSTA(,)= LOWEST N-SHELL INCLUDED FOR THE SPIN SYSTEM
C                               1ST DIMENSION: SPIN SYSTEM INDEX
C                               2ND DIMENSION: PARENT INDEX
C               (R*8)  PLWSTA(,)= PHASE SPACE OCCUPANCY FACTOR FOR LOWEST
C                                 N-SHELL FOR SPIN SYSTEM
C                               1ST DIMENSION: SPIN SYSTEM INDEX
C                               2ND DIMENSION: PARENT INDEX
C               (R*8)  FLWSTA(,)= FRACTIONAL PARENTAGE (EQUIV. ELECTRONS) FOR
C                                 FOR IONISATION FROM LOWEST LEVEL OF
C                                 SPIN SYSTEM
C                               1ST DIMENSION: SPIN SYSTEM INDEX
C                               2ND DIMENSION: PARENT INDEX
C               (R*8)  FRACPRT = TEMP. STORE OF FRACTIONAL PARENTAGE
C               (I*4)  INDA()  = LEVEL INDEX WITH RESPECT TO SPEC. ION FILE
C                               1ST DIMENSION: COUNTER OVER EXP. RECORDS
C               (C*11) LVSYMA()= LEVEL SYMMETRY AND ADDITIONAL INFO.ON CONFIG
C                               1ST DIMENSION: COUNTER OVER EXP. RECORDS
C               (I*4)  LSZDA() = SZD FILE SELECTOR FOR RECORD (IF REQUIRED)
C                               1ST DIMENSION: COUNTER OVER EXP. RECORDS
C               (I*4)  LSPA()  = SPIN SYSTEM (2S+1) FOR RECORD
C                               1ST DIMENSION: COUNTER OVER EXP. RECORDS
C               (I*4)  LSHA()  = ACTIVE N SHELL FOR RECORD
C                               1ST DIMENSION: COUNTER OVER EXP. RECORDS
C               (I*4)  LPTA()  = PARENT INDEX  FOR RECORD
C                               1ST DIMENSION: COUNTER OVER EXP. RECORDS
C               (R*8)  WGHTA(,)= WEIGHTING FOR EXPANSION FOR RECORD
C                               1ST DIMENSION: COUNTER OVER EXP RECORDS
C                               2ND DIMENSION: NSHELL INDEX
C               (I*4)  NMET    = NUMBER OF '*' LEVELS COUNTED
C                               (NB. USE ONLY ONCE FOR A GIVEN LEVEL
C                                     EVEN THOUGH ANOTHER RECORD FOR THE
C                                     LEVEL MAY EXIST)
C               (I*4)  IMETR() = LEVEL INDEX OF METASTABLES '*'ED
C                               1ST DIMENSION: METASTABLE COUNTER(<=NMET)
C               (C*250)LSTRNG  = COND. BUNDLE-N. MATRIX (CBNM) FILE RECORD
C               (C*2)  SEQM    = SEQUENCE IDENTIFIER GIVEN ON CBNM FILE
C               (I*4)  NUCGM   = NUCLEAR CHARGE GIVEN ON CBNM FILE
C               (I*4)  NPRTM   = NO. OF PARENTS GIVEN ON CBNM FILE
C               (I*4)  MAXDM   = NO. OF DENSITIES GIVEN ON CBNM FILE
C               (I*4)  MAXTM   = NO. OF TEMPERATURES GIVEN ON CBNM FILE
C               (I*4)  IPRT    = PARENT INDEX
C               (I*4)  IPRTM   = PARENT INDEX IN CBNM FILE
C               (C*4)  TRMPM   = PARENT TERM SPECIFICATION AS (2SP+1LP)
C               (I*4)  SPNPM   = PARENT SPIN (2SP+1)
C               (I*4)  ISYSM   = SPIN SYSTEM INDEX IN CBNM FILE
C               (I*4)  SSYSM(,)= SPIN SYSTEM IN CBNM FILE
C                               1ST DIM.: PARENT INDEX         (<=NDMET)
C                               2ND DIM.: SPIN SYSTEM INDEX  (<=2)
C               (I*4)  NSYSM() = NO OF SPIN SYSTEM IN CBNM FILE FOR PARENT
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C                                1ST DIM.: PARENT INDEX        (<=NDMET)
C          (I*4)  NSHLM(,)= NO. OF N-SHELLS IN CBNM FILE
C                                1ST. DIM.: PARENT INDEX       (<=NDMET)
C                                2ND. DIM.: SPIN SYSTEM INDEX (<=2)
C          (R*8)  DENSM() = ELECTRON DENSITIES (CM-3) ON CBNM FILE
C                                1ST DIMENSION: DENSITY INDEX (<=NDMAX)
C          (R*8)  TEM()   = ELECTRON TEMPS.  (K) ON CBNM FILE
C                                1ST DIMENSION: TEMP. INDEX (<=NTMAX)
C          (R*8)  PCRMAT(,,,,,)=PROJECTED COLLISIONAL-RADIATIVE MATRIX
C                                IN P-REPRESENTATION WITHOUT ELIMINATIONS
C                                1ST DIM.: TEMPERATURE INDEX
C                                2ND DIM.: DENSITY INDEX
C                                3RD DIM.: ROW INDEX
C                                4TH DIM.: COLUMN INDEX
C                                5TH DIM.: PARENT INDEX
C                                6TH DIM.: SPIN SYSTEM INDEX
C          (R*8)  PIOMAT(,,,,,)=PROJECTED COLLISIONAL-RADIATIVE IONIS.
C                                MATRIX TO RESOLVED + METASTABLES
C                                IN P-REPRESENTATION WITHOUT ELIMINATIONS
C                                1ST DIM.: TEMPERATURE INDEX
C                                2ND DIM.: DENSITY INDEX
C                                3RD DIM.: ROW INDEX
C                                4TH DIM.: COLUMN INDEX (+ METASTABLES)
C                                5TH DIM.: PARENT INDEX
C                                6TH DIM.: SPIN SYSTEM INDEX
C          (R*8)  PQPIND(,,,,,)=PROJECTED INDIRECT PARENT CQ COEFFICIENT
C                                MATRIX FROM SPECIFIC PARENT, SPIN TO
C                                FINAL PARENT IN PN REPRESENTATION
C                                1ST DIM.: TEMPERATURE INDEX
C                                2ND DIM.: DENSITY INDEX
C                                3TH DIM.: FINAL   PARENT INDEX
C                                4TH DIM.: INITIAL PARENT INDEX
C                                5TH DIM.: SPIN SYSTEM INDEX
C          (R*8)  PVCRPR(,,)   =PROJECTED INDIRECT PARENT CQ COEFFICIENT
C                                MATRIX FROM SPECIFIC PARENT TO
C                                FINAL PARENT IN PN REPRESENTATION
C                                SUMMED OVER SPIN SYSTEMS
C                                1ST DIM.: FINAL   PARENT INDEX
C                                2ND DIM.: INITIAL PARENT INDEX
C          (R*8)  PCRRHS(,,,,)= PROJECTED COLLISIONAL-RADIATIVE RECOM.
C                                RHS. FROM A SPECIFIED PARENT AND IN
C                                A SPECIFIED SPIN SYSTEM
C                                IN P-REPRESENTATION WITHOUT ELIMINATIONS
C                                1ST DIM.: TEMPERATURE INDEX
C                                2ND DIM.: DENSITY INDEX
C                                3RD DIM.: ROW INDEX
C                                5TH DIM.: PARENT INDEX
C                                6TH DIM.: SPIN SYSTEM INDEX
C          (R*8)  PRB(,,,)    = RECOM/BREMS. COEFFT (
C                                1ST DIM: TEMPERATURE INDEX
C                                2ND DIM: DENSITY INDEX
C                                3RD DIM: PARENT INDEX
C                                4TH DIM: SPIN SYSTEM INDEX
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C             (R*8)  DCRMAT(,,,) = DIRECT COLLISIONAL-RADIATIVE MATRIX
C                                  IN P-REPRESENTATION FOR LOW N-SHELLS
C                                  1ST DIM.: TEMPERATURE INDEX
C                                  2ND DIM.: DENSITY INDEX
C                                  3RD DIM.: ROW INDEX
C                                  4TH DIM.: COLUMN INDEX
C             (R*8)  DIOMAT(,,,) = DIRECT COLLISIONAL-RADIATIVE IONIS.
C                                  MATRIX TO RESOLVED + METASTABLES
C                                  IN P-REPRESENTATION FOR LOW N-SHELLS
C                                  1ST DIM.: TEMPERATURE INDEX
C                                  2ND DIM.: DENSITY INDEX
C                                  3RD DIM.: ROW INDEX
C                                  4TH DIM.: COLUMN INDEX (+ METASTABLES)
C             (R*8)  DTREC(,)   = DIRECT THREE-BODY RECOMBINATION COEFFTS.
C                                  FROM A SPECIFIED PARENT AND IN A
C                                  SPECIFIED SPIN SYSTEM
C                                  1ST DIM.: TEMPERATURE INDEX
C                                  2ND DIM.: ROW INDEX
C             (R*8)  DDREC(,)   = DIRECT DIELECTR.  RECOMBINATION COEFFTS.
C                                  FROM A SPECIFIED PARENT AND IN A
C                                  SPECIFIED SPIN SYSTEM
C                                  1ST DIM.: TEMPERATURE INDEX
C                                  2ND DIM.: ROW INDEX
C             (R*8)  DRREC(,)   = DIRECT RADIATIVE  RECOMBINATION COEFFTS.
C                                  FROM A SPECIFIED PARENT AND IN A
C                                  SPECIFIED SPIN SYSTEM
C                                  1ST DIM.: TEMPERATURE INDEX
C                                  2ND DIM.: ROW INDEX
C             (R*8)  DXREC(,)   = DIRECT CH. EXCH.  RECOMBINATION COEFFTS.
C                                  FROM A SPECIFIED PARENT AND IN A
C                                  SPECIFIED SPIN SYSTEM DUE TO H(1S)
C                                  1ST DIM.: TEMPERATURE INDEX
C                                  2ND DIM.: ROW INDEX
C             (I*4)  NM()       = LOW N-SHELLS FOR PARENT SPIN SYSTEM
C                                  COMBINATION
C                                  1ST. DIM.: N-SHELL INDEX
C             (I*4)  NSUP(,)    = HIGHEST N-SHELL REQUIRED FOR EXPANSION
C                                  FOR THE PARENT AND SPIN SYSTEM
C                                  1ST. DIM.: PARENT INDEX
C                                  2ND. DIM.: SPIN SYSTEM INDEX
C             (I*4)  ISPIN      = GENERAL INDEX
C             (I*4)  IPT        = GENERAL INDEX
C             (I*4)  JPT        = GENERAL INDEX
C             (I*4)  I          = GENERAL INDEX
C             (I*4)  J          = GENERAL INDEX
C             (I*4)  II         = GENERAL INDEX
C             (I*4)  JJ         = GENERAL INDEX
C             (I*4)  IR         = GENERAL INDEX
C             (I*4)  IC         = GENERAL INDEX
C             (I*4)  IS         = GENERAL INDEX
C             (I*4)  KI         = GENERAL INDEX
C             (I*4)  KJ         = GENERAL INDEX
C             (I*4)  IN         = DENSITY INDEX
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C              (I*4)  IT       =  TEMPERATURE INDEX
C              (I*4)  NUP      =  UPPER N-SHELL FOR CURRENT EXPANSION
C              (I*4)  IMAX     =  NO. OF SHELLS REQUIRED IN EXPANSION
C              (L*4)  LSOLVE   = .TRUE. -INVERSION WITH SOLN. OF EQUATIONS
C                              = .FALSE. -INVERSION ONLY
C              (R*8)  AMAT(,)  = TEMPORARY ARRAY FOR INVERTING
C              (R*8)  BRHS()   = TEMPORARY R.H.S FOR EQUATION SOLUTION
C              (R*8)  DINTX    = + OR - DEPENDING ON INTERCHANGES IN
C                                INVERSION SUBROUTINE XXMINV
C              (R*8)  PCRTMP(,) = TEMPORARY PROJECTED COLL. RAD. MATRIX
C                                TO BE CONDENSED TO PCRMAT
C              (R*8)  DCRTMP(,) = TEMPORARY DIRECT COLL. RAD. MATRIX
C                                TO BE CONDENSED TO DCRMAT
C              (R*8)  PIOTMP(,) = TEMPORARY PROJECTED IONIS. MATRIX
C                                TO BE CONDENSED TO PIOMAT
C              (R*8)  PRHTMP(,) = TEMPORARY PROJECTED R.H.S. VECTOR
C                                TO BE CONDENSED TO PCRRHS
C              (R*8)  PQPTMP() = TEMPORARY INDIRECT PARENT QC COEFFICIENT
C                                TO BE CONDENSED TO PQPIND
C                                  1ST INDEX  - FINAL PARENT
C              (R*8)  SUM      = GENERAL USE FOR SUMMING
C              (R*8)  Z0       = NUCLEAR CHARGE
C              (R*8)  Z1       = ION CHARGE+1 (=CHARGE OF PARENT)
C              (R*8)  SSYSWT   = FRACTIONAL WEIGHTING OF SPIN SYSTEM
C                                FOR PARTICULAR PARENT TO BE USED IF
C                                RECOMBINATION COEFFICIENTS ARE GIVEN IN
C                                THE MULTIPLIED UP FORM.
C              (L*4)  LTRNG()  = .TRUE. - OUTPUT VALUE WAS EXTRAPOLATED
C                                          FOR TEMPERATURE
C                                .FALSE. - OUTPUT VALUE NOT EXTRAPOLATED
C              (L*4)  LDRNG()  = .TRUE. - OUTPUT VALUE WAS EXTRAPOLATED
C                                          FOR DENSITY
C                                .FALSE. - OUTPUT VALUE NOT EXTRAPOLATED
C              (I*4)  IUP      = NUP-NM(1)+1
C              (R*8)  V        = TEMPORARY REAL NUMBER
C              (R*8)  ARRIN(,) = TEMPORARY ARRAY FOR INPUT TO SPLINING
C              (R*8)  ARROUT(,) = TEMPORARY ARRAY FOR IOUTPUT FROM SPLINING
C              (R*8)  TEMIN    = MINIMUM TEMPERATURE BELOW WHICH COEFFT.
C                                SHOULD BE SET TO ZERO
C              (R*8)  DEMIN    = MINIMUM DENSITY  BELOW WHICH COEFFT.
C                                SHOULD BE SET TO ZERO
C              (R*8)  DETMP    = TEMPORARY VALUE OF DEMIN
C              (R*8)  TETMP    = TEMPORARY VALUE OF TEMIN
C                                SHOULD BE SET TO ZERO
C              (I*4)  IUPA(,)  = DIMENSION OF FINAL CONDENSED N-SHELL
C                                MATRIX
C                                1ST DIM: PARENT INDEX
C                                2ND DIM: SPIN SYSTEM INDEX
C C            (I*4)  IPOINTA() = POINTER TO INDEX OF N-SHELL IN NSHEL
C C                                LIST
C C                                1ST DIM: N=PRINCIPAL QUANTUM NUMBER
C
C              (I*4)  IEDMAT   = 0 PCRL ADDED ONTO PCRMAT
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C                                    1 PCRL NOT ADDED ON
C               (I*4)   IECION   = 0 PCION  ADDED ONTO TO PCRMAT
C                                      PCIONRI ADDED ONTO PCIONRP
C                                    1 PCION NOT ADDED ON
C                                      PCIONRI NOT ADDED ON
C               (I*4)   IETREC   = 0 PTREC ADDED ONTO PCRRHS
C                                    1 PTREC NOT ADDED ON
C               (I*4)   IEDREC   = 0 PDREC ADDED ONTO PCRRHS
C                                    1 PDREC NOT ADDED ON
C               (I*4)   IERREC   = 0 PRREC ADDED ONTO PCRRHS
C                                    1 PRREC NOT ADDED ON
C               (I*4)   IEXREC   = 0 PXREC ADDED ONTO PCRRHS
C                                    1 PXREC NOT ADDED ON
C               (I*4)   IERSYS   = 0 RECOMBINATION RATES MULTIPLIED
C                                          BY SPIN SYSTEM WEIGHT
C                                    1 RECOMBINATION RATES NOT MULTIPLIED
C                                          BY SSYSWT
C
C ROUTINES: NONE
C
C STREAM HANDLING :
C            7      OUTPUT (PAPER.TEXT)
C           14      EXPANSION FILE
C           15      CONDENSED MATRIX MASTER FILE
C
C AUTHOR: HP SUMMERS
C         K1/1/57
C         JET EXT. 4941
C
C DATE:   18/08/92
C
C----------------------------------------------------------------------
C
C UPDATE: WJ DICKSON
C         K1/1/26
C
C   DATE: JANUARY 1993
C
C         NUMEROUS ADJUSTMENTS AND UPDATES
C
C----------------------------------------------------------------------
C
C UPDATE: WJ DICKSON
C         K1/1/26
C
C   DATE: 12TH AUGUST 1993
C
C         INCLUSION OF VARIABLES IEFPRS AND IEFPRE AND CORRESPONDING
C         ADJUSTMENTS TO DIO , PCR AND PIO MATRICES. FRACTIONAL
C         PARENTAGE COEFFICIENTS AS GIVEN BY EXPANSION FILE
C         ( VARIABLE  FLWSTA )
C
C         (I*4)   IEFPRS   = 0 GROUND STATE IONISATION RATE COEFFICIENTS
```

```
C                                  HAVE BEEN MULTIPLYIED BY FRACTIONAL
C                                  PARENTAGE COEFFICIENT IN MAINBNS
C                              1 GROUND STATE IONISATION RATE COEFFICIENTS
C                                  HAVE NOT BEEN MULTIPLYIED BY FRACTIONAL
C                                  PARENTAGE COEFFICIENT IN MAINBNS
C
C          (I*4)  IEFPRE  = 0 ELEMENTS OF MAIN C-R MATRIX ARISING
C                                  FROM GROUND STATE
C                                  HAVE BEEN MULTIPLYIED BY FRACTIONAL
C                                  PARENTAGE COEFFICIENT IN MAINBNS
C                              1 ELEMENTS OF MAIN C-R MATRIX ARISING
C                                  FROM GROUND STATE
C                                  HAVE NOT BEEN MULTIPLYIED BY FRACTIONAL
C                                  PARENTAGE COEFFICIENT IN MAINBNS
C
C UNIX-IDL PORT:
C
C DATE: UNKNOWN
C
C AUTHOR: DAVID H BROOKS, UNIVERSITY OF STRATHCLYDE
C
C UPDATE:  29/03/96  HPS - INCREASE PARAMETER SETTINGS NDTEM: 20->35
C                                                    NDDEN: 20->24
C
C UPDATE:  18/04/96  HPS - ALTER FORMAT 2008 FOR READING TEMPS. AND
C                           DENS. FROM CBNM FILE FOR CONSISTENCY WITH
C                           NEW PRODUCTION VERSION OF ADAS204
C UPDATE:  18/04/96  HPS - ALTER B8SPLNX TO B8SPLN IN 2ND AND 3RD
C                           CALLS IN THE SUBROUTINE
C UPDATE:  03/05/96  DHB - ALTERED IBM SPECIFIC STATEMENTS. INCREASED
C                           SIZE OF DSNINC & DSNSPF TO 80.
C UPDATE:  09/03/98  HPS - ADDED PR TO PARAMETER LIST. PREPARED FROM PRB
C                           FROM PROJECTION MATRIX FILE BY INTERPOLATION.
C                           CORRECTED PB TO INCLUDE SUM OVER SPIN SYSTEMS
C*******************************************************************
C PUT UNDER SCCS CONTROL:
C
C DATE:   10-05-96
C
C VERSION: 1.1 DATE: 10-05-96
C MODIFIED: WILLIAM OSBORN (TESSELLA SUPPORT SERVICES PLC)
C     - FIRST PUT UNDER SCCS
C
C VERSION: 1.2
C MODIFIED: WILLIAM OSBORN DATE: 13-05-96
C     - ADDED IUNT27 AND OPEN27 TO ALLOW PAPER.TEXT OUTPUT
C
C VERSION: 1.3
C MODIFIED: WILLIAM OSBORN + HPS DATE: 28-05-96
C     - ADDED CALL TO XXFLNM TO EXPAND FILENAMES
C
C VERSION: 1.4
C MODIFIED: TIM HAMMOND               DATE: 02-08-96
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C              - CHANGED NAME OF VARIABLE DINT TO DINTX AS DINT IS THE
C                NAME OF AN INTRINSIC FUNCTION ON HP WORKSTATIONS
C
C VERSION: 1.5
C MODIFIED: RICHARD MARTIN                     DATE: 02-03-98
C              - CHANGED IUNT7 TO IUNT27 AND OPEN7 TO OPEN27.
C
C VERSION: 1.6
C MODIFIED: HUGH SUMMERS                       DATE: 09-03-98
C - ADDED PR TO PARAMETER LIST. PREPARED FROM PRB
C                FROM PROJECTION MATRIX FILE BY INTERPOLATION.
C                CORRECTED PB TO INCLUDE SUM OVER SPIN SYSTEMS
C
C VERSION:  1.7                                DATE: 2/09/99
C MODIFIED:  Martin O'Mullane
C              - Format error in 2020. Skip 70X not 80X.
C
C VERSION:  1.8                                DATE: 26/10/99
C MODIFIED:  Martin O'Mullane
C              - Added call to b8splt to correct for odd behaviour
C                at low ne high Te recombination data.
C
C VERSION:  1.9                                DATE: 08/12/99
C MODIFIED:  Martin O'Mullane
C              - Added check for expansion data which did not have any
C                weighting factors. Only proceed if LPTA is non zero.
C                It is the do 56 loop.
C              - The assumption that variables are saved between calls
C                should not be made (Linux again). Anyway it's bad
C                practice. Data required when called with LPDATA true
C                is now saved.
C
C VERSION:  1.10                               DATE: 13/02/2006
C MODIFIED:  Martin O'Mullane
C              - Increase number of levels to 150.
C              - Write status of projection to screen.
C              - Index error in FLWSTA corrected.
C
C-------------------------------------------------------------------------
       CHARACTER*80        DSNEXP,        DSNSPF
       INTEGER             IDIN,          IL,            ITIN,          IUNT27
       INTEGER             IZ0,           IZ1,           MAXD,          MAXT
       INTEGER             NDDENI,        NDLEV,         NDMETI,        NDTEMI
       LOGICAL             LHSEL,         LIOSEL,        LPDATA,        LRSEL
       LOGICAL             OPEN27
       REAL*8              DENSA(NDDENI),            PCC(NDLEV,NDLEV)
       REAL*8              PCIE(NDLEV), PCIEPR(NDLEV,NDMETI)
       REAL*8              PR(NDMETI,NDTEMI,NDDENI), PV3PR(NDLEV,NDMETI)
       REAL*8              PVCRPR(NDMETI,NDMETI),    PVECR(NDLEV,NDMETI)
       REAL*8              TEA(NDTEMI)
```