ADAS Subroutine b8popo

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C
      SUBROUTINE B8POPO( NDTEM  , NDDEN , NDMET , NDLEV ,
     &                   NPL    , NPLR  , NPLI  ,
     &                   MAXT   , MAXD  , NMET  , NORD  ,
     &                            DENSA , IMETR , IORDR ,
     &                            LRSEL , LISEL , LHSEL ,
     &                            RATPIA, RATMIA, RATHA ,
     &                   STACK  , STVR  , STVI  , STVH  ,
     &                   POPAR
     &                 )
C-----------------------------------------------------------------------
C
C  ****************** FORTRAN77 SUBROUTINE: B8POPO *********************
C
C  PURPOSE: TO CONSTRUCT ORDINARY/NON-METASTABLE LEVEL POPULATIONS.
C
C  CALLING PROGRAM:  ADAS205/ADAS206
C
C  SUBROUTINE:
C
C  INPUT :  (I*4)  NDTEM   = MAXIMUM NUMBER OF TEMPERATURES ALLOWED
C  INPUT :  (I*4)  NDDEN   = MAXIMUM NUMBER OF DENSITIES ALLOWED
C  INPUT :  (I*4)  NDMET   = MAXIMUM NUMBER OF METASTABLE LEVELS ALLOWED
C  INPUT :  (I*4)  NDLEV   = MAXIMUM NUMBER OF ENERGY LEVELS ALLOWED
C  INPUT :  (I*4)  NPL     = NO. OF METASTABLES OF (Z+1) ION ACCESSED
C                            BY EXCITED STATE IONISATION IN COPASE
C                            FILE WITH IONISATION POTENTIALS GIVEN
C                            ON THE FIRST DATA LINE
C  INPUT :  (I*4)  NPLR    = NO. OF ACTIVE METASTABLES OF (Z+1) ION
C  INPUT :  (I*4)  NPLI    = NO. OF ACTIVE METASTABLES OF (Z-1) ION
C
C  INPUT :  (I*4)  MAXT    = NUMBER OF INPUT TEMPERATURES ( 1 ->'NDTEM')
C  INPUT :  (I*4)  MAXD    = NUMBER OF INPUT DENSITIES ( 1 ->'NDDEN')
C  INPUT :  (I*4)  NMET    = NUMBER OF METASTABLES LEVELS ( 1 ->'NDMET')
C  INPUT :  (I*4)  NORD    = NUMBER OF ORDINARY LEVELS ( 1 ->'NDLEV')
C
C  INPUT :  (R*8)  DENSA() = ELECTRON DENSITIES  (UNITS: CM-3)
C  INPUT :  (I*4)  IMETR() = INDEX OF METASTABLE IN COMPLETE LEVEL LIST
C                            (ARRAY SIZE = 'NDMET' )
C  INPUT :  (I*4)  IORDR() =INDEX OF ORDINARY EXCITED LEVELS IN COMPLETE
C                           LEVEL LIST.
C                           (ARRAY SIZE = 'NDLEV' )
C
C  INPUT :  (L*4)  LRSEL   = .TRUE.  => FREE ELECTRON RECOMBINATION
C                                       REQUESTED.
C                          = .FALSE. => FREE ELECTRON RECOMBINATION
C                                       NOT REQUESTED.
C  INPUT :  (L*4)  LISEL   = .TRUE.  => ELECTRON IMPACT IONISATION
C                                       REQUESTED.
C                          = .FALSE. => ELECTRON IMPACT IONISATION
C                                       NOT REQUESTED.
C  INPUT :  (L*4)  LHSEL   = .TRUE.  => CHARGE TRANSFER FROM NEUTRAL
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C                                        HYDROGREN REQUESTED.
C                          = .FALSE. => CHARGE TRANSFER FROM NEUTRAL
C                                        HYDROGREN NOT REQUESTED.
C
C  INPUT :  (R*8)  RATPIA(,)= RATIO ( N(Z+1)/N(Z)  STAGE ABUNDANCIES )
C                              1ST DIMENSION: TEMP/DENS INDEX
C                              2ND DIMENSION: PARENT INDEX
C  INPUT :  (R*8)  RATMIA(,)= RATIO ( N(Z-1)/N(Z)  STAGE ABUNDANCIES )
C                              1ST DIMENSION: TEMP/DENS INDEX
C                              2ND DIMENSION: PARENT INDEX
C  INPUT :  (R*8)  RATHA() = RATIO (NEUTRAL H DENSITY/ELECTRON DENSITY)
C
C  INPUT : (R*4) STACK(,,,)= ORDINARY EXCITED LEVEL POPULAT'N DEPENDENCE
C                            ON METASTABLE LEVEL.
C                             1st DIMENSION: ORDINARY LEVEL INDEX
C                             2nd DIMENSION: METASTABLE INDEX
C                             3rd DIMENSION: TEMPERATURE INDEX
C                             4th DIMENSION: DENSITY INDEX
C  INPUT : (R*4) STVR(,,,) = ORDINARY EXCITED LEVEL:
C                             FREE-ELECTRON RECOMBINATION COEFFICIENTS
C                             (UNITS* CM**3/SEC-1)
C                             1st DIMENSION: ORDINARY LEVEL INDEX
C                             2nd DIMENSION: TEMPERATURE INDEX
C                             3rd DIMENSION: DENSITY INDEX
C                             4TH DIMENSION: PARENT INDEX
C  INPUT : (R*4) STVI(,,,) = ORDINARY EXCITED LEVEL:
C                             ELECTRON IMPACT IONISATION  COEFFICIENTS
C                             (UNITS* CM**3/SEC-1)
C                             1st DIMENSION: ORDINARY LEVEL INDEX
C                             2nd DIMENSION: TEMPERATURE INDEX
C                             3rd DIMENSION: DENSITY INDEX
C                             4TH DIMENSION: PARENT INDEX
C  INPUT : (R*4) STVH(,,,) = ORDINARY EXCITED LEVEL:
C                             CHARGE-EXCHANGE RECOMBINATION COEFFICIENTS
C                             (UNITS* CM**3/SEC-1)
C                             1st DIMENSION: ORDINARY LEVEL INDEX
C                             2nd DIMENSION: TEMPERATURE INDEX
C                             3rd DIMENSION: DENSITY INDEX
C                             4TH DIMENSION: PARENT INDEX
C
C  I/O   :  (R*8)  POPAR(,,)= LEVEL POPULATIONS
C                              1st DIMENSION: LEVEL INDEX
C                              2nd DIMENSION: TEMPERATURE INDEX
C                              3rd DIMENSION: DENSITY INDEX
C                               ON INPUT : CONTAINS POPULATIONS FOR
C                                          METASTABLE LEVELS ONLY.
C                               ON OUTPUT: CONTAINS POPULATIONS FOR
C                                          ALL LEVELS.
C
C           (R*8) DCOEF     = DENSITY MULTIPLIED BY RELEVANT RATIOS  FOR
C                             CALCULATING RECOMBINATION CONTRIBUTIONS.
C
C           (I*4) IT        = TEMPERATURE ARRAY INDEX
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C           (I*4) IP        = PARENT INDEX
C           (I*4) IN        = DENSITY ARRAY INDEX
C           (I*4) IO        = ORDINARY LEVEL ARRAY INDEX
C           (I*4) IM        = METASTABLE LEVEL ARRAY INDEX
C
C
C ROUTINES: NONE
C
C AUTHOR:  HP SUMMERS  (UPDATE OF BXPOPO BY PE BRIDEN)
C          K1/1/57
C          JET EXT. 4941
C
C DATE:    11/06/92
C
C UPDATE:  12/07/93  HPS - CHANGE STSCK, STVR, STVI, STVH
C                          DIMENSIONS TO R*4
C-----------------------------------------------------------------------
C UNIX-IDL PORT:
C
C AUTHOR: DAVID H BROOKS, UNIVERSITY OF STRATHCLYDE
C
C DATE: UNKNOWN
C
C-----------------------------------------------------------------------
C PUT UNDER SCCS CONTROL:
C
C VERSION: 1.1 DATE: 10/05/96
C MODIFIED: WILLIAM OSBORN (TESSELLA SUPPORT SERVICES PLC)
C     - FIRST PUT UNDER SCCS
C
C-----------------------------------------------------------------------
C
C-----------------------------------------------------------------------
      INTEGER             IMETR(NDMET),              IORDR(NDLEV)
      INTEGER             MAXD,         MAXT,        NDDEN,       NDLEV
      INTEGER             NDMET,        NDTEM,       NMET,        NORD
      INTEGER             NPL,          NPLI,        NPLR
      LOGICAL             LHSEL,        LISEL,       LRSEL
      REAL*8              DENSA(NDDEN)
      REAL*8              POPAR(NDLEV,NDTEM,NDDEN), RATHA(NDDEN)
      REAL*8              RATMIA(NDDEN,NDMET),      RATPIA(NDDEN,NDMET)
      REAL                STACK(NDLEV,NDMET,NDTEM,NDDEN)
      REAL                STVH(NDLEV,NDTEM,NDDEN,NDMET)
      REAL                STVI(NDLEV,NDTEM,NDDEN,NDMET)
      REAL                STVR(NDLEV,NDTEM,NDDEN,NDMET)
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