

ADAS Subroutine d9sgcf

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      SUBROUTINE D9SGCF( IZ0      , IZL      , IZH      ,
&                      ISDIMD   , IZDIMD   , ITDIMD   , IPDIMD   , IMDIMD   ,
&                      NMSUM    , IZIP     , IMIP     , IPIZM    ,
&                      NDLIN    , NDCOMP   ,
&                      NLINE    , NCOMP    , SPECL    , IPLINE   ,
&                      IZION    , IMET     , CIMET    , INDPH    , CINDPH   ,
&                      IFILE    ,
&                      NTDIM    , NDDIM    , ITMAX    , IDMAX    ,
&                      DENS     , DENSH    ,
&                      PECA     , LPEC     ,
&                      FPABUN   ,
&                      GCFPEQ   , GCSEQ    ,
&                      NDRAT    , NRAT     ,
&                      ILINE    , JLINE    ,
&                      RATA
&                      )
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C ***** FORTRAN77 SUBROUTINE: D9SGCF *****

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C PURPOSE : TO ASSEMBLE GCF FUNCTIONS AND THEIR COMPONENTS USING
C FRACTIONAL METASTABLE ABUNDANCES. 2D (TEMPERATURE, DENSITY)
C VERSION.

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C INPUT : (I*4) IZ0 = NUCLEAR CHARGE
C INPUT : (I*4) IZL = MINIMUM ION CHARGE+1 IN MASTER DATA FILES
C INPUT : (I*4) IZH = MAXIMUM ION CHARGE+1 IN MASTER DATA FILES
C INPUT : (I*4) ISDIMD = MAXIMUM NUMBER OF (CHARGE, PARENT, GROUND)
C BLOCKS IN ISONUCLEAR MASTER FILES
C INPUT : (I*4) IZDIMD = MAXIMUM NUMBER OF CHARGE STATES
C IN ISONUCLEAR MASTER FILES
C INPUT : (I*4) ITDIMD = MAXIMUM NUMBER OF TEMP OR DENS VALUES IN
C ISOELECTRONIC MASTER FILES
C INPUT : (I*4) IPDIMD = MAXIMUM NUMBER OF METASTABLES FOR EACH
C IONISATION STAGE
C INPUT : (I*4) IMDIMD = MAXIMUM NUMBER OF METASTABLES
C
C INPUT : (I*4) NMSUM = TOTAL NUMBER OF POPULATIONS
C
C INPUT : IZIP() = ION CHARGE +1 (IZ1) OF METASTABLE IN LIST
C INPUT : IMIP() = METASTABLE INDEX WITHIN CHARGE STATE IZ1
C OF METASTABLE INDEX FROM COMPLETE LIST
C INPUT : IPIZM(,) = METASTABLE INDEX IN COMPLETE LIST
C 1ST DIM: INDEX IZ1-IZL+1
C 2ND DIM: METASTABLE COUNT FOR STAGE (IGRD)
C INPUT : (I*4) NDLIN = MAXIMUM NUMBER OF LINES ALLOWED
C INPUT : (I*4) NDCOMP = MAXIMUM NUMBER OF COMPONENT FOR EACH LINE
C INPUT : (I*4) NLINE = NUMBER OF LINES IDENTIFIED IN SCRIPT

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C INPUT  : (I*4)  NCOMP()   = NUMBER OF COMPONENTS OF SCRIPT LINE
C INPUT  : (I*4)  IZION(, ) = CHARGE STATE OF COMPONENT
C                                     1ST DIM: LINE INDEX
C                                     2ND DIM: COMPONENT INDEX
C INPUT  : (I*4)  IMET(, )  = METASTABLE INDEX OF COMPONENT OF
C                                     SCRIPT LINE WITHIN CHARGE STATE
C                                     1ST DIM: LINE INDEX
C                                     2ND DIM: COMPONENT INDEX
C INPUT  : (C*1)  CIMET(, ) = SIGN (+, BLANK OR -) OF METASTABLE
C                                     1ST DIM: LINE INDEX
C                                     2ND DIM: COMPONENT INDEX
C INPUT  : (I*4)  INDPH(, ) = PEC FILE INDEX OF LINE COMPONENT
C                                     1ST DIM: LINE INDEX
C                                     2ND DIM: COMPONENT INDEX
C INPUT  : (C*1)  CINDPH(, ) = DRIVER (E OR BLANK => ELECTRONS)
C                                     (H           => HYDROGEN )
C                                     1ST DIM: LINE INDEX
C                                     2ND DIM: COMPONENT INDEX
C INPUT  : (I*4)  IFILE(, ) = INDEX OF PEC FILE IN FILE LIST
C                                     1ST DIM: LINE INDEX
C                                     2ND DIM: COMPONENT INDEX
C INPUT  : (I*4)  NTDIM     = MAXIMUM NUMBER OF DTEV VALUES
C INPUT  : (I*4)  NDDIM     = MAXIMUM NUMBER OF DDENS VALUES
C INPUT  : (I*4)  ITMAX     = NUMBER OF DTEV() VALUES
C INPUT  : (I*4)  IDMAX     = NUMBER OF DDENS() VALUES
C INPUT  : (R*8)  DENS( )   = ELECTRON DENSITIES (CM-3)
C INPUT  : (R*8)  DENS( )   = HYDROGEN DENSITIES (CM-3)
C INPUT  : (R*8)  PECA(, , ,) = PHOTON EMISSIVITY COEFFICIENTS (CM3 S-1)
C                                     1ST DIM: TEMPERATURE INDEX
C                                     2ND DIM: DENSITY INDEX
C                                     3RD DIM: LINE INDEX
C                                     4TH DIM: COMPONENT INDEX
C INPUT  : (L*4)  LPEC(, )  = .TRUE.  => PHOTON EMISSIVITY OBTAINED
C                                     .FALSE. => PHOTON EMISSIVITY NOT OBTAINED
C                                     2ND DIM: LINE INDEX
C                                     3RD DIM: COMPONENT INDEX
C INPUT  : (R*8)  FPABUN(, , ) = RESOLVED METASTABLE EQUILIBRIUM
C                                     FRACTIONAL ABUNDANCES
C                                     1ST DIM: - TEMPERATURE INDEX
C                                     2ND DIM: - DENSITY INDEX
C                                     3RD DIM: - METASTABLE INDEX
C INPUT  : (I*4)  NDRAT     = MAXIMUM NUMBER OF LINE RATIOS ALLOWED
C INPUT  : (I*4)  NRAT      = NUMBER OF RATIOS IDENTIFIED IN SCRIPT
C INPUT  : (I*4)  ILINE( )  = INDEX OF NUMERATOR LINE FOR LINE RATIO
C INPUT  : (I*4)  JLINE( )  = INDEX OF DENOMINATOR LINE FOR LINE RATIO
C
C OUTPUT  : (C*16) SPECL(, ) = SPEC. OF POINTERS OF LINE COMPONENT
C                                     1ST DIM: LINE INDEX
C                                     2ND DIM: COMPONENT INDEX
C OUTPUT  : (I*4)  IPLINE(, ) = METASTABLE POINTER OF LINE COMPONENT
C                                     1ST DIM: LINE INDEX
C                                     2ND DIM: COMPONENT INDEX
C OUTPUT  : (R*8)  GCFPEQ(, , ,) = GCF FUNC. COMPONENT (CM3 S-1)

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C 1ST DIM: TEMPERATURE INDEX
 C 2ND DIM: DENSITY INDEX
 C 3RD DIM: LINE INDEX
 C 4TH DIM: LINE COMPONENT INDEX

C OUTPUT : (R*8) GCFEQ(,,) = GCF FUNCTION (CM3 S-1)
 C 1ST DIM: TEMPERATURE INDEX
 C 2ND DIM: DENSITY INDEX
 C 3RD DIM: LINE INDEX
 C OUTPUT : (R*8) RATA(,,) = LINE GCF RATIOS
 C 1ST IND: TEMPERATURE INDEX
 C 2ND IND: DENSITY INDEX
 C 3RD IND: RATIO INDEX

C PROGRAM: (I*4) IT = GENERAL INDEX FOR TEMPERATURE
 C (I*4) ID = GENERAL INDEX FOR DENSITY
 C (I*4) IZ = GENERAL INDEX FOR CHARGE
 C (I*4) IP = GENERAL INDEX FOR CHARGE
 C (I*4) IZ1 = GENERAL INDEX FOR CHARGE+1
 C (I*4) IL = GENERAL INDEX FOR LINE
 C (I*4) IR = GENERAL INDEX FOR RATIO
 C (I*4) ICPT = GENERAL INDEX FOR LINE COMPONENT

C ROUTINES:

ROUTINE	SOURCE	BRIEF DESCRIPTION
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C MODIFIED: RICHARD MARTIN

- PUT UNDER SCCS CONTROL

CHARACTER	CIMET (NDLINE, NDCOMP)		
CHARACTER	CINDPH (NDLINE, NDCOMP)		
CHARACTER*16	SPECL (NDLINE, NDCOMP)		
INTEGER	IDMAX, IFILE (NDLINE, NDCOMP)		
INTEGER	ILINE (NDRAT), IMDIMD		
INTEGER	IMET (NDLINE, NDCOMP), IMIP (IMDIMD)		
INTEGER	INDPH (NDLINE, NDCOMP), IPDIMD		
INTEGER	IPIZM (IZDIMD, IPDIMD)		
INTEGER	IPLINE (NDLINE, NDCOMP), ISDIMD, ITDIMD		
INTEGER	ITMAX, IZ0, IZDIMD, IZH		
INTEGER	IZION (NDLINE, NDCOMP), IZIP (IMDIMD)		
INTEGER	IZL, JLINE (NDRAT)		
INTEGER	NCOMP (NDLINE), NDCOMP, NDDIM		

INTEGER	NDLINE,	NDRAT,	NLINE,	NMSUM
INTEGER	NRAT,	NTDIM		
LOGICAL	LPEC	(NDLINE, NDCOMP)		
REAL*8	DENS	(NDDIM), DENS	(NDDIM)	
REAL*8	FPABUN	(NTDIM, NDDIM, IMDIM)		
REAL*8	GCFEQ	(NTDIM, NDDIM, NDLINE)		
REAL*8	GCFPEQ	(NTDIM, NDDIM, NDLINE, NDCOMP)		
REAL*8	PECA	(NTDIM, NDDIM, NDLINE, NDCOMP)		
REAL*8	RATA	(NTDIM, NDDIM, NDRAT)		