

ADAS Subroutine spfman11

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SUBROUTINE SPFMAN11 (Z0, Z, Z1, IIGRP0, IRGRP0, TITLE,  
& ACIA, BCIA, ACRA, BCRA,  
& ISHE, IRES, INS1, ILS1, ES1, IZS1, INS2,  
& ILS2, ES2, IZS2, ER1, ER2, WR1, WR2,  
& IIFTYP, IIOTYP, IIFOUT, IXMAX, ITMAX, XDAT, EDAT, TDAT,  
& IOP, ASCL,  
& XA, YA, APA, XP, YP, TOA, YOA, YOAP,  
& NITHR, NRTHR, CIA, CRA, NA, LA,  
& EIONA, IZETAA, ENERA, WGHTA, EMIN)  
  IMPLICIT REAL*8 (A-H, O-Z)
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C-----  
C  
C *****      FORTRAN 77 PROGRAM:   SPFMAN11 *****  
C  
C  
C PURPOSE: FIT IONISATION CROSS-SECTION DATA WITH SIMPLE APPROXIMATE  
C FORMS AND TO CALCULATE IONISATION RATE COEFFICIENTS  
C  
C THE APPROXIMATE FORM ADOPTED IS A SUM OF TERMS ARISING FROM EACH  
C SHELL OF THE BCHID TYPE + A SUM OF TERMS OF EXCITATION CROSS-SECTION  
C FORM. THE LATTER SEEK TO REPRESENT SHARP ABOVE THRESHOLD AUTOIONISING  
C FEATURES. SCALING FACTORS ARE ASSIGNED TO AT MOST TWO SHELL GROUPS  
C (A GROUP FOR EXAMPLE BEING L-SHELLS OF THE SAME N) AND TWO RESONANCE  
C GROUPS. THE SCALING FACTORS ARE OBTAINED BY LEAST SQUARE FITTING TO  
C THE OBSERVED DATA.  
C  
C DATA:  
C     THIS PROGRAM IS NOT YET PROPERLY ANNOTATED  
C  
C INPUT:  
C     (R*8)  Z0      = NUCLEAR CHARGE OF ION  
C     (R*8)  Z       = INITIAL ION CHARGE  
C     (R*8)  Z1      = FINAL ION CHARGE  
C     (I*4)  IIGRP0 = NO. OF SHELL GROUPS  
C     (I*4)  IRGRP0 = NO. OF RESONANCE GROUPS  
C     (C*40) TITLE  = TITLE FOR THIS RUN  
C     (R*8)  ACIA   = SCALING PARAMETER FOR SHELL GROUP 1  
C     (R*8)  BCIA   = SCALING PARAMETER FOR SHELL GROUP 2  
C     (R*8)  ACRA   = SCALING PARAMETER FOR RESONANCE GROUP 1  
C     (R*8)  BCRA   = SCALING PARAMETER FOR RESONANCE GROUP 2  
C     (I*4)  ISHE() = NO. OF ENTRIES FOR EACH SHELL GROUP (1-6)  
C     (I*4)  IRES() = NO. OF ENTRIES FOR EACH RESONANCE GROUP (1-6)  
C     (I*4)  INS1() = SHELL GROUP 1 DATA: N  
C     (I*4)  ILS1() = SHELL GROUP 1 DATA: L  
C     (R*8)  ES1()  = SHELL GROUP 1 DATA: EION(RYD)  
C     (I*4)  IZS1() = SHELL GROUP 1 DATA: IZETA  
C     (I*4)  INS2() = SHELL GROUP 2 DATA: N  
C     (I*4)  ILS2() = SHELL GROUP 2 DATA: L  
C     (R*8)  ES2()  = SHELL GROUP 2 DATA: EION(RYD)  
C     (I*4)  IZS2() = SHELL GROUP 2 DATA: IZETA  
C     (R*8)  ER1()  = RESONANCE GROUP 1 DATA: ENERGY(RYD)  
C     (R*8)  ER2()  = RESONANCE GROUP 2 DATA: ENERGY(RYD)
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C      (R*8)  WR1()  = RESONANCE GROUP 1 DATA: WEIGHT
C      (R*8)  WR2()  = RESONANCE GROUP 2 DATA: WEIGHT
C      (I*4)  IIFTYP = ENERGY PARAMETER FORM
C              1 : INCIDENT ENERGY (RYD)
C              2 : INCIDENT ENERGY (EV)
C              3 : X THRESHOLD PARAMETER
C      (I*4)  IIOTYP = CROSS-SECTIONAL FORM
C              1 : X-SECT. (PI*A0**2)
C              2 : X-SECT. (CM**2)
C              3 : COLLISION STRENGTH (OMEGA)
C              4 : SCALED COLLISION STRENGTH ((Z**2)*OMEGA)
C      (I*4)  IIFOUT = OUTPUT TEMPERATURE FORM
C              1 : KELVIN
C              2 : EV
C              3 : SCALED UNITS (TE(K)/(Z1**2))
C      (I*4)  IXMAX  = NUMBER OF X-SECT./ENERGY PAIRS
C      (I*4)  ITMAX  = NUMBER OF TEMPS.
C      (R*8)  XDAT() = X-SECTION DATA
C      (R*8)  EDAT() = ENERGY DATA
C      (R*8)  TDAT() = TEMPERATURE DATA
C      (I*4)  IOP    = USE DEFAULT SCALING PARAMS? (1 = YES, 0 = NO)
C      (R*8)  ASCL  = GRAPHIC SCALING PARAMETER
C
C  OUTPUT:
C      (R*8)  XA()   = SCALED ENERGY
C      (R*8)  YA()   = OMEGA
C      (R*8)  APA()  = APPROXIMATE OMEGA
C      (R*4)  XP()   = SCALED ENERGY RESONANCE POINTS
C      (R*4)  YP()   = OMEGA OF RESONANCE POINTS
C      (R*8)  TOA()  = TEMP (KELVIN)
C      (R*8)  YOA()  = S, MAXWELL AVERAGED IONISATION RATE COEFF.(CM^3 S^-1)
C      (R*8)  YOAP() = SEM, APPROXIMATE RATE COEFF.
C      (I*4)  NITHR  = NUMBER OF RESONANCES
C      (I*4)  NRTHR  = NUMBER OF EXTRA (?) RESONANCES
C      (R*8)  CIA()  = OUTPUT SCALING PARAMS
C      (R*8)  CRA()  = OUTPUT SCALING PARAMS
C      (I*4)  NA(,)  = SHELL GROUP DATA : N
C      (I*4)  LA(,)  = SHELL GROUP DATA : L
C      (R*8)  EIONA(,) = SHELL GROUP DATA : EION(RYD)
C      (I*4)  IZETAA(,) = SHELL GROUP DATA : IZETA
C      (R*8)  ENERA(,) = RESONANCE GROUP DATA : ENERGY (RYD)
C      (R*8)  WGHTA(,) = RESONANCE GROUP DATA : WEIGHT
C
C  AUTHOR:
C
C  ***** H.P.SUMMERS, JET          1 JULY 1987 *****
C  ***** J.SPENCE, JET           JULY 1987 *****
C  *** COR                          30 OCT 1989          ***
C
C  UPDATE : 30/4/92 W DICKSON - ADD PARAMETER NDTEM AND SET TO 30
C                          ALTER OUTPUT TEMP PANEL ACCORDINGLY
C
C  UPDATE : 7/5/92 W DICKSON - ADJUST OUTPUT TO INCLUDE TEMPERATURE

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C                                  IN EV, AND FORMAT AS SZD FILE
C
C-----
C
C UNIX-IDL CONVERSION:
C
C VERSION: 1.1                      DATE: 23-08-96
C MODIFIED: WILLIAM OSBORN
C           - FIRST CONVERTED.
C           - MADE INTO A SUBROUTINE. COMMENTED-OUT PANEL INPUT
C             AND GRAPHICAL ROUTINES.
C
C VERSION: 1.2                      DATE: 03-10-96
C MODIFIED: WILLIAM OSBORN
C           - ALLOWED ISTOP = 5 FROM XXSIM TO GIVE NO ERROR
C
C VERSION: 1.3                      DATE: 08-10-96
C MODIFIED: WILLIAM OSBORN
C           - LET YAT BE YA WEIGHTED BY X1 TO AGREE WITH NAG VERSION,
C             IT WAS UNWEIGHTED
C
C VERSION: 1.4                      DATE: 08-10-96
C MODIFIED: WILLIAM OSBORN
C           - ADDED NA AND LA TO PARAMETERS
C
C VERSION 1.5 DATE: 14/02/97
C MODIFIED: RICHARD MARTIN
C   - ADDED STATEMENTS '136 CONTINUE' AND '146 CONTINUE'
C     IMMEDIATELY AFTER '135 CONTINUE' AND '145 CONTINUE'
C   - CHANGED 'GOTO 135' TO 'GOTO 136' ETC..
C
C VERSION: 1.6 DATE: 15/05/07
C MODIFIED: Allan Whiteford
C           - Updated comments as part of subroutine
C             documentation production.
C
C-----

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CHARACTER*40	TITLE			
INTEGER	IIFOUT,	IIFTYP,	IIGRP0,	IIOTYP
INTEGER	ILS1(6),	ILS2(6),	INS1(6),	INS2(6)
INTEGER	IOP,	IRES(2),	IRGRP0,	ISHE(2)
INTEGER	ITMAX,	IXMAX,	IZETAA(6,2),	IZS1(6)
INTEGER	IZS2(6),	LA(6,2),	NA(6,2),	NITHR
INTEGER	NRTHR			
REAL*8	ACIA,	ACRA,	APA(40),	ASCL
REAL*8	BCIA,	BCRA,	CIA(2),	CRA(2)
REAL*8	EDAT(40),	EIONA(6,2),	EMIN	
REAL*8	ENERA(6,2),	ER1(6),	ER2(6),	ES1(6)
REAL*8	ES2(6),	TDAT(NDTEM),	TOA(NDTEM)	
REAL*8	WGHTA(6,2),	WR1(6),	WR2(6),	XA(40)
REAL*8	XDAT(40)			
REAL	XP(12)			

REAL*8	YA(40),	YOA(NDTEM),	YOAP(NDTEM)
REAL	YP(12)		
REAL*8	Z,	Z0,	Z1