ADAS Subroutine burgfs

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      SUBROUTINE BURGFS(MAXT,TEA,ALFO,ALFGF,Z1,N0,V0,
     &NI,LI,WI,NJ,LJ,WJ,EIJ,F,EDISPG,SCALEG,PHFRAC,CORFAC,IOPT)
      IMPLICIT REAL*8(A-H,O-Z)
C-----------------------------------------------------------------------
C  PURPOSE: TO PROVIDE BURGESS GENERAL FORMULA RESULTS AT A SERIES OF
C  TEMPERATURES, AND ALSO TO PRODUCE BURGESS GENERAL PROGRAM RESULTS AT
C  ZERO DENSITY AT THE SAME TEMPERATURES.
C
C  THE LATTER ARE ADJUSTED TO EQUAL THE GENERAL FORMULA RESULTS AS FAR
C  AS POSSIBLE BY MODIFICATION OF BETHE CORRECTIONS VIA A SINGLE
C  SCALING PARAMETER CORFAC AND BY ADJUSTMENT OF THE PROPORTION OF THE
C  LOWEST LEVEL CAPTURE ALLOWED BASED ON AVAILABLE PHASE SPACE OF
C  OCCUPIED SHELLS ARGUMENTS VIA THE PARAMETER PHFRAC. THE CORRECTION
C  FACTORS USED IN THE GENERAL PROGRAM ARE OBTAINED BY ADJUSTMENT OF
C  STANDARD SETS FOR SPECIFIC TYPES OF TRANSITION.  THE ADJUSTMENT IS
C
C    (NEW COR(J))=EXP(-CORFAC/(L**DF+0.5))*(STANDARD COR(J)
C  THE STANDARD COR'S ARE AS FOLLOWS:
C   TYPE    TRANSITION                      COR'S                      DF
C     1   NI=1,NJ>=2,LJ=LI+1:       0.05,0.30,0.50,0.90              2.0
C     2   NI=2,NJ=3,LJ=LI+1:        0.01,0.02,0.20,0.40,0.70,0.90    1.0
C     3   NI=2,NJ=3,LJ=LI-1:        0.01,0.01,0.01,0.08,0.30,0.70    1.0
C     4   NJ-NI=0, LJ=LI+1 :        0.30,0.35,0.40,0.45,0.70,0.90    0.5
C     5   NJ-NI=0, LJ=LI-1 :        0.30,0.35,0.40,0.45,0.70,0.90    0.5
C     6   NJ-NI>0, LJ=LI+1 :        0.01,0.02,0.20,0.40,0.70,0.90    1.0
C     7   NJ-NI>0, LJ=LI-1 :        0.01,0.01,0.01,0.08,0.30,0.70    1.0
C  ********** H.P. SUMMERS, JET          11 JUNE 1987  ***************
C  ********** W. DICKSON, JET   CORR.    14 DEC  1987  ***************
C  INPUT
C      MAXT=NUMBER OF TEMPERATURES
C      TEA(I)=ELECTRON TEMPERATURES (K)
C      Z1=RECOMBINING ION CHARGE
C      N0=LOWEST ACCESSIBLE N-SHELL BY RECOMBINATION
C      V0=EFFECTIVE PRINCIPAL QUANTUM NUMBER OF LOWEST ACCESSIBLE SHELL
C      NI=LOWER PRINCIPAL QUANTUM NUMBER OF PARENT TRANSITION
C      LI=LOWER ANGULAR QUANTUM NUMBER OF PARENT TRNASITION.
C      WI=LOWER PARENT STATE STATISTICAL WEIGHT.
C      NJ=UPPER PRINCIPAL QUANTUM NUMBER OF PARENT TRANSITION
C      LJ=UPPER ANGULAR QUANTUM NUMBER OF PARENT TRNASITION.
C      WJ=UPPER PARENT STATE STATISTICAL WEIGHT.
C      EIJ=PARENT TRANSITION ENERGY (RYD)
C      FIJ=ABSORPTION OSCILLATOR STRENGTH OF PARENT TRANSITION
C      EDISPG=UNIFORM ENERGY DISPLACEMENT FOR GENERAL FORMULA
C      SCALEG=UNIFORM SCALING OF GENERAL FORMULA
C      PHFRAC=INITIAL ESTIMATE OF PHASE SPACE FACTOR
C      CORFAC=INITIAL ESTIMATE OF BETHE CORRECTION SCALER
C      IOPT=1  RETURNS GENERAL FORMULA RESULTS ONLY.
C          =2  RETURNS GENERAL FORMULA AND PROGRAM RESULTS WITH THE
C              THE INITIAL VALUE OF CORFAC USED.
C          =3  RETURNS GENERAL FORMULA AND PROGRAM RESULTS WITH
C              CORFAC ADJUSTED TO GIVE AGREEMENT BETWEEN THE TWO.
C  OUTPUT
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C      ALFO(I)=GENERAL PROGRAM DIELECTRONIC COEFFICIENTS (CM+3 SEC-1)
C      ALFGFA(I)=GENERAL FORMULA DIELECTRONIC COEFFICIENTS
C      PHFRAC=REVISED PHASE SPACE FACTOR
C      CORFAC=REVISED BETHE CORRECTION SCALER
C-----------------------------------------------------------------------
C IDL-UNIX CONVERSION:
C
C  VERSION: 1.1                                          DATE: 01/10/96
C  MODIFIED:  WILLIAM OSBORN
C           - FIRST WRITTEN. NO CHANGES.
C
C  VERSION: 1.2                                          DATE: 15/05/07
C  MODIFIED:  Allan Whiteford
C           - Updated comments as part of subroutine
C             documentation production.
C
C-----------------------------------------------------------------------
      INTEGER             IOPT,        LI,          LJ,          MAXT
      INTEGER             N0,          NI,          NJ
      REAL*8              ALFGF(10),   ALFO(10),    CORFAC,      EDISPG
      REAL*8              EIJ,         F,           PHFRAC,      SCALEG
      REAL*8              TEA(10),     V0,          WI,          WJ
      REAL*8              Z1
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