ADAS Subroutine b3leve

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          SUBROUTINE B3LEVE( NDLEV , IZDIMD,
     &                       IZMAX , Z1A   , IZA   , IZ0A  , IZ1A,
     &                       BWNOA , IL    ,
     &                       IA    , NA    , WAA   ,
     &                       IZS   , IZ0   ,
     &                       BWNO  , WAO )
C
C-----------------------------------------------------------------------
C
C  ****************** FORTRAN77 SUBROUTINE: B3LEVE *********************
C
C  PURPOSE:  TO EVALUATE IONISATION AND LEVEL ENERGIES FOR A SELECTED
C            MEMBER OF AN ISOELECTRONIC SEQUENCE FROM THE GENERAL Z DATA
C
C  CALLING PROGRAM: ADAS203
C
C  DATA:
C
C          THE UNITS USED IN THE DATA FILE ARE TAKEN AS FOLLOWS:
C
C          IONISATION POTENTIAL: WAVE NUMBER (CM-1)
C          INDEX LEVEL ENERGIES: WAVE NUMBER (CM-1)
C
C
C  SUBROUTINE:
C
C          (I*4)  NDSPLN = PARAMETER = MAXIMUM NUMBER OF SPLINE KNOTS
C
C  INPUT : (I*4)  NDLEV  = MAXIMUM NUMBER OF LEVELS THAT CAN BE READ
C  INPUT : (I*4)  IZDIMD = MAX. NUMBER OF SEQUENCE MEMBERS ALLOWED
C
C  INPUT : (I*4)  IZMAX  = NUMBER OF SEQUENCE MEMBERS
C  INPUT : (R*8)  Z1A()  = SEQUNCE RECOMBINING ION CHARGES READ
C                          1ST DIMENSION - SEQUENCE MEMBER INDEX
C  INPUT : (I*4)  IZA()  = SEQUENCE RECOMBINED ION CHARGES
C                          1ST DIMENSION - SEQUENCE MEMBER INDEX
C  INPUT : (I*4)  IZ0A() = SEQUENCE NUCLEAR CHARGES
C                          1ST DIMENSION - SEQUENCE MEMBER INDEX
C  INPUT : (I*4)  IZ1A() = SEQUNCE RECOMBINING ION CHARGES READ
C                          1ST DIMENSION - SEQUENCE MEMBER INDEX
C                          (NOTE: IZ1 SHOULD EQUAL IZ+1)
C  INPUT : (R*8)  BWNOA() = IONISATION POTENTIALS (CM-1)
C                          1ST DIMENSION - SEQUENCE MEMBER INDEX
C
C  INPUT : (I*4)  IL     = INPUT DATA FILE: NUMBER OF ENERGY LEVELS
C
C  INPUT : (I*4)  IA()   = ENERGY LEVEL INDEX NUMBER
C  INPUT : (I*4)  NA()   = PRINCIPAL QUANTUM NUMBER OF VALENCE ELECTRON
C  INPUT : (R*8)  WAA()  = ENERGY RELATIVE TO LEVEL 1 (CM-1) FOR LEVEL
C                          'IA()'
C                          1ST DIMENSION - LEVEL INDEX
C                          2ND DIMENSION - SEQUENCE MEMBER INDEX
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C  INPUT : (I*4)  IZS     = NUCLEAR CHARGE OF NEUTRAL SEQUENCE MEMBER
C  INPUT : (I*4)  IZ0     = NUCLEAR CHARGE OF SELECTED ION
C
C  OUTPUT: (R*8)  BWNO    = IONISATION ENERGY OF SELECTED ION (CM-1)
C  OUTPUT: (R*8)  WAO()   = LEVEL ENERGIES RELATIVE TO LOWEST (CM-1)
C
C          (I*4)  I       = GENERAL USE.
C          (I*4)  IENDN   = SPLINE END CONDITION SWITCH AT LAST POINT
C          (I*4)  IEND1   = SPLINE END CONDITION SWITCH AT FIRST POINT
C          (I*4)  IFORMS  = SPLINE INDEPENDENT VARIABLE FORM SWITCH
C          (I*4)  K       = GENERAL USE.
C
C          (R*8)  C1(,)   = 1ST SPLINE COEFFICIENT MATRIX
C          (R*8)  C2(,)   = 2ND SPLINE COEFFICIENT MATRIX
C          (R*8)  C3(,)   = 3RD SPLINE COEFFICIENT MATRIX
C          (R*8)  C4(,)   = 4TH SPLINE COEFFICIENT MATRIX
C          (R*8)  DY      = GRADIENT OF SPLINE AT POINT
C          (R*8)  ENI     = LEVEL PRINCIPAL QUANTUM NUMBER
C          (R*8)  EN1     = LOWEST LEVEL PRINCIPAL QUANTUM NUMBER
C          (R*8)  E1I     = LEVEL ENERGY (RYDBERGS)
C          (R*8)  B3FORM  = EXTERNAL FUNCTION (SEE SUBROUTINE SECTION)
C          (R*8)  REN     = GENERAL USE
C          (R*8)  XI      = GENERAL USE
C          (R*8)  XSA()   = SPLINE INDEPENDENT VARIABLE AT KNOTS
C          (R*8)  Y       = SPLINE INTERPOLATED VALUE
C          (R*8)  YSA()   = SPLINE DEPENDENT VARIABLE AT KNOTS
C          (R*8)  Z1      = CURRENT ION CHARGE +1
C
C ROUTINES:
C          ROUTINE    SOURCE    BRIEF DESCRIPTION
C          -------------------------------------------------------------
C          B2GSPC     ADAS      GENERATES SPLINE COEFFICIENT MATRICES
C          B2NFAS     ADAS      SETS SPLINE ASYMPTOTIC CONDITIONS
C          B3FORM     ADAS      INDEPENDENT VARIABLE FUNCTION FOR SPLINE
C          B2SORT     ADAS      SORTS VECTOR INTO INCREASING ORDER
C
C AUTHOR: H. P. SUMMERS, JET
C         K1/1/57
C         JET EXT. 4941
C
C DATE:   08/01/95
C
C UNIX-IDL PORT:
C
C VERSION: 1.1                              DATE: 20-03-96
C MODIFIED: TIM HAMMOND (TESSELLA SUPPORT SERVICES PLC)
C                  - PUT UNDER S.C.C.S. CONTROL
C                  - REPLACED CALLS TO NSORT ROUTINE WITH CALLS TO B2SORT.
C                    NSORT IS USED TO SORT A REAL ARRAY AND ASSOCIATED
C                    INTEGER ARRAY WHEREAS WHAT WAS BEING PASSED TO IT WAS
C                    A REAL ARRAY AND ANOTHER, ASSOCIATED REAL ARRAY. B2SORT
C                    TAKES 2 REAL ARRAYS AS INPUT AND PERFORMS A BUBBLE SORT
C                    ON THEM.
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C
C VERSION: 1.2                        DATE: 23-04-07
C MODIFIED: ALLAN WHITEFORD
C            - RENAMED FORM SUBROUTINE TO B3FORM.
C
C-------------------------------------------------------------------
      INTEGER            IA(NDLEV),    IL,          IZ0
      INTEGER            IZ0A(IZDIMD),              IZ1A(IZDIMD)
      INTEGER            IZA(IZDIMD),  IZDIMD,      IZMAX,       IZS
      INTEGER            NA(NDLEV),    NDLEV
      REAL*8             BWNO,         BWNOA(IZDIMD)
      REAL*8             WAA(NDLEV,IZDIMD),         WAO(NDLEV)
      REAL*8             Z1A(IZDIMD)
```