ADAS Subroutine c6qeik

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      SUBROUTINE C6QEIK( MXNSHL , MXJSHL , MXBEAM , IZ1     ,
     &                   IDONOR , NBOT   , NTOP   , NBEAM   ,
     &                   BMENA  , BMFRA  , QTHCH  , FTHCHJ
     &                 )
C
C
C-------------------------------------------------------------------
C
C  ****************** FORTRAN77 SUBROUTINE: C6QEIK ********************
C
C  PURPOSE:  USES THE EIKONIAL APPROXIMATION TO CALCULATE THE
C            THEORETICAL CHARGE EXCHANGE RATE COEFFICIENTS TO N SHELLS
C            AND THE NLJ FRACTIONS FROM NEUTRAL HYDROGEN OR HELIUM IN
C            GROUND OR EXCITED STATE TO A BARE NUCLEUS TARGET.
C
C  CALLING PROGRAM: ADAS306
C
C  INPUT : (I*4)  MXNSHL   = MAXIMUM NO. OF N SHELLS.
C  INPUT : (I*4)  MXJSHL   = MAXIMUM NO. OF J SUB-SHELLS.
C  INPUT : (I*4)  MXBEAM   = MAXIMUM NO. OF BEAM ENERGIES.
C  INPUT : (R*8)  IZ1      = CHARGE OF TARGET ION.
C  INPUT : (I*4)  IDONOR   = DONOR STATE FOR EIKONAL MODEL.
C                               1 = H(1S)    DONOR
C                               2 = H(2S)    DONOR
C                               3 = H(2P)    DONOR
C                               4 = H(1S2)   DONOR
C                               5 = HE(1S2S) DONOR
C  INPUT : (I*4)  NBOT     = MINIMUM PRINCIPAL QUANTUM NUMBER.
C  INPUT : (I*4)  NTOP     = MAXIMUM PRINCIPAL QUANTUM NUMBER.
C  INPUT : (I*4)  NBEAM    = NUMBER OF BEAM ENERGIES.
C  INPUT : (R*8)  BMENA()  = BEAM ENERGY COMPONENTS.
C                            UNITS: EV/AMU
C                            DIMENSION: COMPONENT INDEX.
C  INPUT : (R*8)  BMFRA()  = BEAM COMPONENT FRACTIONS.
C                            DIMENSION: COMPONENT INDEX.
C
C  OUTPUT: (R*8)  QTHCH()  = MEAN RATE COEFFICIENTS FOR N-LEVELS
C                            AVERAGED OVER BEAM FRACTIONS.
C                            UNITS: CM3 SEC-1
C                            DIMENSION: REFERENCED BY N QUANTUM NUMBER.
C  OUTPUT: (R*8)  FTHCHJ(,) = MEAN RATE COEFFICIENTS FOR NLJ-LEVELS
C                            AVERAGED OVER BEAM FRACTIONS. EXPRESSED AS
C                            FRACTIONS OF CORRESPONDING N-LEVELS.
C                            1ST DIMENSION: J SUB-SHELL
C                                           1 => J=L+0.5
C                                           2 => J=L-0.5
C                            2ND DIMENSION: REFERENCED BY I4IDFL(N,L)
C
C  PARAM : (I*4)  MXN      = 'MXNSHL'.
C
C          (I*4)  N        = N-SHELL INDEX.
C          (I*4)  L        = L-SHELL INDEX.
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C           (I*4)   J          = J-SHELL INDEX.
C           (I*4)   IDL        = L-RESOLVED INDEX.
C
C           (R*8)   XL         = REAL VALUE = L.
C           (R*8)   WL         =
C
C           (R*8)   FTHCH()    = MEAN RATE COEFFICIENTS FOR NL-LEVELS
C                                AVERAGED OVER BEAM FRACTIONS. EXPRESSED AS
C                                FRACTIONS OF CORRESPONDING N-LEVELS.
C                                DIMENSION: REFERENCED BY I4IDFL(N,L)
C
C ROUTINES:
C           ROUTINE    SOURCE    BRIEF DESCRIPTION
C           ------------------------------------------------------------
C           I4UNIT     ADAS      RETURNS UNIT NO. FOR OUTPUT OF MESSAGES.
C           I4IDFL     ADAS      RETURNS UNIQUE INDEX GIVEN QUANTUM
C                                NUMBERS N AND L.
C           CXQEIK     ADAS      CALCULATES N-LEVEL AND NL-LEVEL CHARGE
C                                EXCHANGE RATE COEFFICIENTS USING EIKONAL
C                                APPROX. NL RATES ARE GIVEN AS FRACTION
C                                OF CORRESPONDING N RATE.
C
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C
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C
C UNIX-IDL PORT:
C
C AUTHOR:  WILLIAM OSBORN (TESSELLA SUPPORT SERVICES PLC)
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C VERSION: 1.1                          DATE: 22-05-96
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C              - Fixed typo in comments
C
C-------------------------------------------------------------------
C
C-------------------------------------------------------------------
      INTEGER           IDONOR,      IZ1,        MXBEAM,      MXJSHL
      INTEGER           MXNSHL,      NBEAM,      NBOT,        NTOP
      REAL*8            BMENA(MXBEAM),           BMFRA(MXBEAM)
      REAL*8            FTHCHJ(MXJSHL,(MXNSHL*(MXNSHL+1))/2)
      REAL*8            QTHCH(MXNSHL)
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