ADAS Subroutine c6qxch

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      SUBROUTINE C6QXCH ( MXNENG , MXNSHL , MXJSHL , MXBEAM ,
     &                    NBEAM  , BMENA  , BMFRA  , NBOT   ,
     &                    NTOP   , NMINF  , NMAXF  , NENRGY ,
     &                    ENRGYA , ALPHAA , XSECNA , FRACLA ,
     &                    QTHCH  , FTHCHJ
     &                  )
C
C
C-----------------------------------------------------------------------
C
C  ****************** FORTRAN77 SUBROUTINE: C6QXCH ********************
C
C  PURPOSE:  USES THE INPUT DATASET TO CALCULATE THE CHARGE EXCHANGE
C            RATE COEFFICIENTS FOR BOTH N-LEVELS AND NLJ-LEVELS AVERAGED
C            OVER THE BEAM FRACTIONS.
C
C            NLJ-LEVEL RATES ARE EXPRESSED AS A FRACTION OF
C            CORRESPONDING N-LEVEL.
C
C  CALLING PROGRAM: ADAS306
C
C  INPUT : (I*4)  MXNENG   = MAXIMUM NO. OF ENERGIES.
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 : (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  INPUT : (I*4)  NBOT     = MINIMUM PRINCIPAL QUANTUM NUMBER.
C  INPUT : (I*4)  NTOP     = MAXIMUM PRINCIPAL QUANTUM NUMBER.
C  INPUT : (I*4)  NMINF    = MINIMUM PRINCIPAL QUANTUM NUMBER OF INPUT
C                           DATASET.
C  INPUT : (I*4)  NMAXF    = MAXIMUM PRINCIPAL QUANTUM NUMBER OF INPUT
C                           DATASET.
C  INPUT : (I*4)  NENRGY   = NUMBER OF ENERGIES IN DATASET.
C  INPUT : (R*8)  ENRGYA() = COLLISION ENERGIES.
C                           UNITS: EV/AMU
C                           DIMENSION: ENERGY INDEX
C  INPUT : (R*8)  ALPHAA() = EXTRAPOLATION PARAMETER ALPHA.
C                           DIMENSION: ENERGY INDEX
C  INPUT : (R*8)  XSECNA(,) = N-RESOLVED CHARGE EXCHANGE CROSS-SECTIONS.
C                           UNITS: CM2
C                           1ST DIMENSION: ENERGY INDEX
C                           2ND DIMENSION: N-SHELL
C  INPUT : (R*8)  FRACLA(,) = L-RESOLVED CHARGE EXCHANGE CROSS-SECTIONS
C                           EXPRESSED AS FRACTION OF CORRESPONDING
C                           N-RESOLVED CROSS-SECTION.
C                           1ST DIMENSION: ENERGY INDEX
C                           2ND DIMENSION: REFERENCED BY I4IDFL(N,L)
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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.
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          CXQXCH     ADAS      CALCULATES N-LEVEL AND NL-LEVEL CHARGE
C                               EXCHANGE RATE COEFFICIENTS USING INPUT
C                               DATASET. NL RATES ARE GIVEN AS FRACTION
C                               OF CORRESPONDING N RATE.
C
C AUTHOR: JONATHAN NASH (TESSELLA SUPPORT SERVICES PLC)
C         K1/0/81
C         JET EXT. 5183
C
C DATE:   22/10/93
C
C UNIX-IDL PORT:
C
C AUTHOR: WILLIAM OSBORN (TESSELLA SUPPORT SERVICES PLC)
C
C DATE:   22ND MAY 1996
C
C VERSION: 1.1                          DATE: 22-05-96
C MODIFIED: WILLIAM OSBORN
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C                   - FIRST VERSION. IBM VERSION NOT CHANGED
C
C VERSION: 1.2                          DATE: 17-05-07
C MODIFIED: Allan Whiteford
C                   - Updated comments as part of subroutine documentation
C                     procedure.
C-----------------------------------------------------------------------
C
C-----------------------------------------------------------------------
        INTEGER          MXBEAM,      MXJSHL,      MXNENG,      MXNSHL
        INTEGER          NBEAM,       NBOT,        NENRGY,      NMAXF
        INTEGER          NMINF,       NTOP
        REAL*8           ALPHAA(MXNENG),          BMENA(MXBEAM)
        REAL*8           BMFRA(MXBEAM),           ENRGYA(MXNENG)
        REAL*8           FRACLA(MXNENG, (MXNSHL*(MXNSHL+1)))/2)
        REAL*8           FTHCHJ(MXJSHL, (MXNSHL*(MXNSHL+1)))/2)
        REAL*8           QTHCH(MXNSHL)
        REAL*8           XSECNA(MXNENG,MXNSHL)
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