

ADAS Subroutine c6tbqm

```
      SUBROUTINE C6TBQM( MXNSHL , MXJSHL , IZ0      , IZ1      ,
&                      NBOT   , NTOP   , TEV     , DENS     ,
&                      ZP     , TPV    , EMP     , TBLF     ,
&                      TBQMEP , TBQMEM , TBQMIP , TBQMIM
&                      )
```

C
C

C-----

C

C ***** FORTRAN77 SUBROUTINE: C6TBQM *****

C

C PURPOSE: SETS UP TABLES OF ELECTRON AND POSITIVE ION COLLISIONAL
C RATE COEFFICIENTS BETWEEN NEARLY DEGENERATE LEVELS FOR
C H-, LI-, AND NA-LIKE IONS.

C

C THE RATES FOR THE SEPARATE TRANSITIONS NLJ->NL+1J' AND
C NLJ->NL-1J' ARE OBTAINED.

C

C CALLING PROGRAM: ADAS306

C

C INPUT : (I*4) MXNSHL = MAXIMUM VALUE OF PRINCIPAL QUANTUM NUMBER.

C INPUT : (I*4) MXJSHL = MAXIMUM NUMBER OF J SUB-SHELLS.

C INPUT : (I*4) IZ0 = NUCLEAR CHARGE OF TARGET ION.

C INPUT : (I*4) IZ1 = ION CHARGE.

C INPUT : (I*4) NBOT = MINIMUM PRINCIPAL QUANTUM NUMBER.

C INPUT : (I*4) NTOP = MAXIMUM PRINCIPAL QUANTUM NUMBER.

C INPUT : (R*8) TEV = ELECTRON TEMPERATURE.

C UNITS: EV

C INPUT : (R*8) DENS = ELECTRON DENSITY.

C UNITS: CM-3

C INPUT : (R*8) ZP = CHARGE OF COLLIDING POSITIVE ION.

C INPUT : (R*8) TPV = TEMPERATURE (COLLIDING POSITIVE ION
C DISTRIBUTION).

C UNITS: EV

C INPUT : (R*8) EMP = REDUCED MASS FOR COLLIDING POSITIVE ION.

C UNITS: ELECTRON MASSES

C INPUT : (R*8) ZP = CHARGE OF COLLIDING POSITIVE ION.

C INPUT : (R*8) TPV = POSITIVE ION TEMPERATURE.

C UNITS: EV

C INPUT : (R*8) EMP = REDUCED MASS FOR COLLIDING POSITIVE ION.

C UNITS: ELECTRON MASSES

C INPUT : (R*8) TBLF() = TABLE OF RADIATIVE LIFETIMES.

C UNITS: SECS

C DIMENSION: REFERENCED BY FUNC I4IDFL(N,L).

C

C OUTPUT: (R*8) TBQMEP(,) = ELECTRON RATE COEFFT. FOR NLJ->NL+1J'.

C 1ST DIMENSION: J->J' TRANSITION INDEX.

C 2ND DIMENSION: REFERENCED BY I4IDFL(N,L).

C OUTPUT: (R*8) TBQMEM(,) = ELECTRON RATE COEFFT. FOR NLJ->NL-1J'.

C 1ST DIMENSION: J->J' TRANSITION INDEX.

C 2ND DIMENSION: REFERENCED BY I4IDFL(N,L).

C OUTPUT: (R*8) TBQMIP(,) = POSITIVE ION RATE COEFFT. FOR NLJ->NL+1J'.

```

C          1ST DIMENSION: J->J' TRANSITION INDEX.
C          2ND DIMENSION: REFERENCED BY I4IDFL(N,L) .
C OUTPUT: (R*8)  TBQMIM(,) = POSITIVE ION RATE COEFFT. FOR NLJ->NL-1J' .
C          1ST DIMENSION: J->J' TRANSITION INDEX.
C          2ND DIMENSION: REFERENCED BY I4IDFL(N,L) .
C
C PARAM : (I*4)  MXJ      = 'MXJSHL' .
C
C          (I*4)  NI      = VALENCE ELECTRON PRINCIPAL QUANTUM NUMBER
C                      IN STATE I.
C          (I*4)  NJ      = VALENCE ELECTRON PRINCIPAL QUANTUM NUMBER
C                      IN STATE J.
C          (I*4)  LI      = VALENCE ELECTRON ORBITAL QUANTUM NUMBER IN
C                      STATE I.
C          (I*4)  LJ      = VALENCE ELECTRON ORBITAL QUANTUM NUMBER IN
C                      STATE J.
C          (I*4)  IDLI    = TABLE INDEX.
C          (I*4)  IDLJ    = TABLE INDEX.
C          (I*4)  I       = LOOP INDEX.
C          (I*4)  J       = LOOP INDEX.
C
C          (R*8)  GAE     = GAMA RATE PARAMETER FOR ELECTRON COLLISIONS.
C          (R*8)  GAP     = GAMA RATE PARAMETER FOR POSITIVE ION
C                      COLLISIONS.
C
C          (R*8)  QEP()   = ELECTRON RATE COEFFT. FOR NLJ->NL+1J'
C                      DIMENSION: J->J' TRANSITION INDEX.
C          (R*8)  QEM()   = ELECTRON RATE COEFFT. FOR NLJ->NL-1J'
C                      DIMENSION: J->J' TRANSITION INDEX.
C          (R*8)  QIP()   = POSITIVE ION RATE COEFFT. FOR NLJ->NL+1J'
C                      DIMENSION: J->J' TRANSITION INDEX.
C          (R*8)  QIM()   = POSITIVE ION RATE COEFFT. FOR NLJ->NL-1J'
C                      DIMENSION: J->J' TRANSITION INDEX.
C
C NOTES:
C   1) THE J->J' TRANSITION INDEX IS AS FOLLOWS:
C       1 : J=L+0.5 -> J'=L'+0.5
C       2 : J=L+0.5 -> J'=L'-0.5
C       3 : J=L-0.5 -> J'=L'+0.5
C       4 : J=L-0.5 -> J'=L'-0.5
C
C   2) BEFORE CALLING C6TBQM THE LIFETIME TABLE MUST BE FILLED
C       WITH A CALL TO C6TBLF.
C
C ROUTINES:
C
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 CXCRDG       ADAS        CALCULATES COLLISIONAL RATE COEFFICIENTS
C                      BETWEEN NEARLY DEGENERATE LEVELS OF
C                      H-, LI- OR NA-LIKE IONS.

```

C
C AUTHOR: JONATHAN NASH (TESSELLA SUPPORT SERVICES PLC)
C K1/0/81
C JET EXT. 5183
C

C DATE: 02/11/93
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
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
C-----

INTEGER	IZ0,	IZ1,	MXJSHL,	MXNSHL
INTEGER	NBOT,	NTOP		
REAL*8	DENS,	EMP		
REAL*8	TBLF ((MXNSHL* (MXNSHL+1)) /2)			
REAL*8	TBQMEM (2*MXJSHL, (MXNSHL* (MXNSHL+1)) /2)			
REAL*8	TBQMEP (2*MXJSHL, (MXNSHL* (MXNSHL+1)) /2)			
REAL*8	TBQMIM (2*MXJSHL, (MXNSHL* (MXNSHL+1)) /2)			
REAL*8	TBQMIP (2*MXJSHL, (MXNSHL* (MXNSHL+1)) /2)			
REAL*8	TEV,	TPV,	ZP	