

ADAS Subroutine c9emis

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      SUBROUTINE C9EMIS ( MXNSHL , MXOBSL , MXPRSL , IZ0      ,
&                        IZ1      , NGRND  , NTOT    , NBOT    ,
&                        DENSZ    , DENS    , NOLINE  , NU      ,
&                        NL       , EMISA   , NPLINE  , NPU     ,
&                        NPL      , QTHEOR  , FTHEOR  , TBQMEP  ,
&                        TBQMEM   , TBQMIP  , TBQMIM  , NUMIN   ,
&                        NUMAX    , EM      , QEX     , TOTPOP  ,
&                        TOTEMI   , AVRGWL  , QEFF    , TBLPOP  ,
&                        TBLEMI   , TBLWLN
&                        )
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C ***** FORTRAN77 SUBROUTINE: C9EMIS *****

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C PURPOSE: PREDICTS THE L-RESOLVED EMISSIVITY FOR REQUESTED
C TRANSITIONS.

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C CALLING PROGRAM: C9CXEE

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

C INPUT : (I*4) MXOBSL = MAXIMUM NUMBER OF OBSERVED SPECTRUM LINES.

C INPUT : (I*4) MXPRSL = MAXIMUM NUMBER OF SPECTRUM LINES TO
C PREDICT.

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

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

C INPUT : (I*4) NGRND = PRINCIPAL QUANTUM NUMBER OF GROUND STATE.

C INPUT : (I*4) NTOT = PRINCIPAL QUANTUM NUMBER OF HIGHEST BOUND
C STATE.

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

C INPUT : (R*8) DENSZ = PLASMA ION DENSITY.

C UNITS: CM-3

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

C UNITS: CM-3

C INPUT : (I*4) NOLINE = NUMBER OF OBSERVED SPECTRUM LINES.

C INPUT : (I*4) NU () = LIST OF UPPER PRINCIPAL QUANTUM NUMBERS OF
C OBSERVED SPECTRUM LINES.

C DIMENSION: SPECTRUM LINE INDEX.

C INPUT : (I*4) NL () = LIST OF LOWER PRINCIPAL QUANTUM NUMBERS OF
C OBSERVED SPECTRUM LINES.

C DIMENSION: SPECTRUM LINE INDEX.

C INPUT : (R*8) EMISA () = LIST OF EMISSIVITIES OF OBSERVED SPECTRUM
C LINES.

C DIMENSION: SPECTRUM LINE INDEX.

C INPUT : (I*4) NPLINES = NUMBER OF SPECTRUM LINES TO PREDICT.

C INPUT : (I*4) NPU () = LIST OF UPPER PRINCIPAL QUANTUM NUMBERS OF
C SPECTRUM LINES TO PREDICT.

C DIMENSION: PREDICTED LINE INDEX.

C INPUT : (I*4) NPL () = LIST OF LOWER PRINCIPAL QUANTUM NUMBERS OF
C SPECTRUM LINES TO PREDICT.

C DIMENSION: PREDICTED LINE INDEX.

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C INPUT : (R*8) QTHEOR() = MEAN CHARGE EXCHANGE OR EXCITATION RATE
C COEFFICIENTS FOR N-LEVELS AVERAGED OVER
C BEAM FRACTIONS.
C UNITS: CM3 SEC-1
C DIMENSION: REFERENCED BY N QUANTUM NUMBER.
C INPUT : (R*8) FTHEOR() = MEAN CHARGE EXCHANGE OR EXCITATION RATE
C FOR NL-LEVELS AS A FRACTION OF
C CORRESPONDING N-LEVEL.
C DIMENSION: REFERENCED BY FUNC I4IDFL(N,L) .
C INPUT : (R*8) TBQMEP() = ELECTRON RATE COEFFT. FOR NL->NL+1.
C INDEX FOR NL->NL+1 TRANSITION GIVEN BY
C I4IDFL(N,L) .
C DIMENSION: REFERENCED BY FUNC I4IDFL(N,L) .
C INPUT : (R*8) TBQMEM() = ELECTRON RATE COEFFT. FOR NL+1->NL.
C INDEX FOR NL+1->NL TRANSITION GIVEN BY
C I4IDFL(N,L+1) .
C DIMENSION: REFERENCED BY FUNC I4IDFL(N,L) .
C INPUT : (R*8) TBQMIP() = POSITIVE ION RATE COEFFT. FOR NL->NL+1.
C INDEX FOR NL->NL+1 TRANSITION GIVEN BY
C I4IDFL(N,L) .
C DIMENSION: REFERENCED BY FUNC I4IDFL(N,L) .
C INPUT : (R*8) TBQMIM() = POSITIVE ION RATE COEFFT. FOR NL+1->NL.
C INDEX FOR NL+1->NL TRANSITION GIVEN BY
C I4IDFL(N,L+1) .
C DIMENSION: REFERENCED BY FUNC I4IDFL(N,L) .
C
C OUTPUT: (I*4) NUMIN = MINIMUM UPPER PRINCIPAL QUANTUM NUMBER FOR
C OBSERVED SPECTRUM LINES.
C OUTPUT: (I*4) NUMAX = MAXIMUM UPPER PRINCIPAL QUANTUM NUMBER FOR
C OBSERVED SPECTRUM LINES.
C OUTPUT: (R*8) EM = EMISSION MEASURE.
C OUTPUT: (R*8) QEX() =
C DIMENSION: MXNSHL.
C OUTPUT: (R*8) TOTPOP() = TOTAL COLLISION POP. FOR PREDICTED SPECTRUM
C LINE.
C UNITS: CM-2
C DIMENSION: PREDICTED LINE INDEX.
C OUTPUT: (R*8) TOTEMI() = TOTAL COLLISION EMISSIVITIES FOR PREDICTED
C SPECTRUM LINE.
C UNITS: PH CM-2 SEC-1
C DIMENSION: PREDICTED LINE INDEX.
C OUTPUT: (R*8) AVRGWL() = AVERAGE AIR WAVELENGTH FOR PREDICTED
C SPECTRUM LINE.
C UNITS: A
C DIMENSION: PREDICTED LINE INDEX.
C OUTPUT: (R*8) QEFF() = EFF. RATE COEFFICIENT FOR PREDICTED
C SPECTRUM LINE.
C UNITS:
C DIMENSION: PREDICTED LINE INDEX.
C OUTPUT: (R*8) TBLPOP(,) = TABLE OF COLLISION POP. FOR PREDICTED
C SPECTRUM LINE.
C UNITS: CM-2
C 1ST DIMENSION: PREDICTED LINE INDEX.

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C          2ND DIMENSION: REFERENCED BY FUNC I4IDLI().
C OUTPUT: (R*8)  TBLEMI(,) = TABLE OF COLLISION EMISSIVITIES FOR
C          PREDICTED SPECTRUM LINE.
C          UNITS: PH CM-2 SEC-1
C          1ST DIMENSION: PREDICTED LINE INDEX.
C          2ND DIMENSION: REFERENCED BY FUNC I4IDLI().
C OUTPUT: (R*8)  TBLWLN(,) = TABLE OF WAVELENGTHS FOR PREDICTED SPECTRUM
C          LINE.
C          UNITS: A
C          1ST DIMENSION: PREDICTED LINE INDEX.
C          2ND DIMENSION: REFERENCED BY FUNC I4IDLI().
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C PARAM : (I*4)  MXN      = MXNSHL.
C PARAM : (I*4)  MXOB     = MXOBSL.
C
C          (I*4)  NREP     =
C          (I*4)  IC       = LOOP INDEX.
C
C          (I*4)  ICREP()  =
C          DIMENSION: MXOB.
C
C          (R*8)  WHIGH()  =
C          DIMENSION: REFERENCED BY L+1.
C          (R*8)  WLOW(,)  =
C          1ST DIMENSION: REFERENCED BY I4IDFL(N,L).
C          2ND DIMENSION: REFERENCED BY L+1.
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C ROUTINES:
C          ROUTINE      SOURCE      BRIEF DESCRIPTION
C          -----
C          I4UNIT       ADAS        RETURNS UNIT NO. FOR OUTPUT OF MESSAGES.
C          C9WFIL       ADAS
C          C9EMQX
C          CXPRSL       ADAS        PREDICTS REQUESTED SPECTRUM LINES.
C
C AUTHOR:  JONATHAN NASH (TESSELLA SUPPORT SERVICES PLC)
C          K1/0/81
C          JET EXT. 5183
C
C DATE:    15/10/93
C
C DATE:    30/06/95 VERSION:1.1
C MODIFIED: TIM HAMMOND (TESSELLA SUPPORT SERVICES PLC)
C - UNIX PORT FOR ADAS309, CREATED C9EMIS FROM C8EMIS
C   ONLY DIFFERENCE IS IT CALLS C9WFIL RATHER THAN C8WFIL
C
C DATE:    10/07/95 VERSION:1.2
C MODIFIED: TIM HAMMOND (TESSELLA SUPPORT SERVICES PLC)
C          - CHANGED CALL FROM C8EMQX TO C9EMQX
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INTEGER	IZ0,	IZ1,	MXNSHL,	MXOBSL
INTEGER	MXPRSL,	NBOT,	NGRND	
INTEGER	NL (MXOBSL) ,	NOLINE,	NPL (MXPRSL) ,	NPLINE
INTEGER	NPU (MXPRSL) ,	NTOT,	NU (MXOBSL) ,	NUMAX
INTEGER	NUMIN			
REAL*8	AVRGWL (MXPRSL) ,		DENS,	DENSZ
REAL*8	EM,	EMISA (MXOBSL)		
REAL*8	FTHEOR ((MXNSHL* (MXNSHL+1)) / 2)			
REAL*8	QEFF (MXPRSL) ,		QEX (MXNSHL)	
REAL*8	QTHEOR (MXNSHL)			
REAL*8	TBLEMI (MXPRSL, 2*MXNSHL-3)			
REAL*8	TBLPOP (MXPRSL, 2*MXNSHL-3)			
REAL*8	TBLWLN (MXPRSL, 2*MXNSHL-3)			
REAL*8	TBQMEM ((MXNSHL* (MXNSHL+1)) / 2)			
REAL*8	TBQMEP ((MXNSHL* (MXNSHL+1)) / 2)			
REAL*8	TBQMIM ((MXNSHL* (MXNSHL+1)) / 2)			
REAL*8	TBQMIP ((MXNSHL* (MXNSHL+1)) / 2)			
REAL*8	TOTEMI (MXPRSL) ,		TOTPOP (MXPRSL)	