ADAS Subroutine ghnle

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      SUBROUTINE GHNLE(Z0,Z1,ZEFF,N,L,MULTN,N1,MULTN1,NL2,TEV,GAMA,
     *GAMTOT)
      IMPLICIT REAL*8(A-H,O-Z)
C-----------------------------------------------------------------------
C  PURPOSE: EVALUATES APPROXIMATE EXCITATION RATE PARAMETERS, GAMMA,
C  FROM N,L (SINGLET OR TRIPLET) LEVELS OF HELIUM-LIKE IONS TO
C  HIGHER LEVELS N1,L1 (SINGLET OR TRIPLET) USING CLASSICAL OVERLAPS.
C
C  FOR TRANSITIONS FROM 1S,2S AND 2P APPROXIMATE FITTINGS ARE USED BASED
C  ON SAMPSON DATA.(FOR SINGLET OR TRIPLET LEVELS)
C  FOR TRANSITIONS FROM HIGHER NL LEVELS UPWARDS A RESOLVED VARIANT
C  OF PERCIVAL-RICHARDS IS USED, WITH NUMERICAL QUADRATURES.
C  ALLOWENCE HAS BEEN MADE FOR THE EFFECT OF SPIN CHANGE.
C
C  *******   H.P. SUMMERS, JET   15 JAN. 1985  ******************
C  ******* SPENCE+SUMMERS(1985),  PAPER TO BE PUBLISHED *********
C  *******     J. SPENCE,  STRATHCLYDE    18 NOV. 1985  *********
C  INPUT
C      Z0=NUCLEAR CHARGE
C      Z1=ION CHARGE+1
C      ZEFF=EFFECTIVE ION CHARGE   (CF. SAMPSON ET AL.)
C      N=LOWER PRINCIPAL QUANTUM NUMBER
C      L=LOWER ANGULAR QUANTUM NUMBER
C      MULTN=MULTIPLICITY OF N
C      N1=UPPER PRINCIPAL QUANTUM NUMBER
C      MULTN1=MULTIPLICITY OF N1
C      NL2=INCLUSIVE LIMIT FOR THE RESOLUTION OF N INTO SEPERATE L'S.
C      TEV=ELECTRON TEMPERATURE (EV)
C  OUTPUT
C      GAMA(I),I=1,N1 IS VECTOR OF RATE PARAMETERS WITH L1=I-1 AND
C                        L1 THE UPPER ANGULAR QUANTUM NUMBER
C      GAMTOT = SUM OF GAMA(I),I=1,N1
C
C
C
C  VERSION : 1.2
C  MODIFIED: Martin O'Mullane
C  DATE    : 08-11-2004
C            Alter nmax in gamaf() from 200 to 500.
C
C  VERSION : 1.3
C  MODIFIED: Allan Whiteford
C  DATE    : 16-05-2007
C            - Updated comments as part of subroutine documentation
C              procedure.
C
C-----------------------------------------------------------------------
      INTEGER             L,           MULTN,       MULTN1,      N
      INTEGER             N1,          NL2
      REAL*8              GAMA(20),    GAMTOT,      TEV,         Z0
      REAL*8              Z1,          ZEFF
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