

ADAS Subroutine bornp1

SUBROUTINE BORNp1 (NMIN, NMAX, NLOW, LLOW, NUP, LUP, LAM, ANS, QA, IOPT,
&IMAX1)

IMPLICIT REAL*8 (A-H, O-Z)

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C-----
C  PURPOSE:  FIRST STAGE OF BORN X-SECT CALCULATION WITH DIRECTIONAL
C  BEAMS CAUSING TRANSITIONS BETWEEN HYDROGEN STARK/ZEEMAN STATES.
C
C  RADIAL INTEGRALS OF FORM  $P(N1, L1) * P(N2, L2) * J(LAM, Q * R)$  ARE EVALUATED
C  FOR ALL HYDROGENIC ORBITALS WITH  $NMIN \leq NMAX$  AND  $N1 < N2$  FOR A SET
C  OF  $Q$ 'S SPANNING THE EXTENT OF THE GENERALISED OSCILLATOR STRENGTH
C
C  CALLING ROUTINE WITH IOPT=1 PREPARES LOOKUP TABLES. CALL WITH IOPT=2
C  RETURNS VALUES.
C
C  MATRIX ELEMENT EVALUATION USES POWER SERIES ROUTINES.
C
C  STACK INTEGRALS OVER A GRID OF MOMENTUM CHANGE FROM  $10^{*-2}$  TO  $10^{*2}$ 
C  EQUALLY SPACED IN THE LOGARITHM (IMAX INTERVALS, IMAX+1 VALUES)
C
C  EVALUATE MULTIPOLES UP TO LAMMX=2
C
C  USE POINTER VECTORS FOR RAPID LOOKUP.
C
C  THE MAIN CALLING ROUTINE MUST HAVE THE LINE
C      CALL GAMAF(200)
C  BEFORE CALL TO BORNp1
C
C ***** H.P. SUMMERS, JET          17 OCT 1988 *****
C INPUT
C      NMIN=LOWEST N-SHELL
C      NMAX=HIGHEST N-SHELL
C      NLOW=LOWER N FOR SELECTED TRANSITION
C      LLOW=LOWER L FOR SELECTED TRANSITION
C      NUP=UPPER N FOR SELECTED TRANSITION
C      LUP=UPPER L FOR SELECTED TRANSITION
C      LAM=REQUIRED MULTIPOLE (0<=LAM<=LAMMX)
C      IOPT=1  PREPARE LOOKUP STACKS (ONLY NMIN, NMAX PARAMETERS USED)
C           =2  SUPPLY ANSWERS FOR SPECIFIED NLOW, LLOW, NUP, LUP, LAM CASE
C OUTPUT
C      ANS(I)=BORN APPROXIMATION RESULT FOR I=1, IMAX+1
C      QA(I)=TRANSFERED MOMENTUM VECTOR
C      IMAX1=IMAX+1
C-----
C
C ADAS305 version. Developed from JETSHP.STARK.FORT (H P Summers).
C
C VERSION   : 1.1
C DATE      : 24-02-2005
C MODIFIED  : Martin O'Mullane
C           - First version.
C           - Change dimensions from 200 to 500.
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C
C VERSION : 1.2
C DATE : 16-05-2007
C MODIFIED : Allan Whiteford
C - Updated comments as part of subroutine documentation
C procedure.
C

C-----
INTEGER IMAx1, IOPT, LAM, LLOW
INTEGER LUP, NLOW, NMAX, NMIN
INTEGER NUP
REAL*8 ANS(41), QA(41)