

ADAS Subroutine phase

REAL*8 FUNCTION PHASE (E, EL, Z, X)

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C
C PURPOSE: CALCULATES ASYMPTOTIC PHASE OF FREE COULOMB
C          REAL FUNCTION FCF4
C
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C UNIX-IDL PORT:
C
C AUTHOR:  WILLIAM OSBORN (TESSELLA SUPPORT SERVICES PLC)
C
C DATE:    4TH JULY 1996
C
C VERSION: 1.1                                DATE: 04-07-96
C MODIFIED: WILLIAM OSBORN
C          - FIRST VERSION.
C
C VERSION  : 1.2
C DATE     : 19-12-2001
C MODIFIED : Martin O'Mullane
C          - Changed function definition to a more standard form.
C          - Removed mainframe listing information beyond column 72.
C
C VERSION  : 1.3
C DATE     : 20-07-2007
C MODIFIED : Allan Whiteford
C          - Small modification to comments to allow for automatic
C            documentation preparation.
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      IMPLICIT REAL*8 (A-H,O-Z)
      L=EL+0.5
      PI=3.141592654
      ZZ=Z*Z
      CK=DSQRT (E)
      XK=X*CK
      XZ=X*Z
      C=EL*(EL+1.0)
      CHI=DSQRT (XK*XK-XZ-XZ-C)
      C1=1.0/CHI
      IF (C) 1,1,2
1  THETA=0.25/(CHI+XK)
      GO TO 8
2  T=CK*C*CHI+ZZ*X+C*Z
      T1=DABS (T)
      IF (T1-1.0D-15) 3,3,4
3  THETA =0.5*PI
      GO TO 7
4  ARG=DSQRT (C*(ZZ+E*C)*(CK*C*CHI+E*C*X+2.*ZZ*X+C*Z)/(CK*CHI+E*X-
1Z))/T
      IF (T) 5,5,6
5  THETA =PI-DATAN (-ARG)
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GOTO 7
6 THETA=DATAN (ARG)
7 THETA=THETA*(C+0.125)/DSQRT(C)
8 IF (E-1.0D-50) 9,9,10
9 PHASE=CHI+CHI+THETA-(EL+0.25)*PI-0.166666667*C1*(1.0+1.25*(XZ+C)*C
11*C1)
GO TO 11
10 A=Z/CK
B=E*C+ZZ
D=3.0*(CHI+XK)*B+ZZ*(CHI-XK)-CK*C*Z
D=(D/(24.0*B*(CHI+XK))+0.208333333*(XZ+C)*C1*C1)*C1
AG=ARGAM(L,A)
PHASE=CHI-A*DLOG(CHI+XK-A)+AG+A-0.5*PI*EL+THETA-D
11 RETURN
END
REAL*8 E, EL, X, Z

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