

ADAS Subroutine bbrint

```
subroutine bbrint( ndgnt ,  
& gaunt , vve , z1 , v ,  
& maxe , temp , dparam , dist ,  
& f , rrcint  
& )
```

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C-----  
C  
C ***** fortran77 subroutine: bbrint *****  
C  
C purpose: To calculate radiative recombination coefficient when  
C electron distribution is not Maxwellian.  
C  
C calling program: adas211  
C  
C input : (i*4) ndgnt = max no of vve gaunt pairs  
C input : (r*8) gaunt() = the bound-free gaunt factor  
C input : (r*8) vve() =  $v^{*2} * e$   
C where e=(free electron energy)/z1**2 (ryd)  
C input : (r*8) z1 = parent ion charge  
C input : (r*8) v = effective principal quantum number  
C input : (i*4) maxe = number of vve gaunt pairs  
C input : (r*8) temp = effective temperature (kelvin),  
C 2/3 * mean energy of distribution  
C input : (r*8) dparam = parameter describing distribution function:  
C kappa dist. => kappa  
C Druyvesteyn dist. => x  
C input : (i*4) dist = non-Maxwellian distribution type:  
C 1 => kappa distribution  
C 2 => numerical distribution  
C 3 => Druyvesteyn distribution  
C input : (r*8) f() = numerical distribution function at vve  
C  
C output: (r*8) rrcint = radiative recombination coefficient (cm3 sec-1)  
C  
C local : (r*8) ryd = Rydberg constant (eV)  
C local : (r*8) te = effective temperature (eV)  
C local : (r*8) ip = ionisation potential (eV)  
C local : (r*8) kek = kappa * characteristic energy of kappa dist.  
C local : (r*8) ex = characteristic energy of Druyvesteyn dist.  
C local : (r*8) alpha = fine structure constant  
C local : (r*8) c = speed of light in vacuum (cm sec-1)  
C local : (r*8) a0 = Bohr radius (cm)  
C local : (r*8) energy() = free electron energy (eV)  
C local : (r*8) int1 = integrand at energy(i)  
C local : (r*8) int2 = integrand at energy(i+1)  
C local : (r*8) de = energy difference from i to i+1  
C  
C routines:  
C routine source brief description  
C-----  
C lngama evaluates ln(gamma(x))
```

C
C author: Paul Bryans, University of Strathclyde
C
C date: 23/01/04
C
C update: 26/01/04 - Paul Bryans
C added Druyvesteyn distribution (dist = 3)
C
C update: 02/12/04 - Paul Bryans
C added numerical distribution (dist = 2)
C
C update: 02/02/05 - Allan Whiteford
C Declared i4unit as an integer.
C
C update: 20/07/07 - Allan Whiteford
C Removed comment stating that Druyvesteyn and numerical
C distributions can't be handled.
C

C-----

INTEGER	DIST,	MAXE,	NDGNT
REAL*8	DPARAM,	F(NDGNT),	GAUNT(NDGNT)
REAL*8	RRCINT,	TEMP,	V
REAL*8	VVE(NDGNT),	Z1	