```
      subroutine newton
      Implicit real*8(a-h,o-z)
      double precision:: alpha,r0,pas
      integer:: cont,cont2,walkers, m, mi
      common/dades1/alpha,r0,pas
      common/dades2/m, mi, sec,encerts
      common/results/energia
      double precision, allocatable :: llistae(:),llistar1(:),llistar2(:),llistarm1(:)
      double precision, allocatable :: llistaer1(:),llistaer2(:)

      allocate ( llistae(m),llistar1(m),llistar2(m),llistarm1(m) )
      allocate ( llistaer1(m),llistaer2(m) )

      x=(r0/2.d0)*ran2(idum)
      p0= prob(x)

      ! termalitzation

    cont=0
    do i=1,mi

      pastemx=pas*ran2(idum)
      xb=pastemx
      p1=prob(xb)
      w=ran2(idum);

      IF(p1/p0>sec*w) THEN
        x=xb
        p0=p1
        cont=cont+1
      ENDIF

    enddo

!     write(*,*) "initial step ",pas
      pas=pas*cont/(encerts*mi);
!     write(*,*) " fitted step ",pas

    cont=0
    cont2=0

    do i=1,m
      pastemx=pas*ran2(idum)
      xb=pastemx
      p1=prob(xb)
      w=ran2(idum);

      IF(p1/p0>sec*w) THEN
        cont=cont+1
        aux=ene(xb)
        llistae(cont)=aux
        llistar1(cont)=xb
        llistarm1(cont)=1/xb
        llistar2(cont)=xb**2
        llistaer1(cont)=aux*xb
        llistaer2(cont)=aux*xb*xb
        x=xb
        p0=p1
```

```
        ELSE
            cont2=cont2+1
        ENDIF

    enddo
            alpha1=alpha
            energia=sum(llistae(1:cont))/cont
            r1=sum(llistar1(1:cont))/cont
            rm1=sum(llistarm1(1:cont))/cont
            r2=sum(llistar2(1:cont))/cont
            er1=sum(llistaer1(1:cont))/cont
            er2=sum(llistaer2(1:cont))/cont
            dere1=-er1+energia*r1
            dere2=2.d0*(er2-energia*r2)+r1*(2.d0*dere1+rm1)-1
            alpha=alpha1-dere1/dere2
            write(*,*) "cont  ",cont
!           write(*,*) "in newton ", alpha1,"  energia ",energia," dere1 ",dere1, "  dere2
",dere2,"  alpha ",alpha
            write(40,*) "in newton ", alpha1,"  energia ",energia," dere1 ",dere1, "  dere2
            ",dere2,"  alpha ",alpha
    deallocate (llistae, llistar1,llistar2,llistaer1,llistaer2)
return
end
```