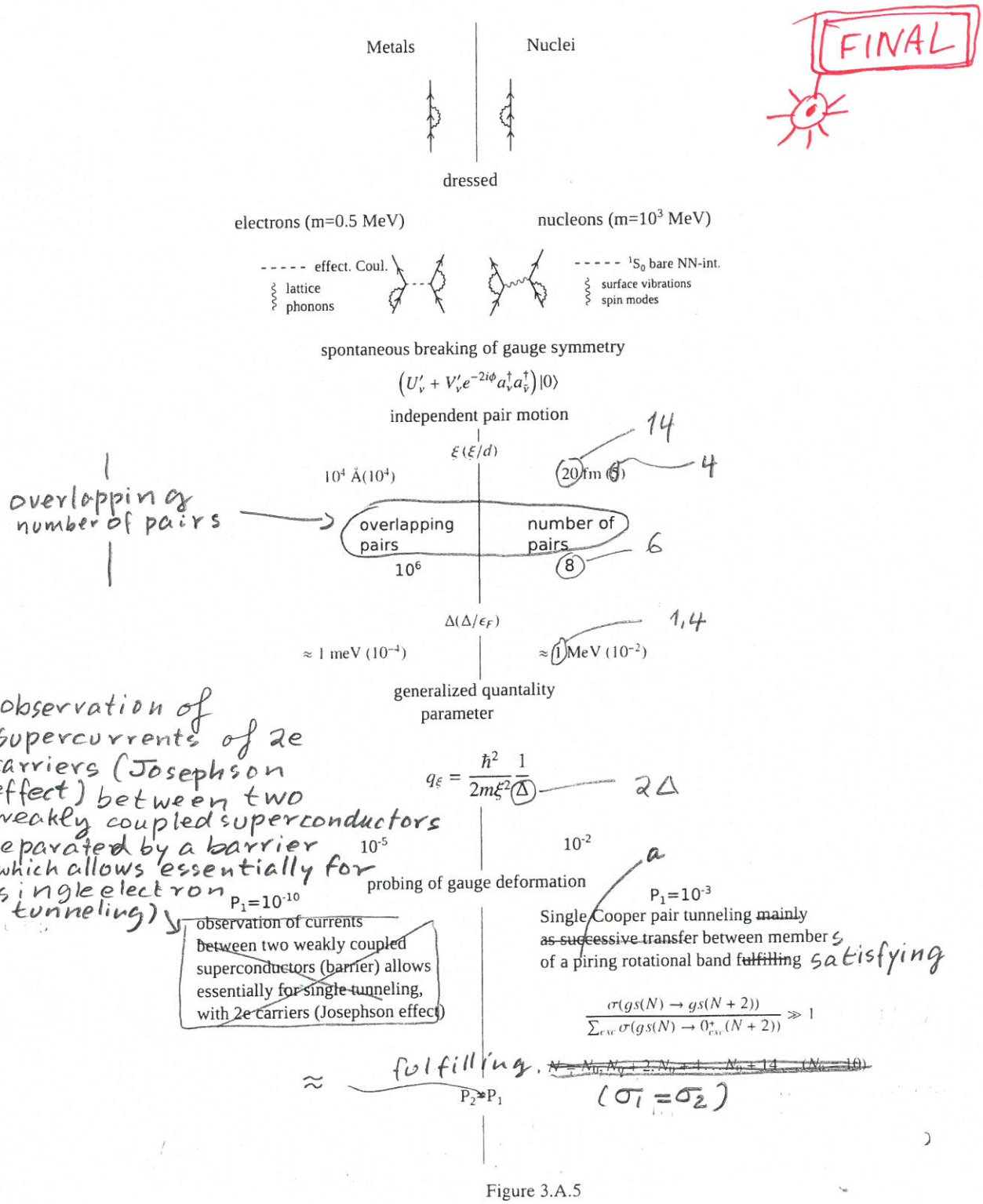

Metals
Nuclei
dressed
electrons (m=0.5 MeV)
nucleons (m=10³ MeV)
effect. Coul.
lattice phonons
¹S₀ bare NN-int.
surface vibrations spin modes
spontaneous breaking of gauge symmetry
$(U'_\nu + V'_\nu e^{-2i\phi} a^\dagger_\nu a^\dagger_{\bar\nu})|0\rangle$
independent pair motion
$\xi(\xi/d)$
10^4 Å(10^4)
20 fm (8)
overlapping pairs
10^6
number of pairs
8
$\Delta(\Delta/\epsilon_F)$
≈ 1 meV (10^{-4})
≈ 1 MeV (10^{-2})
generalized quantality parameter
$q_\xi = \frac{\hbar^2}{2m\xi^2}\frac{1}{\Delta}$
10^{-5}
10^{-2}
probing of gauge deformation
$P_1=10^{-10}$
observation of currents between two weakly coupled superconductors (barrier) allows essentially for single tunneling, with 2e carriers (Josephson effect)
$P_1=10^{-3}$
Single Cooper pair tunneling mainly as successive transfer between members of a piring rotational band fulfilling satisfying
$\frac{\sigma(gs(N)\to gs(N+2))}{\sum_{exc}\sigma(gs(N)\to 0^+_{exc}(N+2))} \gg 1$
≈
$P_2 \ll P_1$
fulfilling. $N_1 = N_0, N_0+2, N_0+4, \ldots N_0+14 \ldots (N_0=10)$
$(\sigma_1 = \sigma_2)$

Figure 3.A.5

Aclaración correcciones Fig. 3, A.5

escribo todo como tendría que ser

$\xi(\xi/d)$

$10^4 \text{Å}\ (10^4)$ | $14\,\text{fm}\ (4)$

overlapping number of pairs

10^6 | 6

$\Delta(\Delta/\epsilon_F)$

$\approx 1\,\text{meV}\ (10^4)$ | $\approx 1.4\,\text{MeV}\ (10^{-2})$

generalized quantality parameter

$$q_\xi = \frac{\hbar^2}{2m\xi^2}\,\frac{1}{2\Delta}$$

10^{-5} | 10^{-2}

probing of gauge deformation

$P_1 = 10^{-10}$ | $P_1 = 10^{-3}$

observation of supercurrents of 2e carriers (Josephson effect) between two weakly coupled superconductors separated by a barrier allowing essentially for single electron tunneling

Single Cooper pair tunneling between members of a pairing rotational band satisfying

$$\frac{\sigma(gs(N) \to gs(N+2))}{\sum_{exc} \sigma(gs(N) \to 0^+_{exc}(N+2))} \gg 1$$

fulfilling

$P_2 \approx P_1$ $\quad (\sigma_2 \approx \sigma_1)$

Fig 3, A.5

Vibrations

(ph) | (pp), (hh)

correlated excitations (E_{corr})
with transfer quantum number

α=0 | $\alpha = \pm 2$

waves on

the nuclear | the Fermi

surface

correlation length
infinite medium ($|E_{corr}| = \frac{\hbar^2 k^2}{2m}$)

$$\lambda\!\!\!^{-} = \frac{1}{k} \approx \frac{\langle k \rangle_F}{2m} \frac{1}{|E_{corr}|} = \frac{\hbar v_F}{\pi |E_{corr}|} = \xi$$

typical values (finite nuclei), E_{corr}=-2.0 MeV (-0.4 MeV, ^{11}Li), $v_F/c \approx 0.3$ (0.14, ^{11}Li)

ξ = 10 fm (16 fm, ^{11}Li)

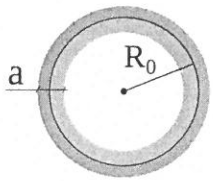
22 i.e (22fm, ^{11}Li)

genralized quantality parameter

$$q_\xi = \frac{\hbar^2}{2m(\xi)^2} \frac{1}{|E_{corr}|} \approx 0.1 \quad (0.1, {}^{11}\text{Li})$$

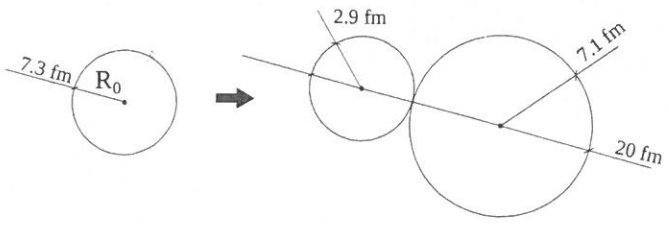
strongly correlated (cluster like $q_\xi \ll 1$), weakly bound ($|E_{corr}|/\epsilon_F \lesssim 0.06$)
very extended ($\xi/d \gtrsim 5$, $d = \left(\frac{4\pi R^3}{3A}\right)^{1/3}$) objects

subject to a strong external field



example

^{223}Ra→^{14}C+^{209}Pb ($\lambda = PfT$)



$$P = \begin{cases} 10^{-76} & (\Delta = 0) \\ 10^{-10} & \Delta_{exp} \end{cases}$$

$$\langle r^2 \rangle^{1/2}_{Cooper} = \xi = \frac{\hbar v_F}{\pi \Delta} \quad (\approx 24\,\text{fm}; \Delta = 0.8\,\text{MeV})$$

Figure 3.B.3