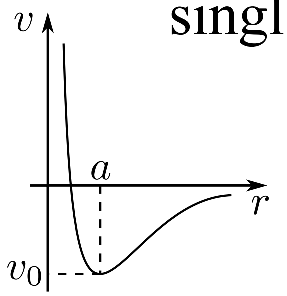
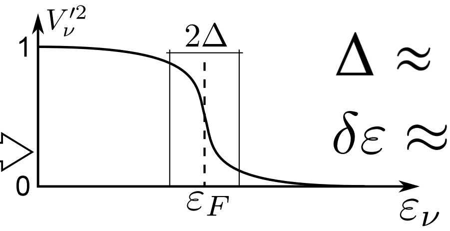
Classical localization and quantal ZPF

$\delta x \delta k \geq 1$ $\qquad \varepsilon = \frac{\hbar^2 k^2}{2M}$ $\qquad \delta k = \frac{\delta \varepsilon}{\hbar v_F}$ $\qquad (v_F \approx 0.27)$

$\boxed{\text{structure}}$

Independent motion of

single nucleons	pairs of nucleons
	
$a \approx 0.9$ fm	$\Delta \approx 1.2$ MeV
$v_0 = -100$ MeV	$\delta\varepsilon \approx 2\Delta; \delta x = \xi$
$\delta\varepsilon = \|v_0\|; \delta x \approx a$	
$\delta x \delta k = \frac{a\|v_0\|}{\hbar v_F} \geq 1$	$\delta x \delta k = \frac{\xi 2\Delta}{\hbar v_F} \geq 1$
quantality parameter	correlation length
$q = \frac{\hbar v_F}{a\|v_0\|} \approx 0.5 \lesssim 1$	$\xi = \frac{\hbar v_F}{\pi \Delta} \approx 14\,\text{fm} \gg R$
delocalization	long range correlation

emergent property: generalized rigidy in

3D-space	gauge space

¿how does a short range force lead to

single-nucleon mean free paths	pairing correlations over distances

larger than nuclear dimension?

$2R \approx 20/k_F$

quantal

fluctuations	phase correlations

$\boxed{\text{reactions}}$

single particle transfer, e.g. *(p,d)*	Cooper pair transfer, e.g. *(p,t)*
$\frac{2R}{a} \approx 15$	$\frac{\xi}{a} \approx 30$
absolute cross section reflects the full nucleon probability amplitude distribution, and does not depend of the specific choice of v_{np}	Successive and simultaneous transfer amplitude contributions to the absolute cross section carry in a equal efficient manner information concerning pair correlations