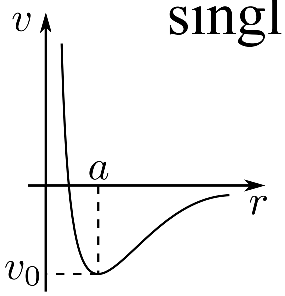
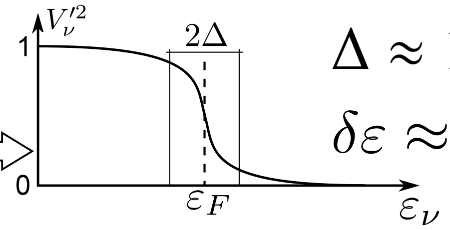
Interplay between classical localization and quantal ZPF

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

$\boxed{\text{structure}}$

Independent motion of

single nucleons	pairs of nucleons
	
$a \approx 0.9$ fm	$\Delta \approx 1.5$ MeV
$v_0 = -100$ MeV	$\delta\varepsilon \approx 2\Delta; \delta x = \xi$
$\delta\varepsilon = \lvert v_0 \rvert; \delta x \approx a$	$\xi = \dfrac{\hbar v_F}{2\Delta} \approx 18$ fm

quantality parameter

$q = \dfrac{\hbar^2}{ma^2}\dfrac{1}{\lvert v_0 \rvert} \approx 0.4$	$q_\xi = \dfrac{\hbar^2}{2m\xi^2}\dfrac{1}{2\Delta} \approx 0.06$
delocalization	long range correlation

emergent property: generalized rigidity 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)*
the *absolute cross section* reflects the full renormalized nucleon transfer amplitude (energy, single-particle content, radial dependence of the wave function (formfactor))	Successive (dominant mechanism) and simultaneous transfer amplitude contributions to the *absolute cross section* carry in a equal efficient manner information concerning pair correlations