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Theorie der Supraleitung, Herbstsemester 2018

Blatt 7

Abgabe: 15.11.18, 12:00H (Treppenhaus 4. Stock)
Tutor: Frank Schäfer Zi.: 4.13

(1) **Abrikosov vortex lattice** (7 Punkte)
Verify the "ZEIGE" items that were pointed out in the lecture:

(a) Confirm that the choice (i) $C_n = C$ and (ii) $C_1 = iC_0$, $C_{n+2} = C_n$ in

$$\psi_L(x,y) = \sum_n C_n \exp(inqy) \exp\left[-\frac{(x-x_n)^2}{2\xi^2}\right]$$

corresponds to (i) a square lattice and (ii) a triangular lattice.

(b) Choose the parameters such that $\Delta x/2 = \Delta y/2$. For the case $C_n = C$, verify that $\psi_L(x,y)$ has a zero at $(\Delta x/2, \Delta y/2)$ and is proportional to $x \pm iy$ around it.

(c) For $H \approx H_{c2}$ (that was assumed throughout this discussion), sketch ψ_L and the magnetic field along typical directions in the xy-plane.

(d) Read Tinkham p. 145 – 146 and confirm numerically that the triangular lattice is more favorable than the square lattice.

(2) $\mathbf{H_{c1} < H < H_{c2}}$ (3 Punkte)
Read Tinkham p. 148 to p. 162.

(a) Write down an extended caption to Fig. 5.1. Compare the magnetic field shown here with the behavior close to H_{c2}.

(b) Write down an extended caption to Fig. 5.2. Convert all the Gaussian units to SI units.