

ÜBUNGEN ZUR VORLESUNG
Feynman Path Integral in Solid State Physics
Blatt 6
Fermi Coherent States-II

- 1) Show that for Grassmann variable we can calculate the following integral

$$\int \prod_{k \neq 1}^N dc_k^* dc_k e^{\sum_{i,j=1}^N c_i^* M_{ij} dc_j} = \det M'_{11} - c_1^* c_1 \det M$$

where M'_{11} is $(1, 1)$ minor of matrix M

- 2) Prove the formula for discrete Hubbard-Stratonovich-Hirsch transformation

$$e^{-U[n_{\uparrow}n_{\downarrow}-(n_{\uparrow}+n_{\downarrow})/2]} = \frac{1}{2} \sum_{s=\pm 1} e^{\lambda s(n_{\uparrow}-n_{\downarrow})}$$

where

$$\lambda = \arccos h(e^{U/2})$$