(a) 
$$f_{S} = -N_{0} \frac{|\Delta|^{2}}{2} + \frac{B^{e^{2}}}{2\mu}$$

$$g_{e}$$
(b) 
$$f_{S} = -N_{0} \frac{|\Delta|^{2}}{2}$$

$$f_{N} = 0$$

$$f_{N} = -N_{0} h^{2}$$

$$h$$

$$x_{N} = N_{0}^{\uparrow \uparrow}$$