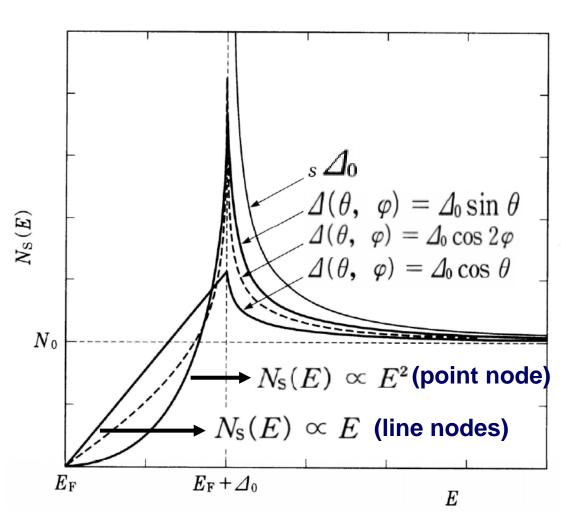# Report 7

Derive the Quasi-particle DOS in unconventional SC states;

(a) p-wave with point–node gap

$$N_S(E) = \frac{N_0 E}{4\pi} \int_0^{2\pi} \int_0^{\pi} \frac{\sin\theta \, d\theta \, d\varphi}{\sqrt{E^2 - \Delta_0^2 \sin^2\theta}}$$

$$= \frac{N_0 E}{2\Delta_0} \ln\left|\frac{E + \Delta_0}{E - \Delta_0}\right|$$

(b) p-wave with line–node gap

$$N_S(E) = \frac{N_0 E}{4\pi} \int_0^{2\pi} \int_0^{\pi} \frac{\sin\theta \, d\theta \, d\varphi}{\sqrt{E^2 - \Delta_0^2 \cos^2\theta}}$$

$$= \frac{\pi}{2} \frac{N_0 E}{\Delta_0} \qquad (E < \Delta_0)$$

$s \; \Delta_0$

$\Delta(\theta, \varphi) = \Delta_0 \sin\theta$
$\Delta(\theta, \varphi) = \Delta_0 \cos 2\varphi$
$\Delta(\theta, \varphi) = \Delta_0 \cos\theta$

$N_S(E) \propto E^2$ **(point node)**

$N_S(E) \propto E$ **(line nodes)**

$N_S(E)$

N_0

E_F

$E_F + \Delta_0$

E