

The energy, in terms of mechanical momentum p

$$\begin{aligned}
 W &= \sum p \dot{q} - L = \sum p \dot{q} - \left[\sum p \dot{q} / 2 - (U - \sum e p \cdot A / mc) \right] \\
 &= \sum (p_\rho^2 + p_z^2 + j_z^2 / \rho^2) / 2m - \sum \underset{\sim}{j} \cdot \underset{\sim}{B} e / 2mc + U
 \end{aligned}$$

becomes

$$W = W_0 - \sum \underset{\text{K.E.}}{j_0 B e / 2mc} - \sum \underset{\text{P.E.}}{j_0 B e / 2mc} + \dots$$

$$= W_0 - \sum j_0 B e / mc + \dots$$

on substituting $j = j_0 - m \rho^2 e B / 2mc$.