

PHY 711 – Assignment #9

9/21/2016

Continue reading Chapters 3 and 6 in **Fetter and Walecka**.

1. Consider the Lagrangian:

$$L(\alpha, \beta, \gamma, \dot{\alpha}, \dot{\beta}, \dot{\gamma}) = A \left(\dot{\alpha}^2 \sin^2 \beta + \dot{\beta}^2 \right) + B (\dot{\alpha} \cos \beta + \dot{\gamma})^2 - C \cos \beta.$$

In this expression, A , B , and C represent given constant parameters. [You may (and will later) recognize this Lagrangian from the motion of a symmetric top.]

Find three constants of motion for this system. Extra credit: Find an equivalent Lagrangian in terms of one generalized coordinate and its velocity and the constants of motion for the system.