PHY 422/622 : ASSIGNMENT II (IN-CLASS, JAN. 25, 2017)

(1) Under β-decay, a neutron (n) at rest, seems to apparently decay into two particles – a proton (p) and an electron (e^-). What would be your prediction for the magnitude of the outgoing particle momenta ?

(2) We are interested in a scattering process $e^- + \mu^- \to e^- + \mu^-$. (i) What is the CM energy of the incoming electron in terms of Mandelstam variables and particle masses ? (ii) If the muons were also replaced by electrons, we have the case of elastic, two-body scattering of identical particles. In this case what are the Mandelstam variables – s and t– in terms of CM momenta and scattering angle ?