

6. NonAbelian Gauge Theory

1. Arnowitt-Fickler Gauge *P&S 16.1*

Perform Faddeev-Popov quantisation of Yang-Mills theory in the gauge $A^{3a} = 0$. Write the Feynman rules; show there is no propagating ghost field; write the equations of motion. *Hint:* obtaining the gluon propagator is much simpler if you write the gauge condition in a 'covariant' form: $n \cdot A = 0$.

2. Charge Universality *P&S 16.3a*

Verify that the ghost counterterms give $\delta_1^c - \delta_2^c = \delta_1 - \delta_2$. You can use the text to write down the RHS. *Hint:* You do not need to consider finite contributions to integrals. You will need to simplify an expression like $f^{ade} f^{ebf} f^{fdc}$. Eq 15.70 in P&S will help.