

# NOTES FOR TTBAR PRODUCTION

## I

- The purpose is to study the process  $pp \rightarrow t\bar{t}$  with the inclusion of CP-violation.
- CP-violation can be introduced into  $t\bar{t}$  production by introducing the coupling term

$$\mathcal{L}_{\text{CP}} = \frac{m_t}{v} h \bar{t} (a + ib\gamma_5) t. \quad (1.1)$$

- Experimental results can put constraints on the value for  $b$ .
- One can write down a list of the contributing tensor structures,  $T_i$ , for both  $gg \rightarrow t\bar{t}$  and  $q\bar{q} \rightarrow t\bar{t}$ ; then their independence can be checked by computing the rank of the matrix

$$M_{ij} = \sum_{\text{pol}} T_i^\dagger T_j. \quad (1.2)$$

- I've computed this matrix for the 20 total tensor structures which appear in  $gg \rightarrow t\bar{t}$ , but found that the matrix rank in 4-dimensions is 17, which disagrees with the expected value of 16.
- We need to determine if this discrepancy is caused by the choice of tensor structures.
- I'll also do some additional research on treatments of  $\gamma_5$  in 4-dimensions.