

# Homework set 5

## Problem 1: Higgsstrahlung

[Simplified version of Problem 6.4 of BM] Compute total cross section of the process

$$e^+e^- \rightarrow Z^0 H \tag{1}$$

that goes through an intermediate virtual  $Z^0$  boson. For simplicity, neglect the electron mass *and*  $Z$  and  $H$  masses:  $\sqrt{s} \gg m_H, m_Z$ . (This may be a good approximation at a future collider with center-of-mass energy of 1 TeV.)

## Problem 2: Higgs decay

[Simplified version of Problem 5.3 of BM]. Compute the rate of the decay

$$H \rightarrow W f \bar{f}' \tag{2}$$

where  $f, \bar{f}'$  are pair of light fermions which could result from the decay of a  $W$ . For simplicity, assume that  $m_H$  is just slightly above the  $W$  mass, so that the following relationship holds:  $m_f + m_{f'} \ll m_H - m_W \ll m_W$ . (In reality, this may be not a very good approximation, but it does make calculations shorter).