number of partons (Np): gluon jet is much "fatter"
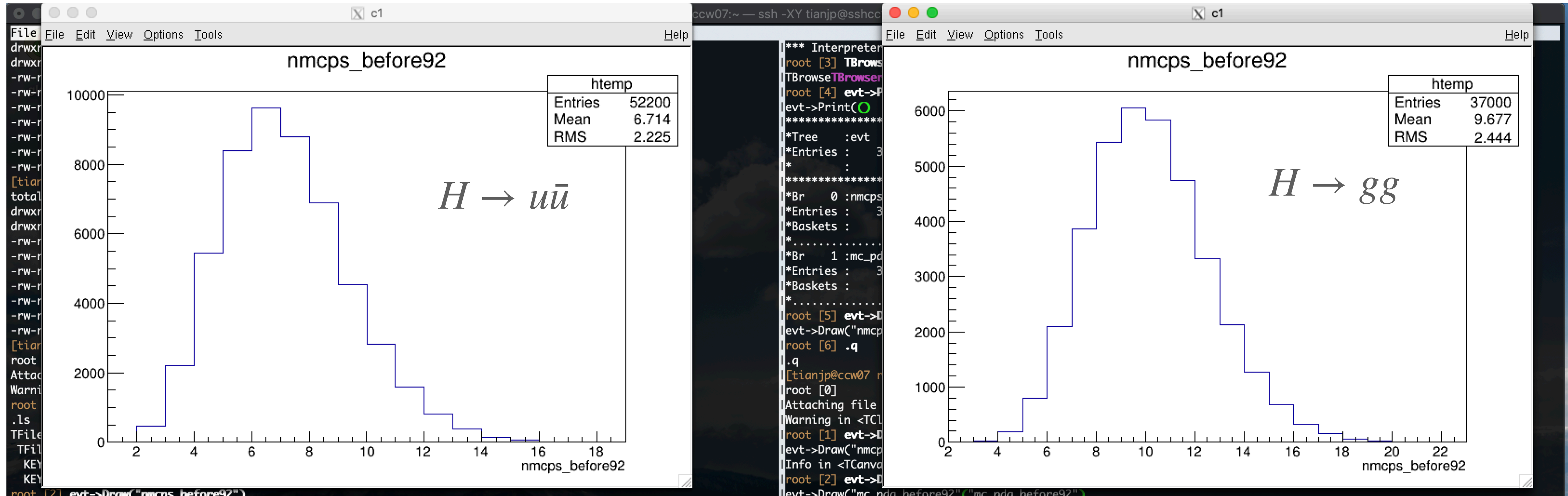
observed $\dfrac{N_p^{g}}{N_p^{u}} = 1.6$

(average, taken out initial partons)

expected ~2

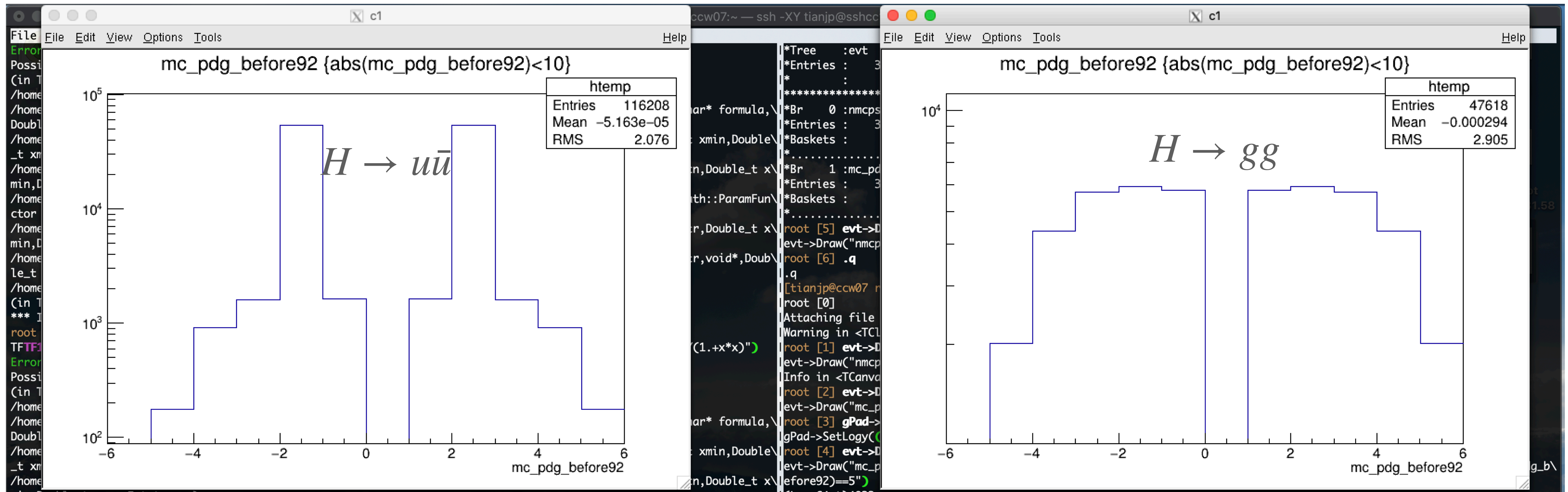$$P_{\text{q}\to\text{qg}}(z) = C_F \frac{1+z^2}{1-z}\,,$$

$$P_{\text{g}\to\text{gg}}(z) = N_C \frac{(1-z(1-z))^2}{z(1-z)}\,,$$

(from splitting kernel; dominated by z~1;
more accurately, has to add Sudakov form
factor, proper cut-off, etc., analytically hard)

all dominated by gluon splitting

quark mass effect in g->qq

$$N_d : N_c : N_b = 9.2 : 5.2 : 1$$

$$N_d : N_c : N_b = 2.9 : 2.2 : 1$$

qualitatively reasonable, since the gluons in H->uu samples have to come from splitting, carrying much lower Q2, which leads to larger effects from different quark masses

probability of getting heavy flavor partons

$$H \to u\bar{u}$$

$$\frac{N_b}{N_p} = 0.10 \, \%$$

$$\frac{N_c}{N_p} = 0.52 \, \%$$

$$H \to gg$$

$$\frac{N_b}{N_p} = 1.1 \, \%$$

$$\frac{N_c}{N_p} = 2.4 \, \%$$

implication for gluon jet:
when b-tag efficiency is <~1%, it will scale linearly as a true b-jet does;
when c-tag efficiency is <~2%, it will scale linearly as a true c-jet does