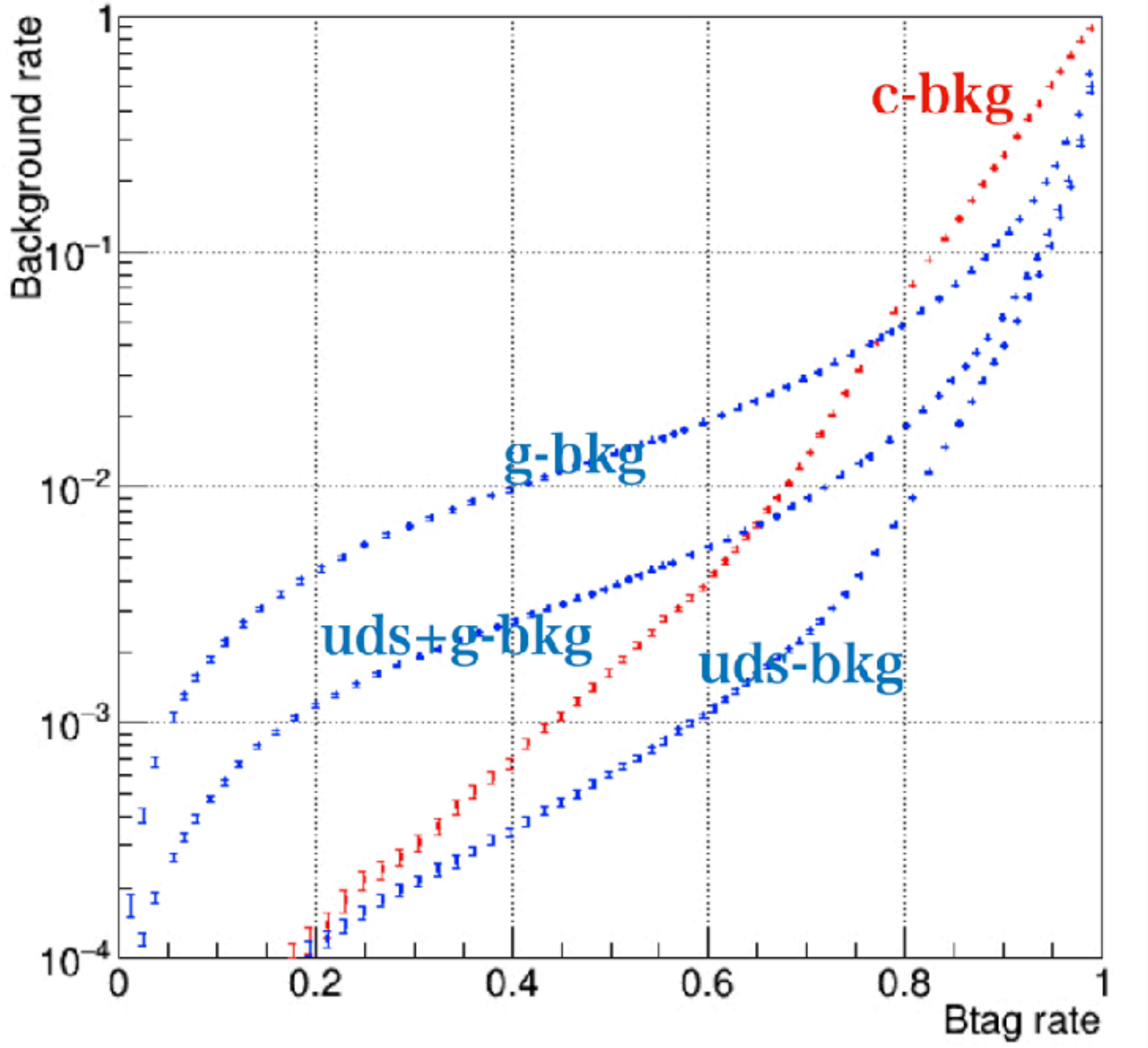
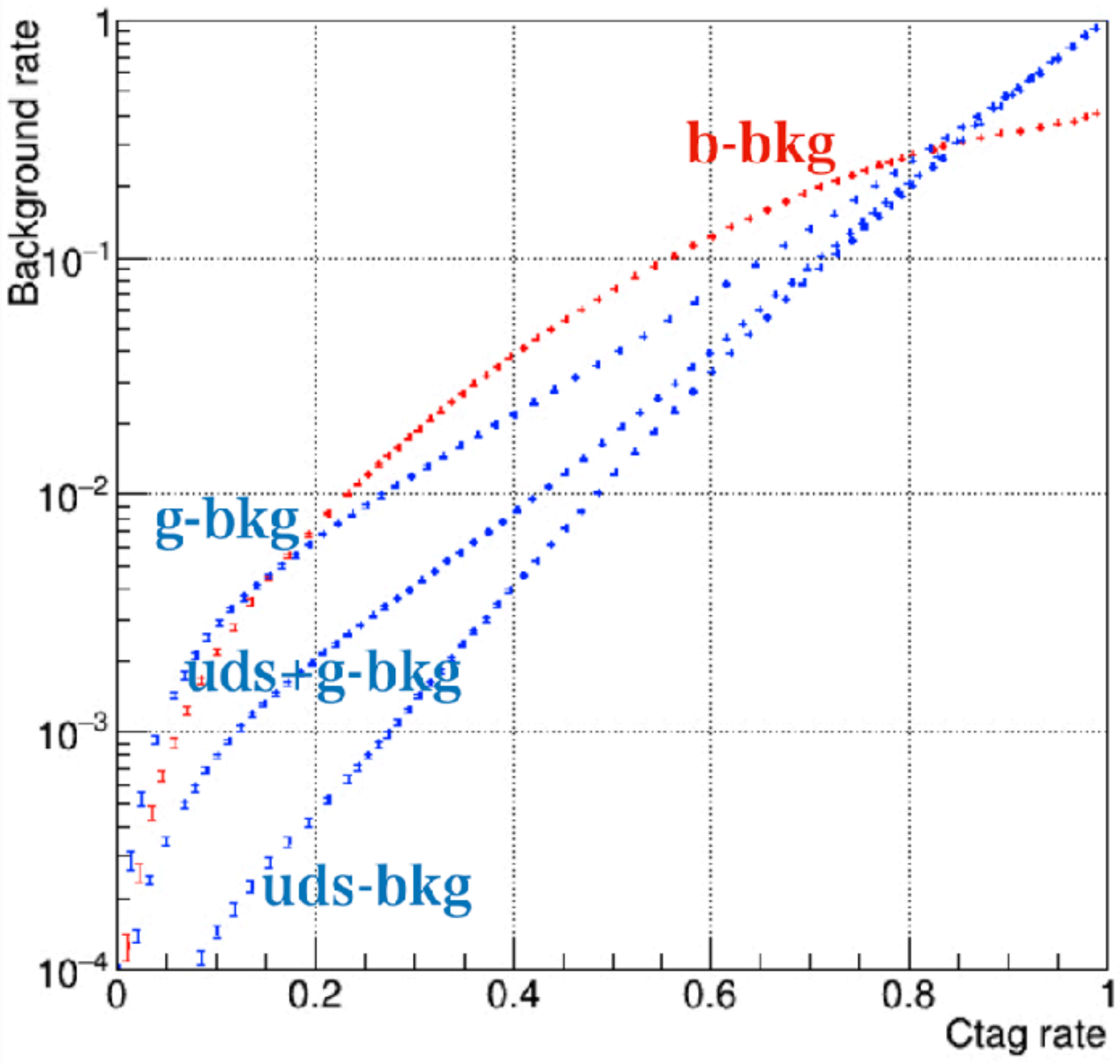
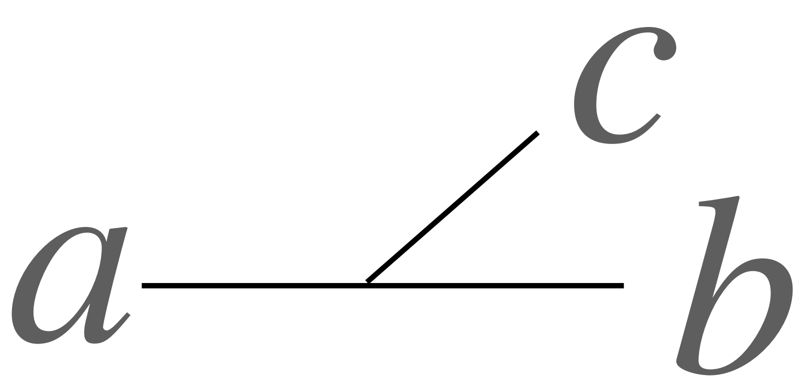
flavor tagging performance: some preliminary understanding together with Ryo



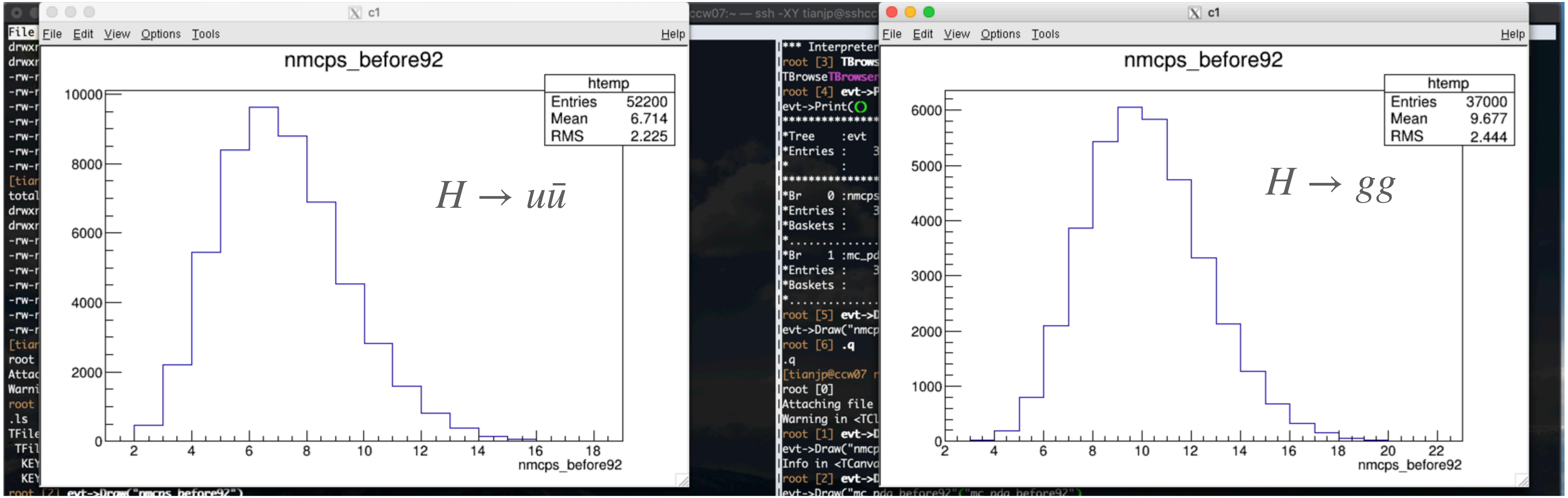


DGLAP



$$\mathrm{d}\mathcal{P}_a = \sum_{b,c} \frac{\alpha_{abc}}{2\pi} P_{a\to bc}(z)\,\mathrm{d}t\,\mathrm{d}z \qquad \mathrm{d}t = \mathrm{d}\ln(Q^2) = \frac{\mathrm{d}Q^2}{Q^2}$$

number of partons (Np): gluon jet is much “fatter”



observed $$\frac{N_p^g}{N_p^u} = 1.6$$

(average, taken out initial partons)

expected ~2

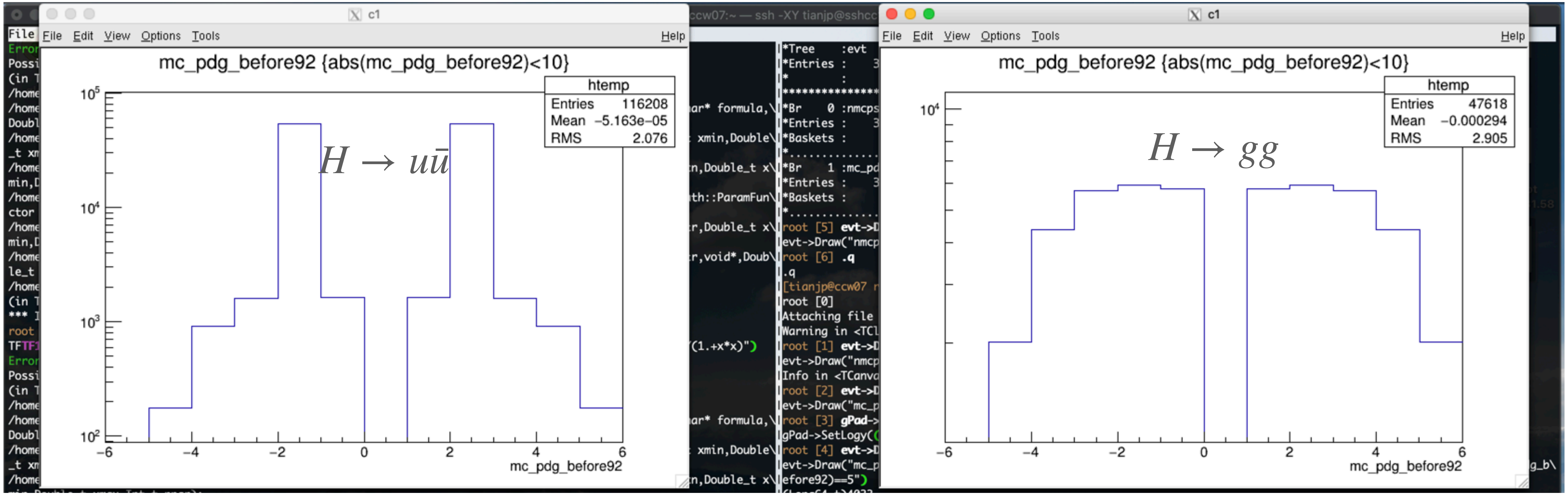
$$P_{q\to qg}(z) = C_F \frac{1+z^2}{1-z},$$

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

(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

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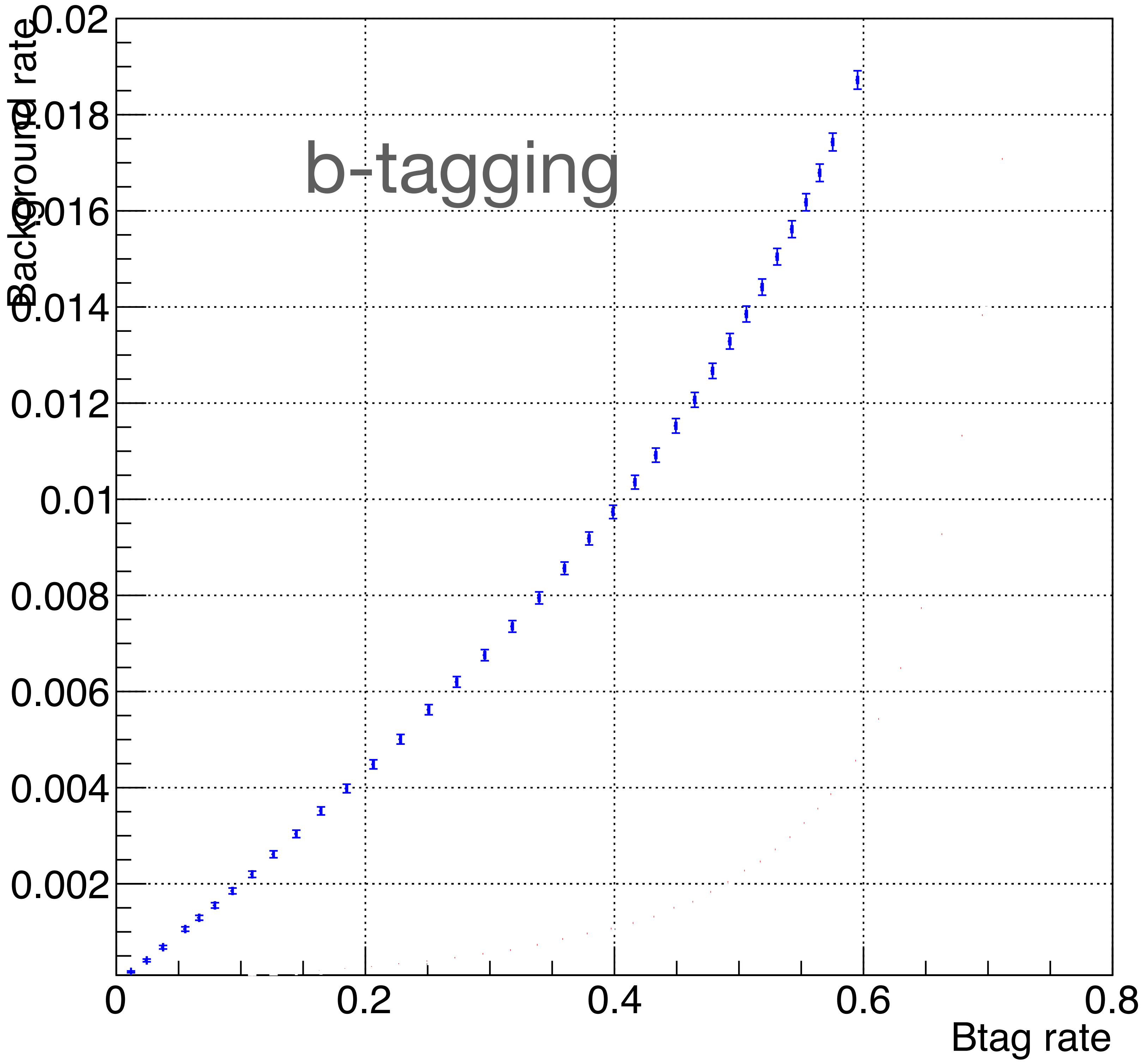

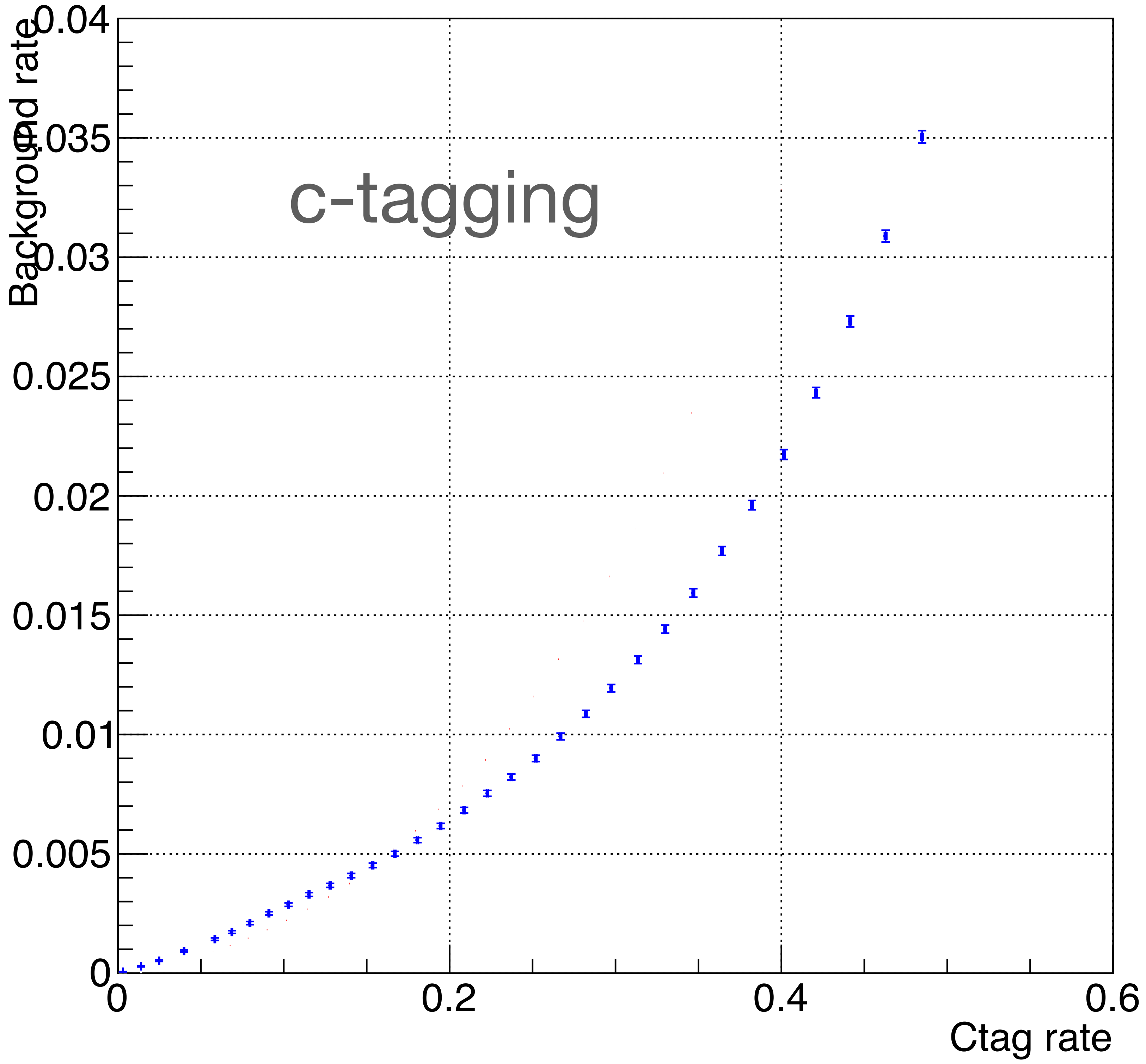

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