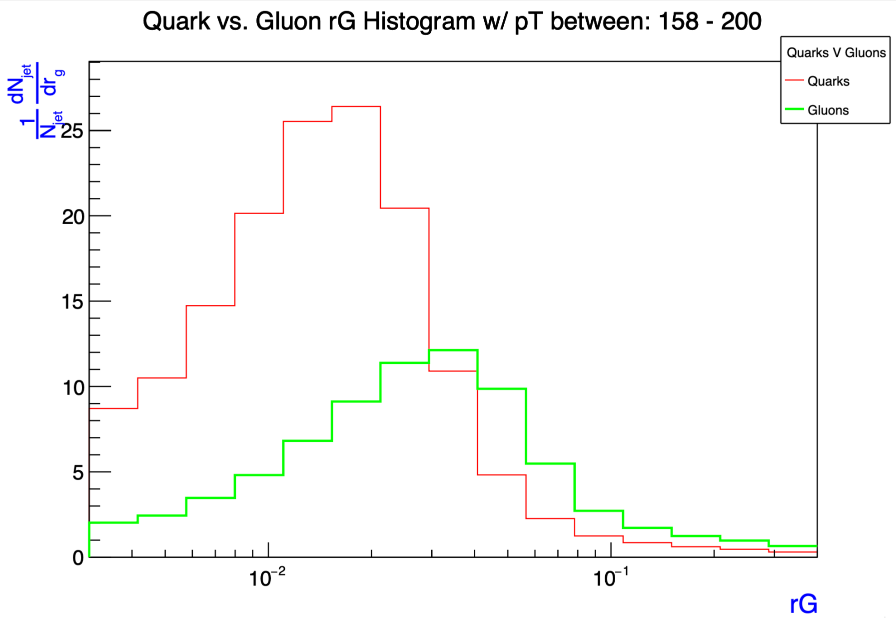
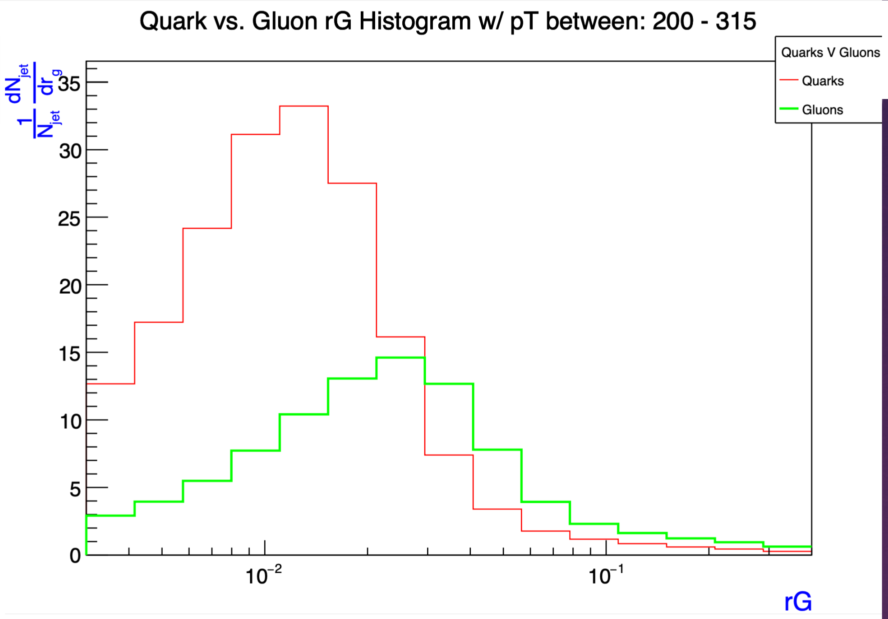
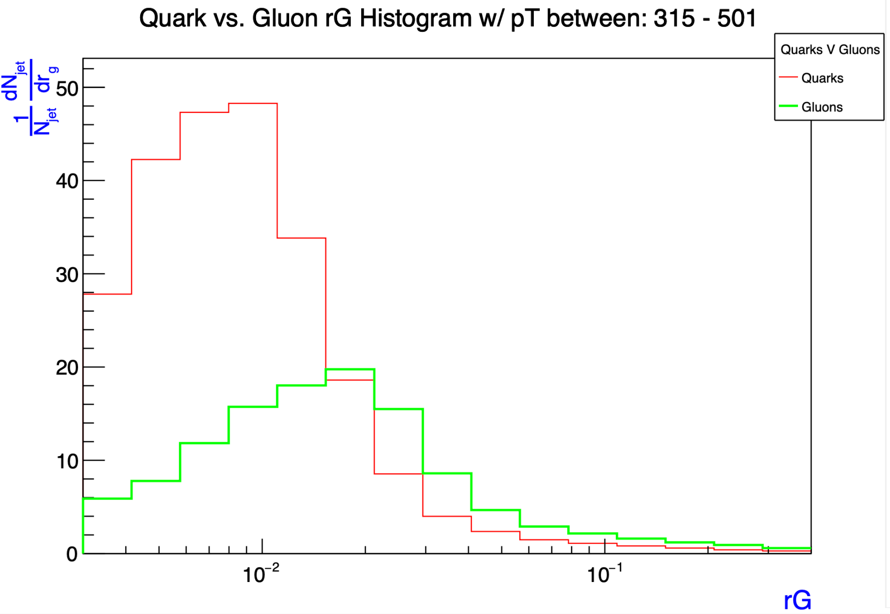
Jet Girths of Parton Collisions

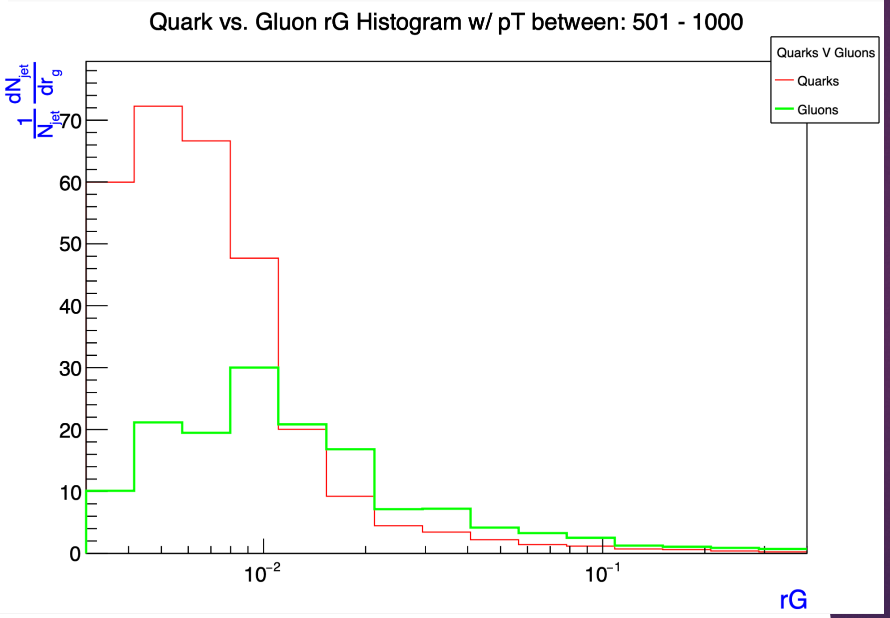
SoftDrop Algorithm: Varying Beta and Z-cut

- Softdrop algorithm: $$\frac{min\left(pT_1, pT_2\right)}{pT_1 + pT_2} > Z_{cut} \cdot \left(\frac{\triangle R}{R}\right)^{\beta}$$
  - (Our R was .4)
- Increasing Beta means higher angular sensitivity: Softcut is harder to pass for wide-angle separation (essentially we care about angle more).
- Increasing Z-cut means we care about pT differences more: Softcut is harder to pass for large pT differences (essentially we care about pT more).
- While a higher Beta while keeping Z-cut fixed results in more jets passing, angular sensitivity still increase due to the fact that this ratio keeps increasing: $$\left(\frac{\frac{\triangle R_2}{R}}{\frac{\triangle R_1}{R}}\right)^{\beta}$$



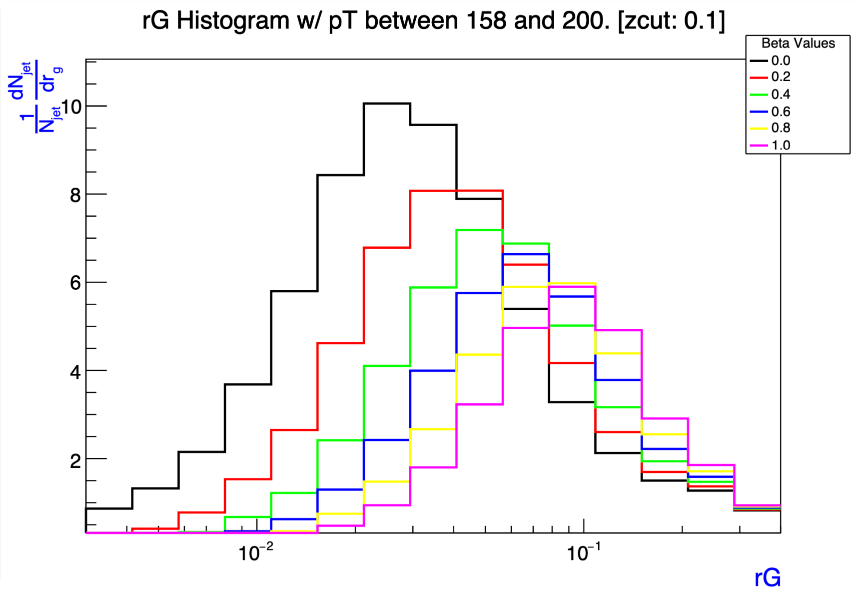


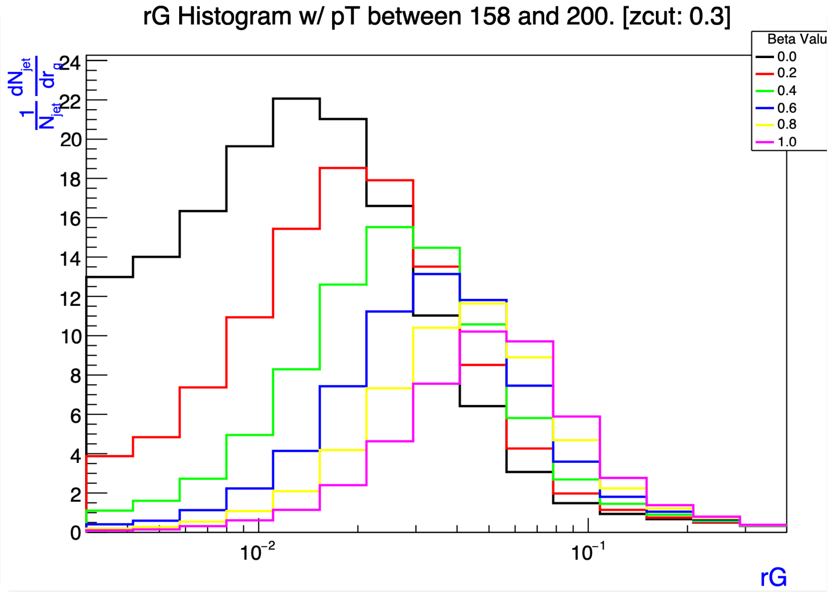


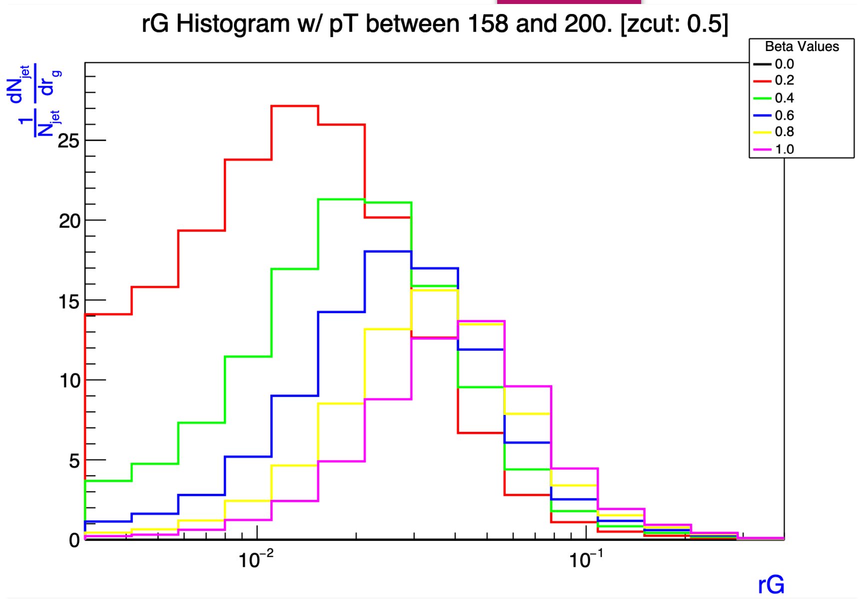


Quark V. Gluon by pT Range

As pT increases, average jet girth decreases due to higher collimation

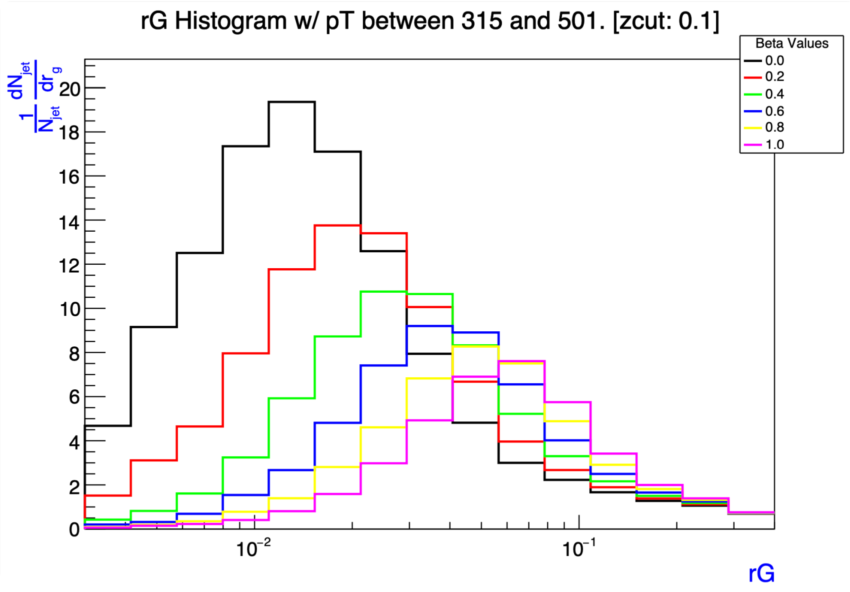


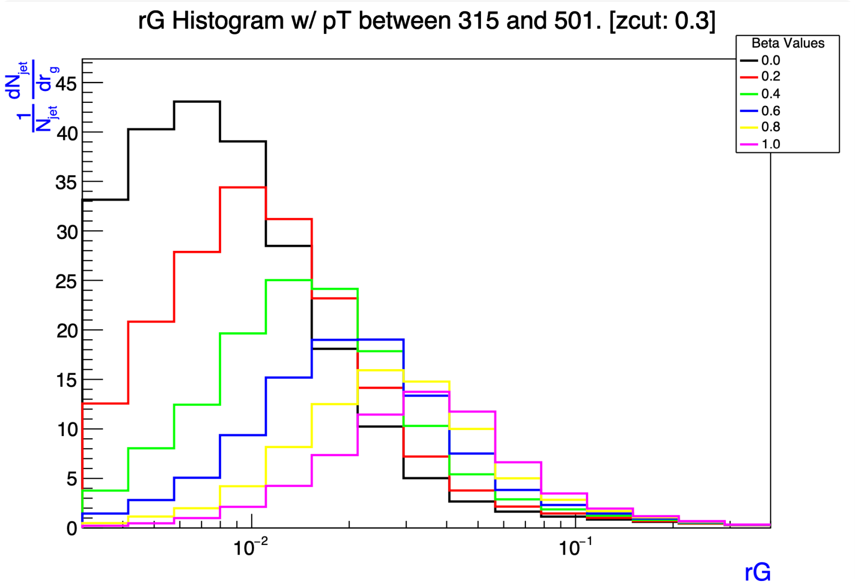


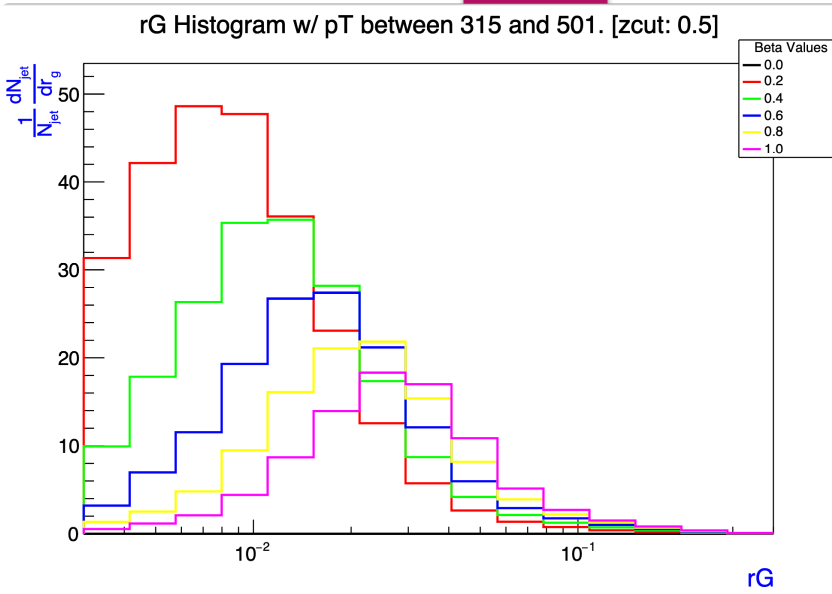


Varying Z-Cut *(pT Range 1)

- As Z-cut increases, average jet girths decrease and the graph left shift (due to higher strictness)
- As Beta Increases, average jet girths increase
- Jets of Zcut .5 and beta 0 never pass as ½ !> ½

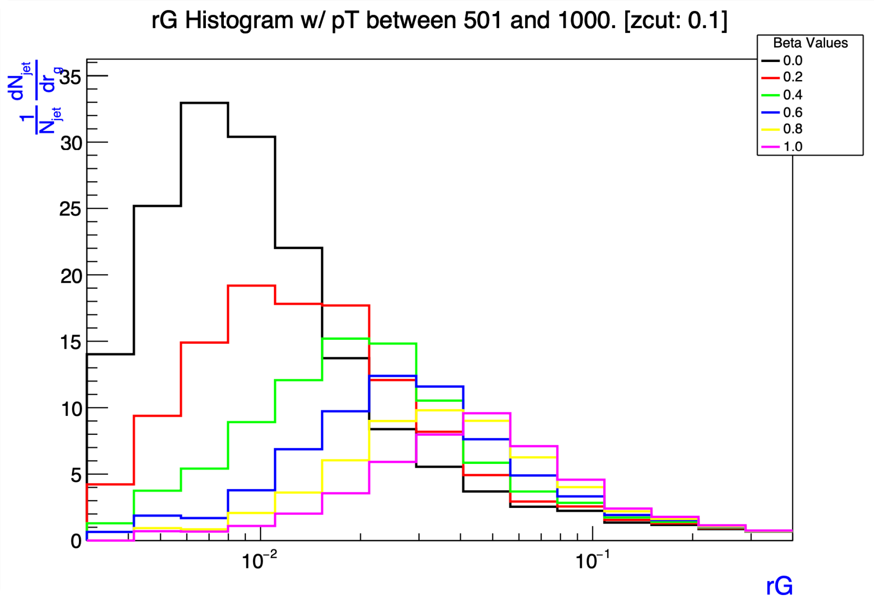


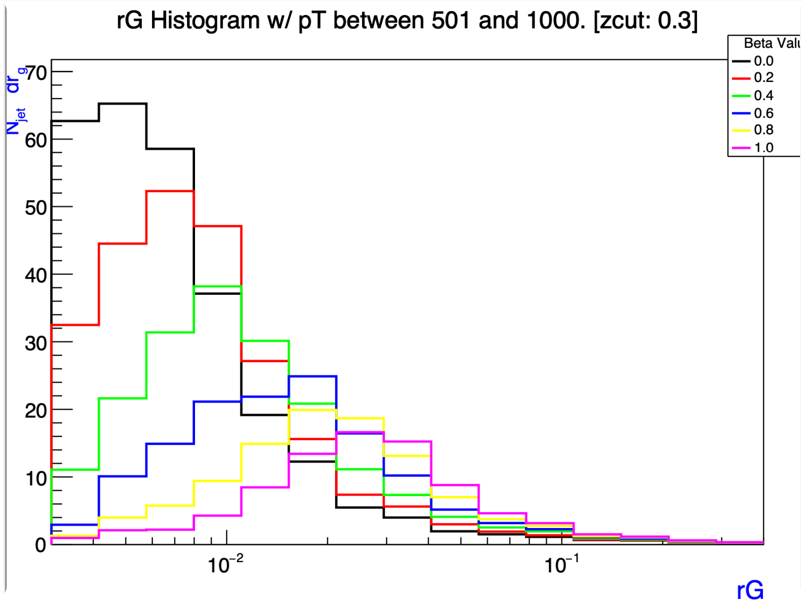


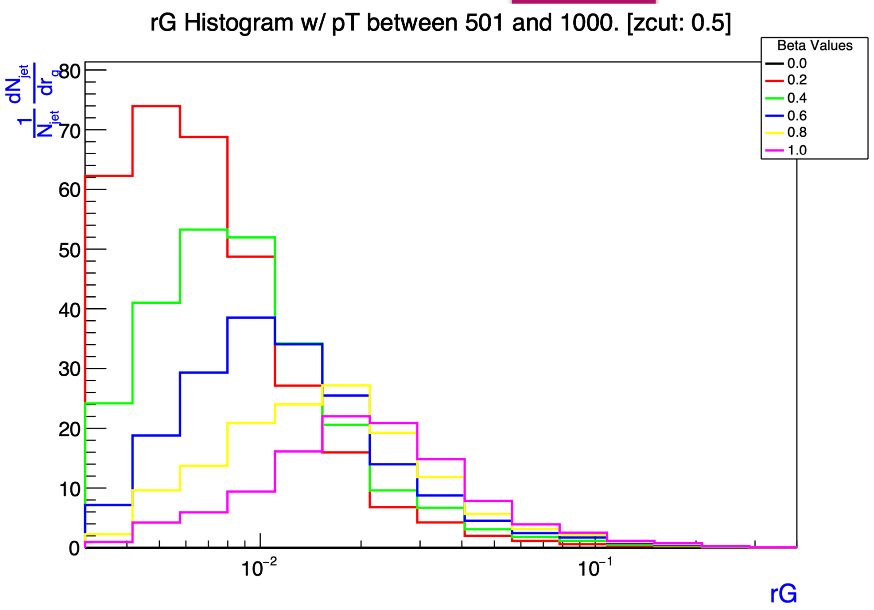


Varying Z-Cut *(pT Range 2)

- As Z-cut increases, average jet girths decrease and the graph left shift (due to higher strictness)
- As Beta Increases, average jet girths increase
- Jets of Zcut .5 and beta 0 never pass as ½ !> ½







Varying Z-Cut *(pT Range 3)

- As Z-cut increases, average jet girths decrease and the graph left shift (due to higher strictness)
- As Beta Increases, average jet girths increase
- Jets of Zcut .5 and beta 0 never pass as ½ !> ½


~FIN~