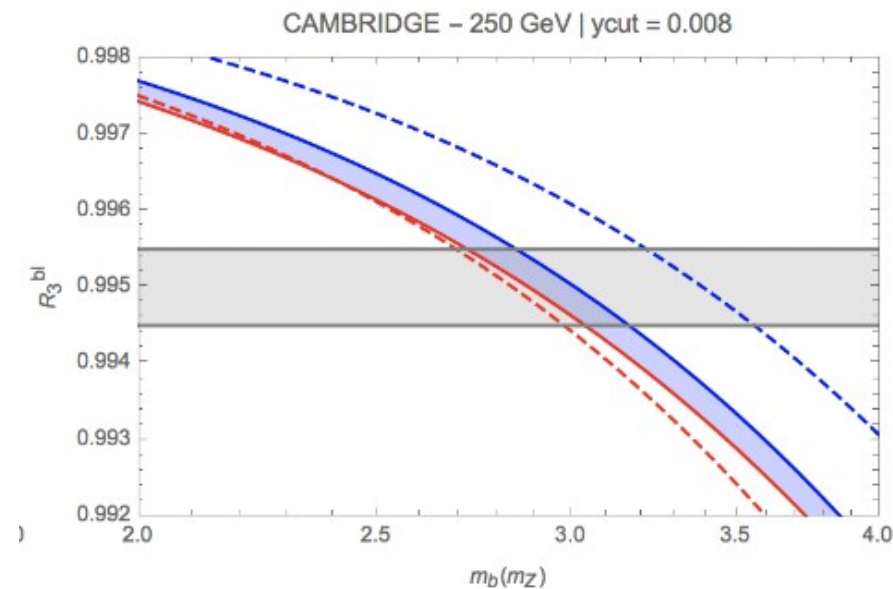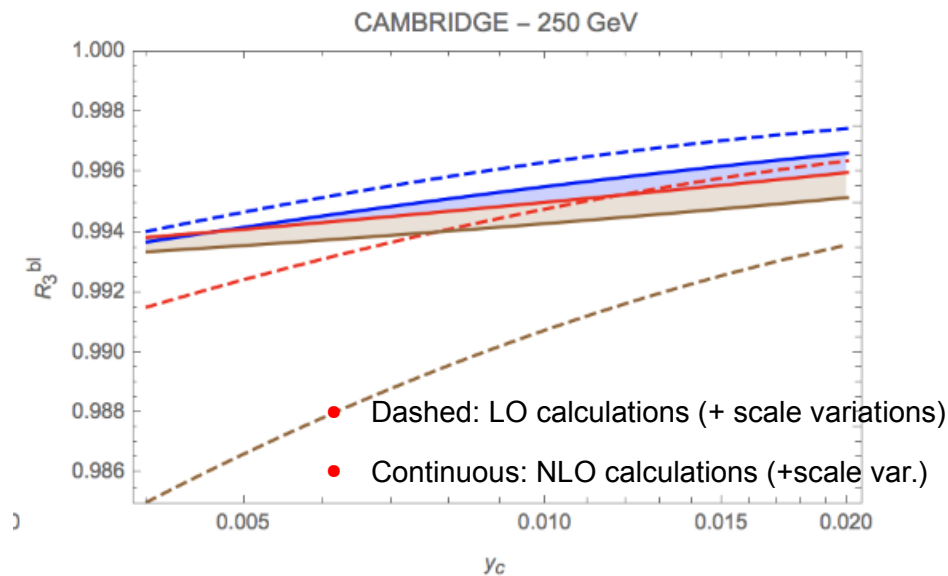# Measuring mb in ee→ bb at 250 GeV
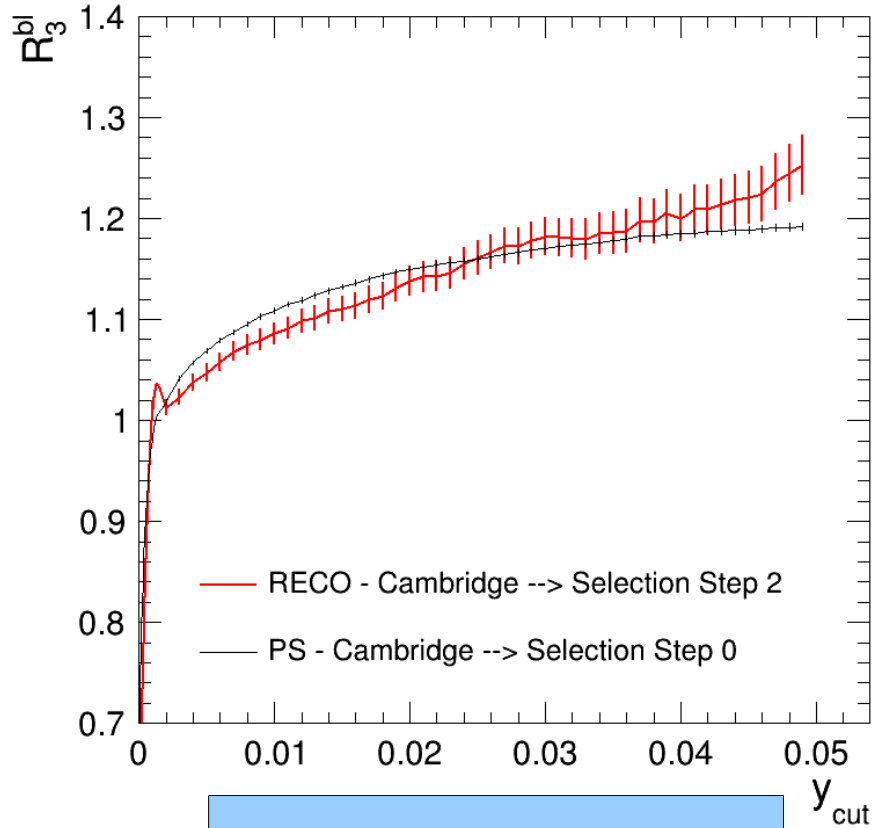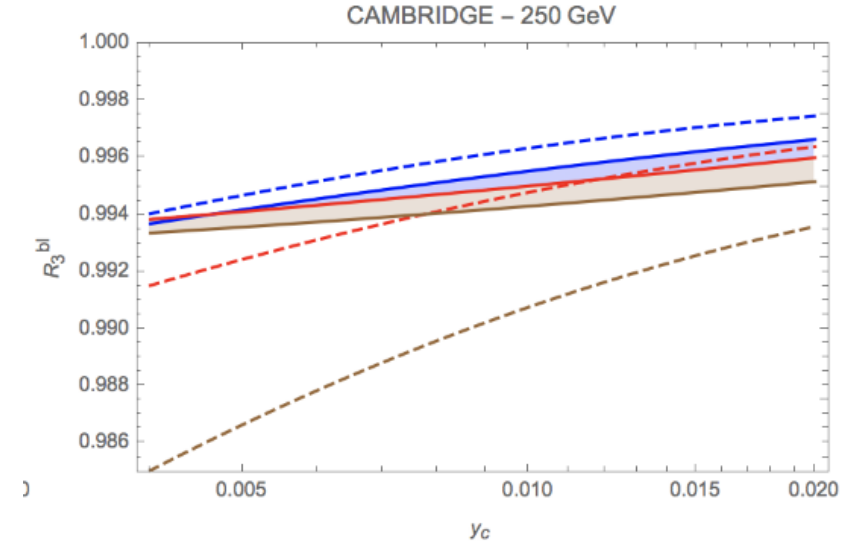## mb(250)

Adrián Irles
IFIC (UV/CSIC)

The observable: 3 jet rates

▶ R3b = N bb-events reconstructed as >2 jets for ycut=X / N -bb events

▶ R3l = N uds/uds-events reconstructed as >2 jets for ycut=X / N -uds/uds events

▶ The observable : R3bl = R3b / R3l

- Dashed: LO calculations (+ scale variations)
- Continuous: NLO calculations (+scale var.)

Results (Cambridge)

ILD simulation
Whizard qq LO + Pythia

qq+jet NLO
Fixed order calculation
(G. Rodrigo et al)

What is the origin of such differences?

▶ Hypothesis

- The LO is just too wrong → Not fully understood. We expected the values to be different but still having R3bl < 1
- Pythia is messing the mass effects?
- ?

▶ We just started to look at this and it is very early to say.

▶ We started to run few "private" simulations with Madgraph

Testing the result with Madgraph Simulations

▶ qq + gluon at LO

- CAMBRIDGE ANALYSIS

  Sigma dd (inc) = 43971.7 N3 (d) (ycut=0.01) 4494.65 R3 (d) (ycut=0.01) 0.102217
  Sigma uu (inc) = 72239.3 N3 (u) (ycut=0.01) 8041.63 R3 (u) (ycut=0.01) 0.111319
  Sigma ss (inc) = 43701 N3 (s) (ycut=0.01) 4494.65 R3 (s) (ycut=0.01) 0.10285
  Sigma cc (inc) = 72645.4 N3 (c) (ycut=0.01) 7825.02 R3 (c) (ycut=0.01) 0.107715
  Sigma bb (inc) = 38204.5 N3 (b) (ycut=0.01) 4657.11 R3 (b) (ycut=0.01) 0.121899
  R3l (ycut=0.01) = 0.106502 R3bl (ycut=0.01) = 1.14457

▶ **qq + gluon at NLO**

- CAMBRIDGE ANALYSIS

  Sigma dd (inc) = 22294.4 N3 (d) (ycut=0.01) 8527.34 R3 (d) (ycut=0.01) 0.382488
  Sigma uu (inc) = 30616.2 N3 (u) (ycut=0.01) 11609.5 R3 (u) (ycut=0.01) 0.379195
  Sigma ss (inc) = 12739.6 N3 (s) (ycut=0.01) 4109.56 R3 (s) (ycut=0.01) 0.322581
  Sigma cc (inc) = 29999.8 N3 (c) (ycut=0.01) 12020.5 R3 (c) (ycut=0.01) 0.400685
  Sigma bb (inc) = 17568.4 N3 (b) (ycut=0.01) 6369.82 R3 (b) (ycut=0.01) 0.362573
  R3l (ycut=0.01) = 0.369327 R3bl (ycut=0.01) = 0.981713

▶ **Madgraph qqg LO ~ Whizard qq LO + Pythia**

▶ **Madgraph qqg NLO ~ German's calculations**

VERY PRELIMINARY

▶ **Only ~10000 events**

Request of samples

▶ should we make an official request of NLO sample(s) ?

- ~10 fb-1 (per polarization) ?
- Different masses ?

▶ Will help understand the issue on the R3bl observable

- But also help with AFBb / Rb observables (systematic effects ?)