HF jets analysis

14.07.2020 ALICE@IFJ meeting

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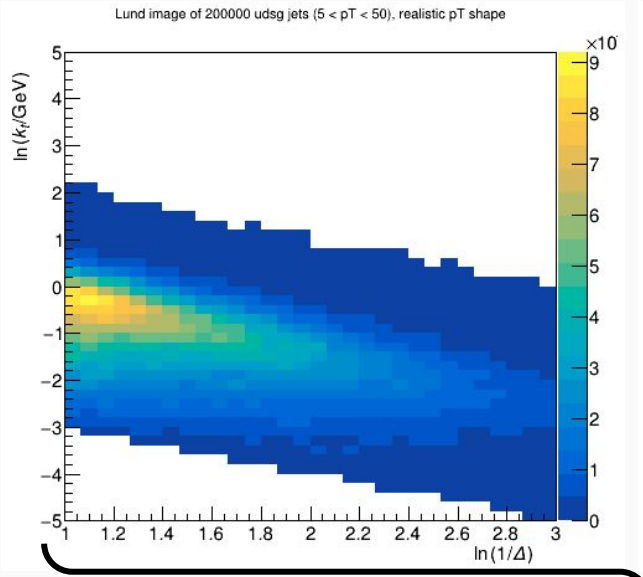
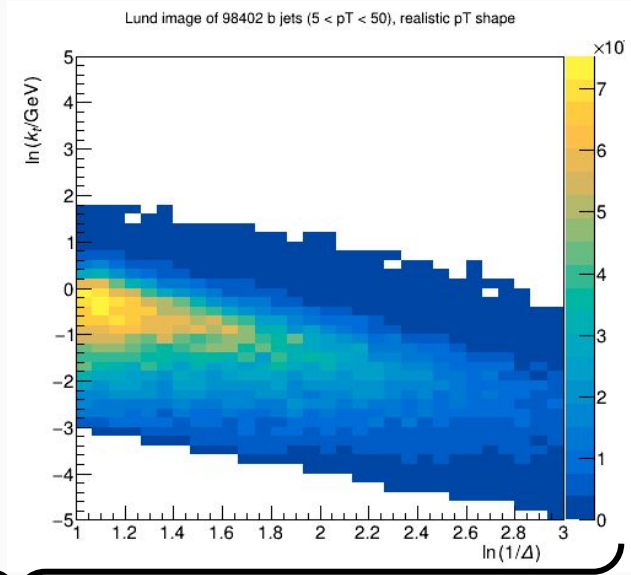
Outline

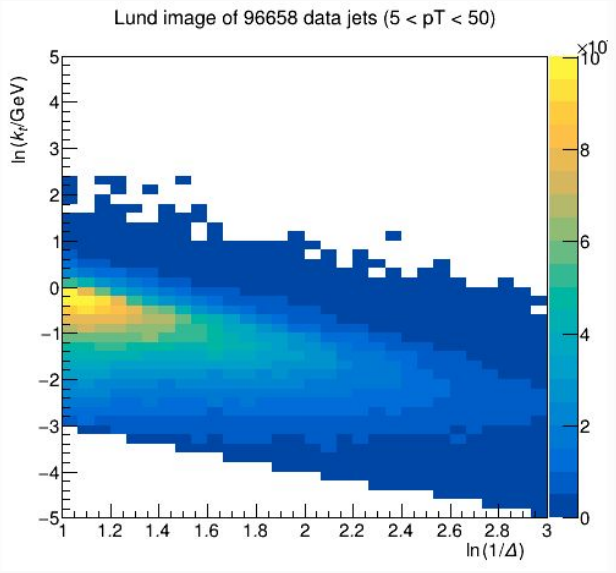
1. Progress in HF-jets analysis
    - Lund diagrams & its projections

Lund diagrams





MC

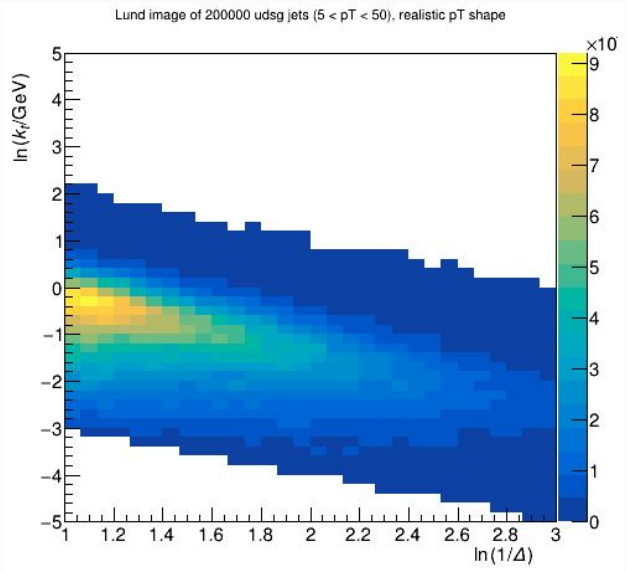


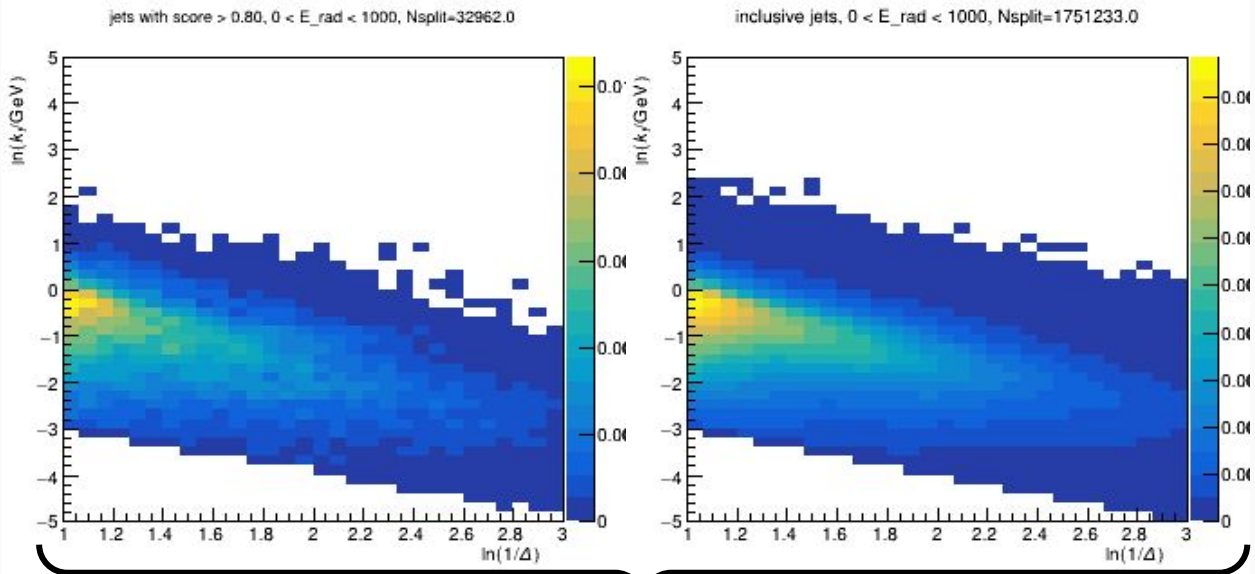
DATA

Lund diagrams

WP: mistag. rate ~1%

full LHC15n statistics





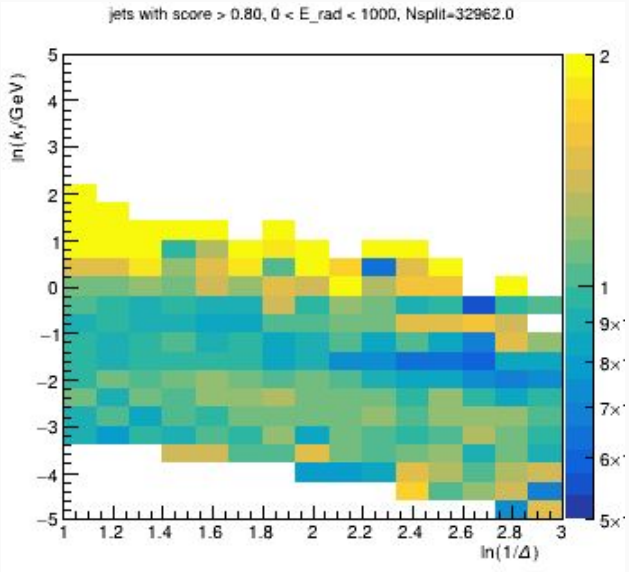
MC

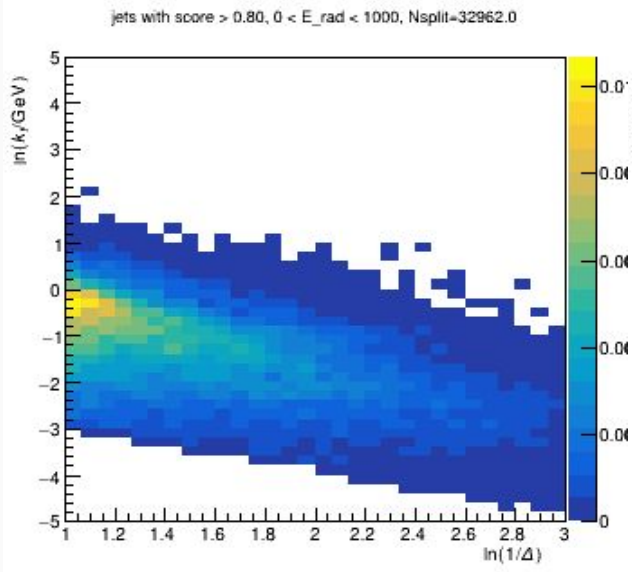
DATA

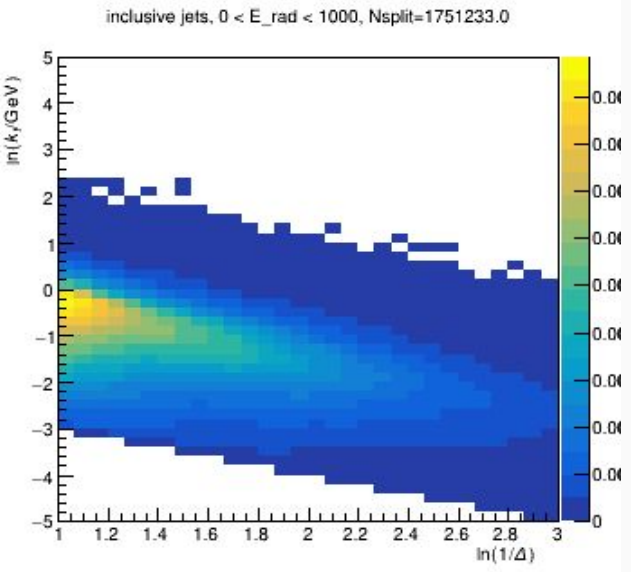
Ratio of Lund diagrams

WP: mistag. rate ~1%

full LHC15n statistics





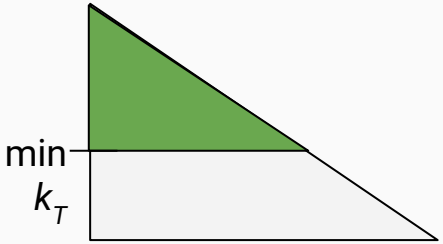


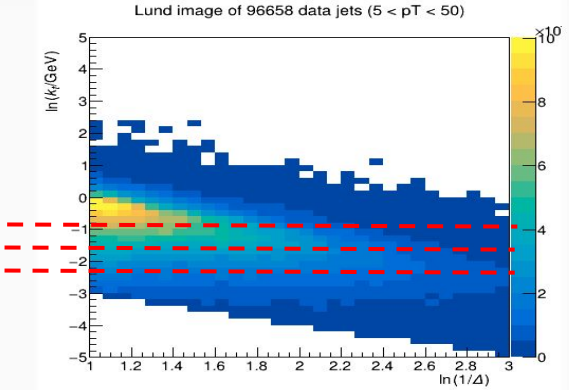
ratio = b-jets / inclusive

Projections

Considered variables:

- min k_T
- $E_{radiator}$ and p_T range
- b-tagger working point



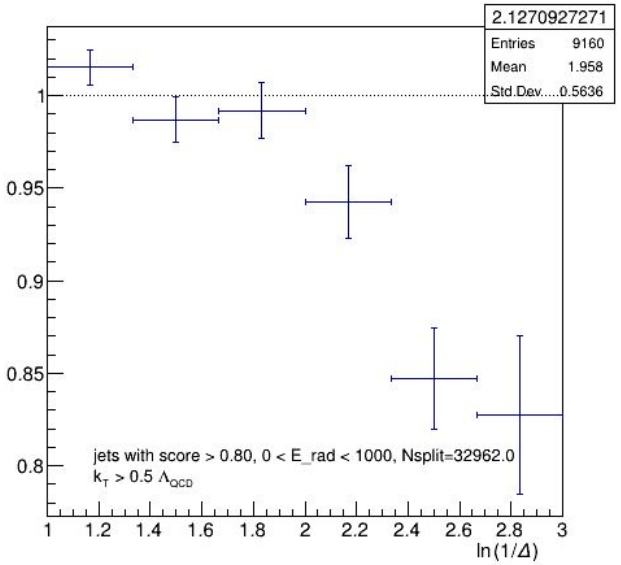


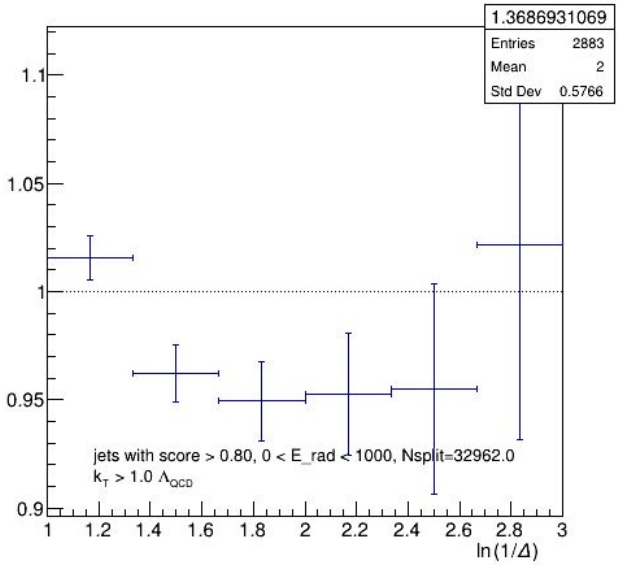
considered k_T cuts: (½ , 1, 2) * Λ_{QCD} (=200 MeV) which corresponds to
$ln(k_T/GeV)$ = (-2.3, -1.6, -0.9) https://arxiv.org/pdf/2004.05968.pdf

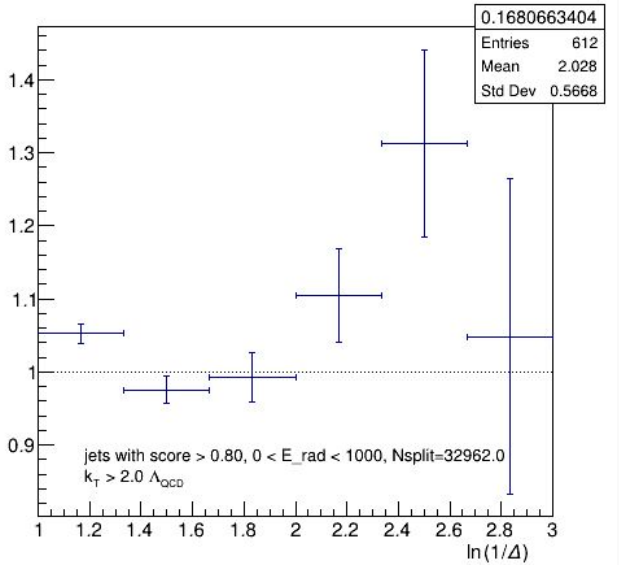
bins of $E_{radiator}$ and set: 5 > p_T > 50 GeV/c

WP: threshold = 0.8 ~ mistagging rate = 1%

any $E_{radiator}$

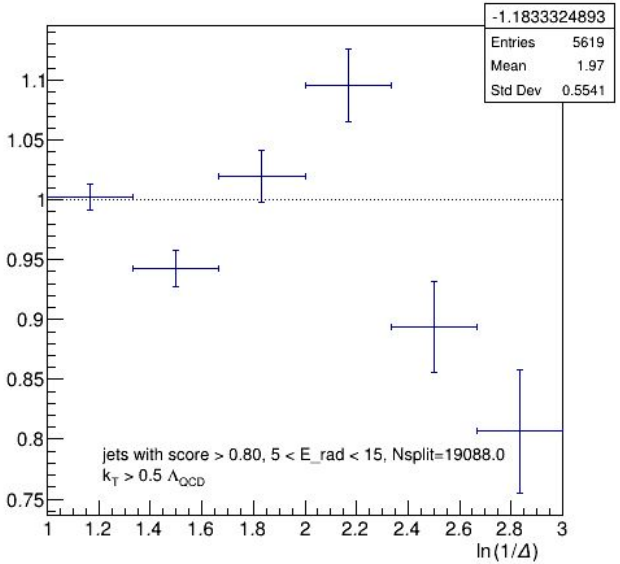


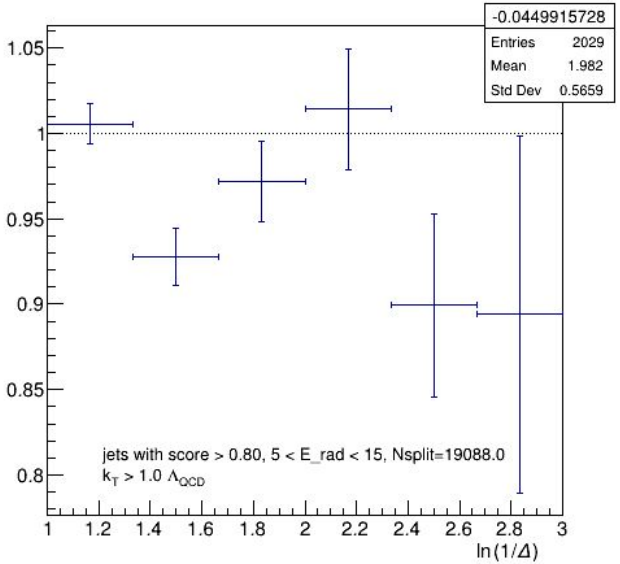


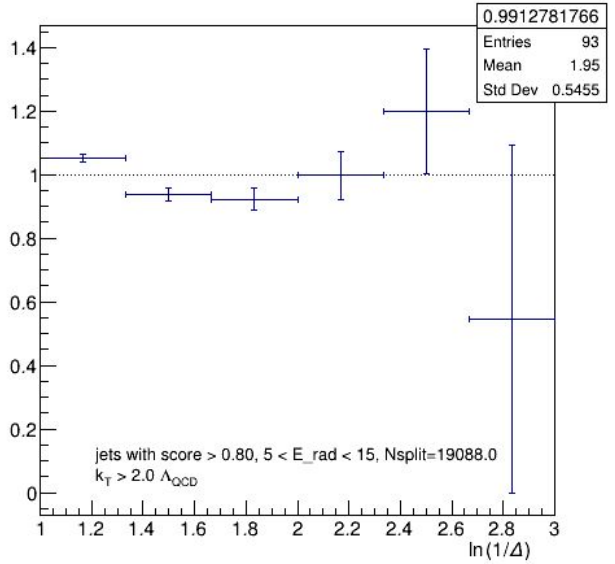


k_T cut = ½ * Λ_{QCD} **Λ_{QCD}** **2 * Λ_{QCD}**

$5 < E_{radiator} < 15$ GeV

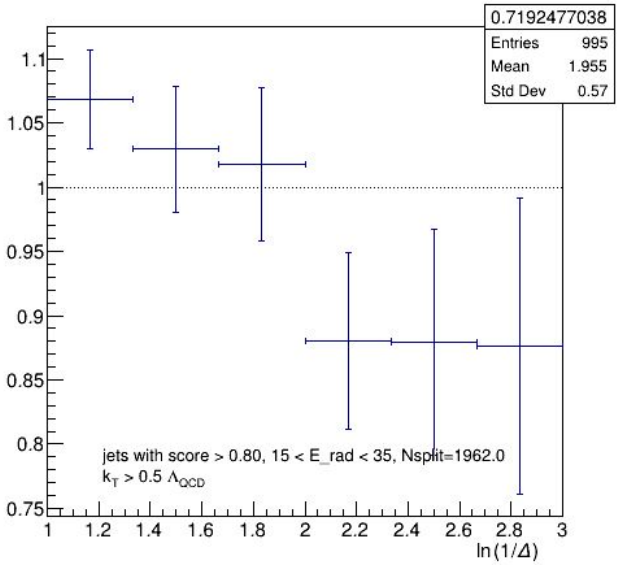


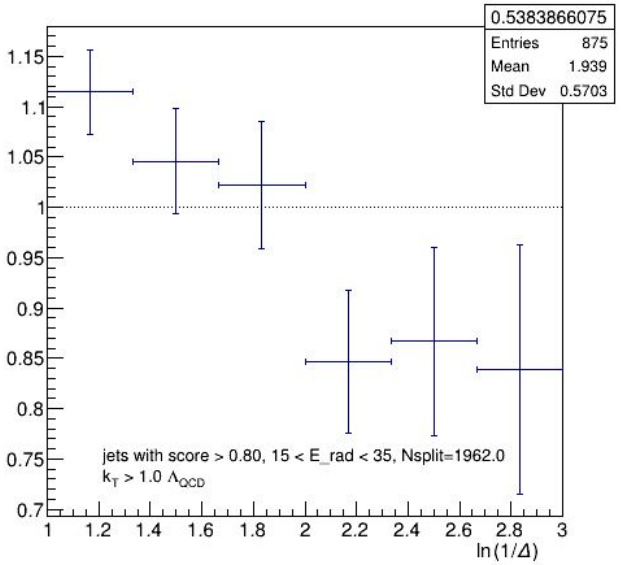


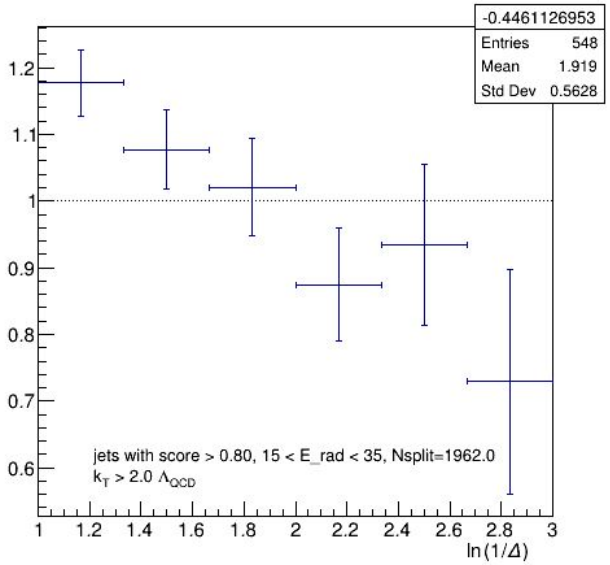


k_T cut = ½ * Λ_{QCD} **Λ_{QCD}** **2 * Λ_{QCD}**

$15 < E_{radiator} < 35$ GeV







k_T cut = ½ * Λ_{QCD} **Λ_{QCD}** **2 * Λ_{QCD}**

5-15 GeV * mass_b / mass_c = 16-48 GeV so maybe this is the most relevant bin?

Next steps, discussion

what is effect of grooming?

is there any dead-cone in PYTHIA?

relation of Erad vs jet pt

data-MC ratio of Lund planes

check how sensitive to pT range we are (on MC)

Next steps?

- data - MC diff <- 1. DONE
- built x-section <- 2. (response matrix etc)
- angular structure <- 3. DONE?
- more pp data <- 4.

analysis note <- 0. (BEFORE HOLIDAY)

BACKUP/TODO: projections

Final results will be probably shown as projections on $ln(1/\Delta)$ binned by E_radiator and with cut on low k_T

considered k_T cuts: (½ , 1, 2) * Λ_{QCD} (=200 MeV) which corresponds to $ln(k_T/\text{GeV})$ = (-2.3, -1.6, -0.9) https://arxiv.org/pdf/2004.05968.pdf

“The suppression of the low angle emission probability for b-tagged radiators relative to inclusive ones is of order 80% at ln(1/θ) = 2, which approximately corresponds 0.14 radians. The corresponding suppression for c-tagged radiators is of order 20%.” https://arxiv.org/pdf/1812.00102.pdf

BACKUP: #jets in data

#jets in LHC15n:

45mln total
854k pt > 5
147k pt > 10
18k pt > 20
1100 pt > 40