How many colors does a quark come in?

- we learned how to calculate the R-value and to deduce the number of quark colors.

$$R = \frac{N(\text{light quarks})}{\frac{1}{2} \cdot [N(\text{muons}) + N(\text{taus})]} = N_C \cdot \frac{10}{9}$$

How many colors does a quark come in?

- we learned how to calculate the R-value and to deduce the number of quark colors.

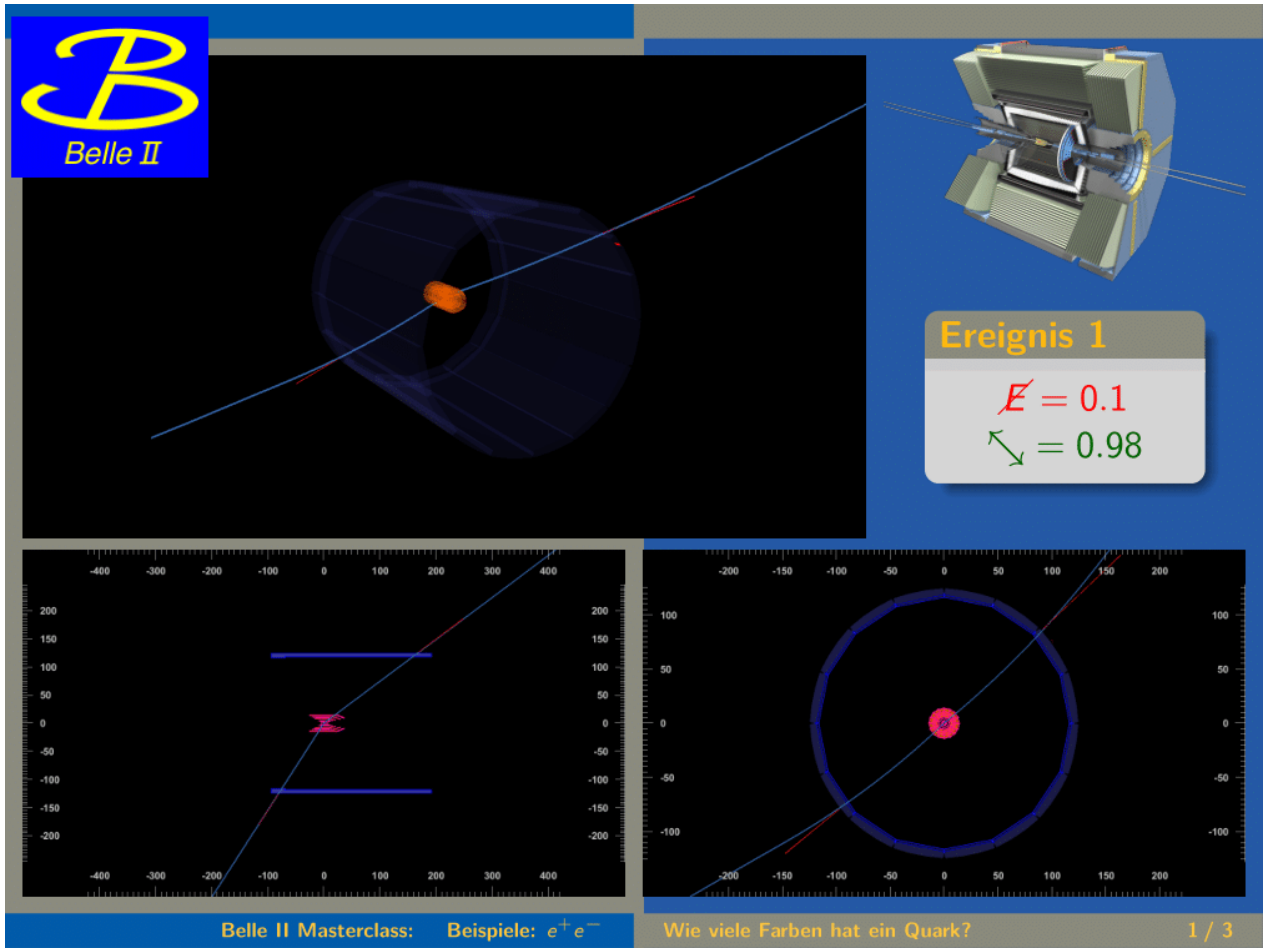
$$R = \frac{N(\text{light quarks})}{\frac{1}{2} \cdot [N(\text{muons}) + N(\text{taus})]} = N_C \cdot \frac{10}{9}$$

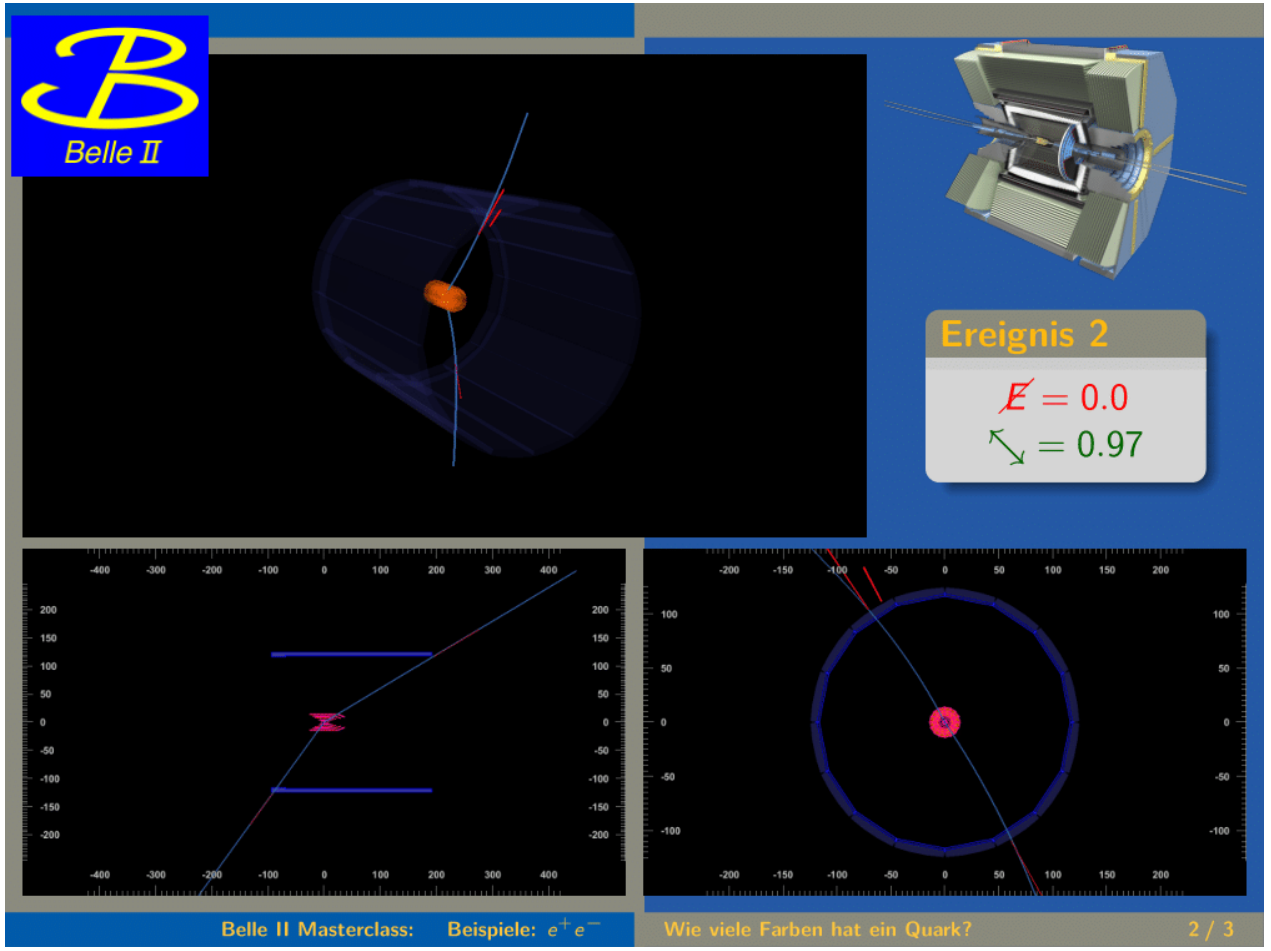
➢ To measure the number of colors, we have to count the number of different processes

- Therefore:

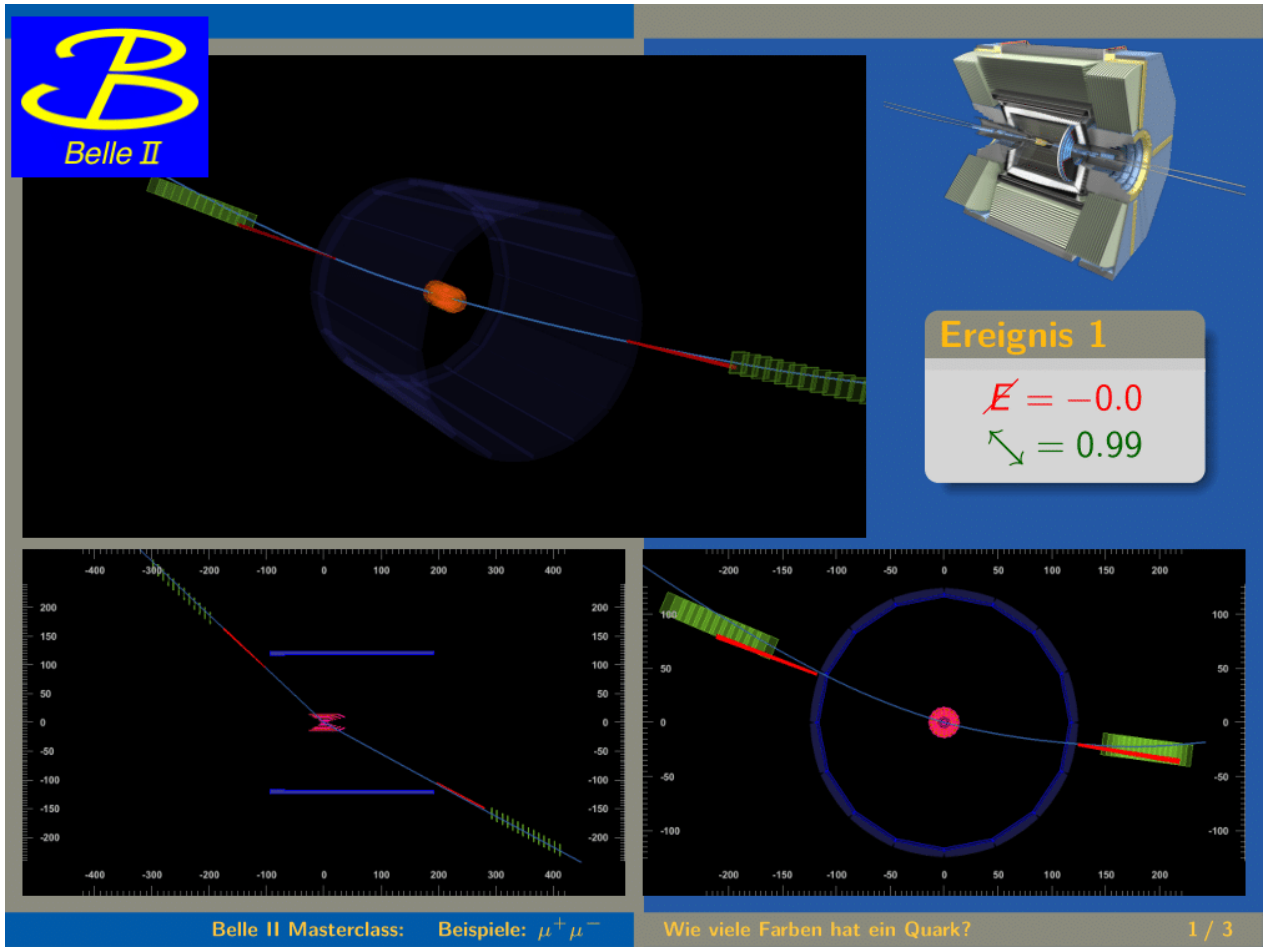
  ➢ We want to learn how to distinguish the different processes from each other in the detector

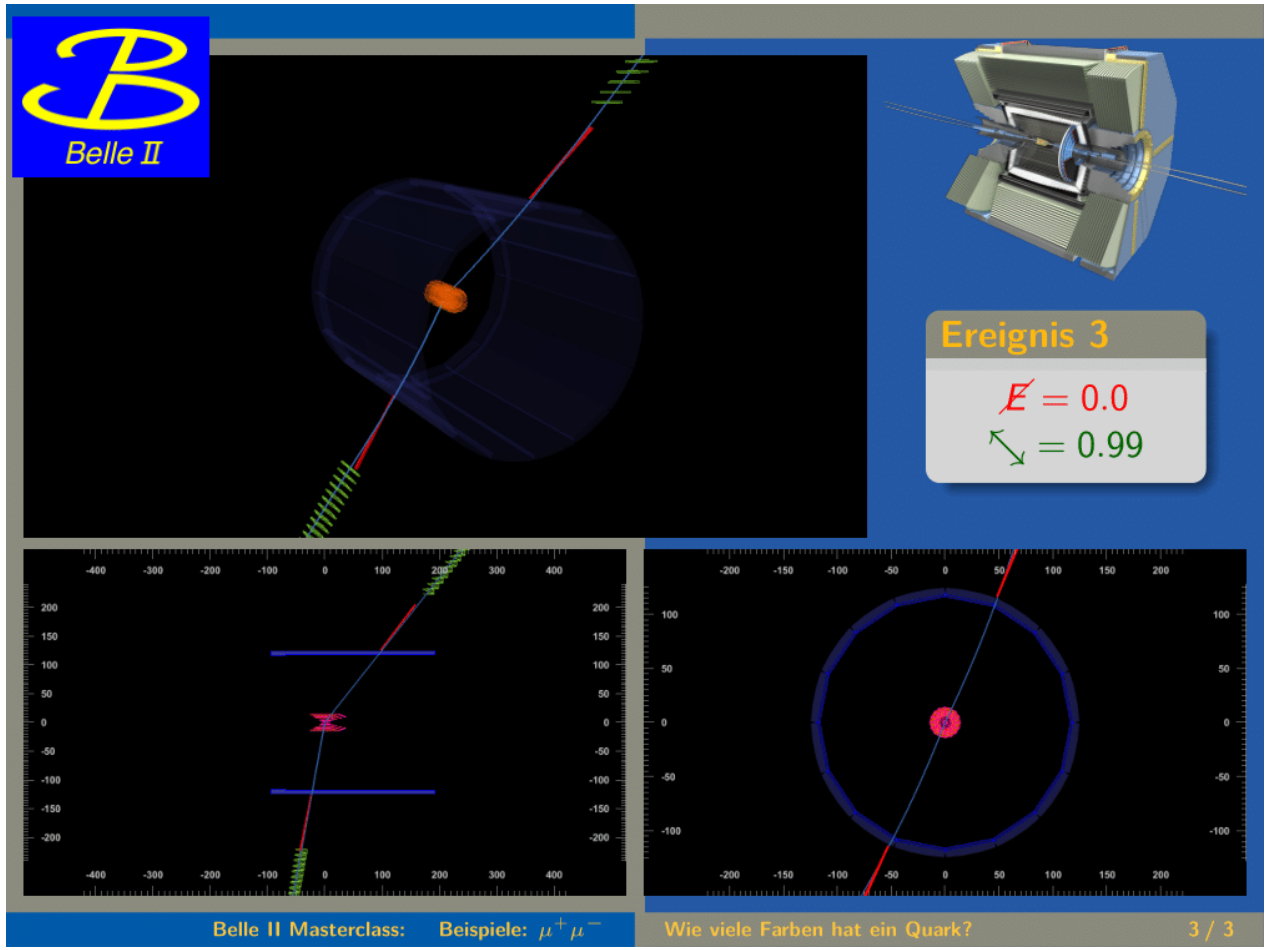
Electron/Positron events



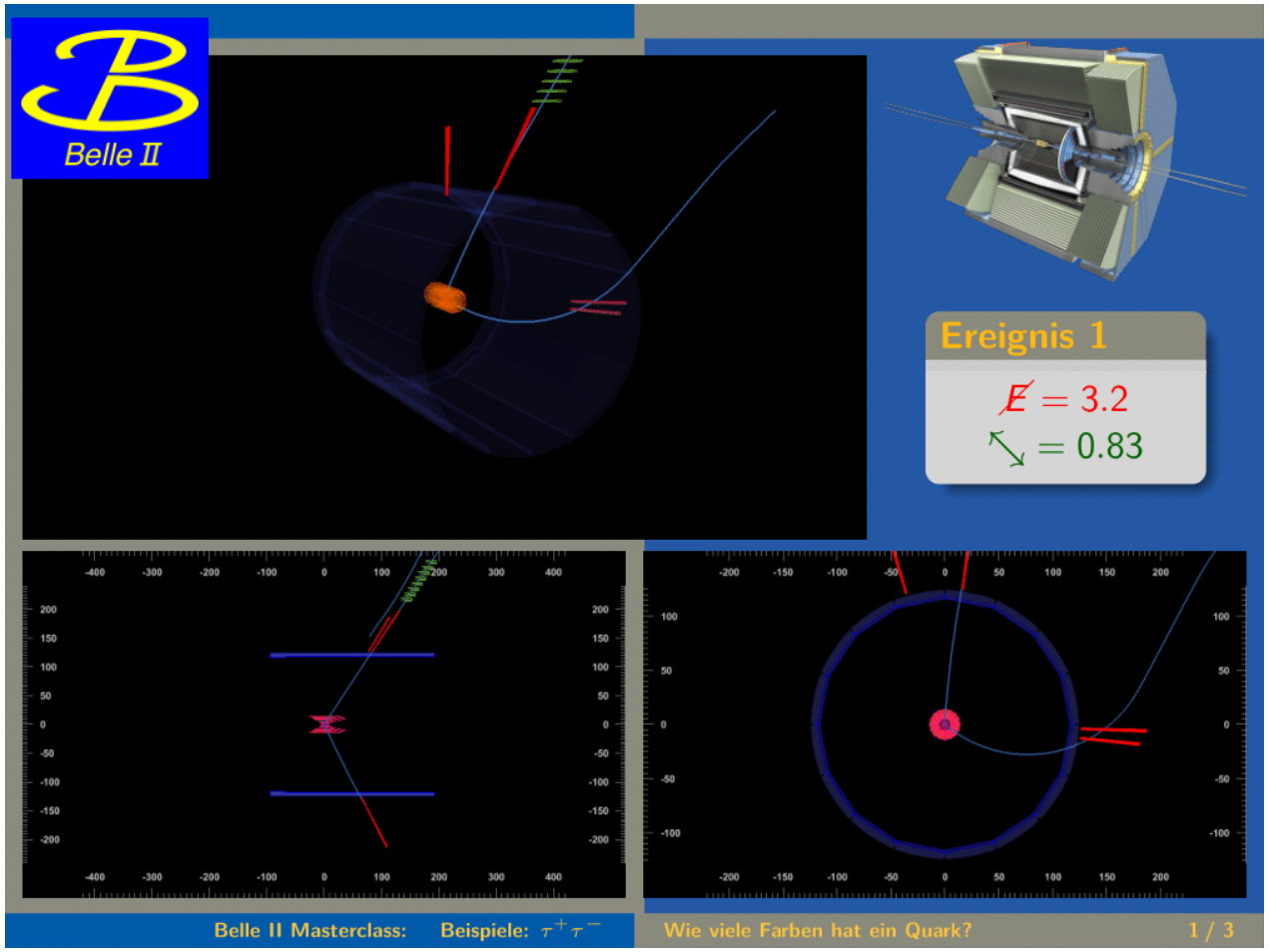


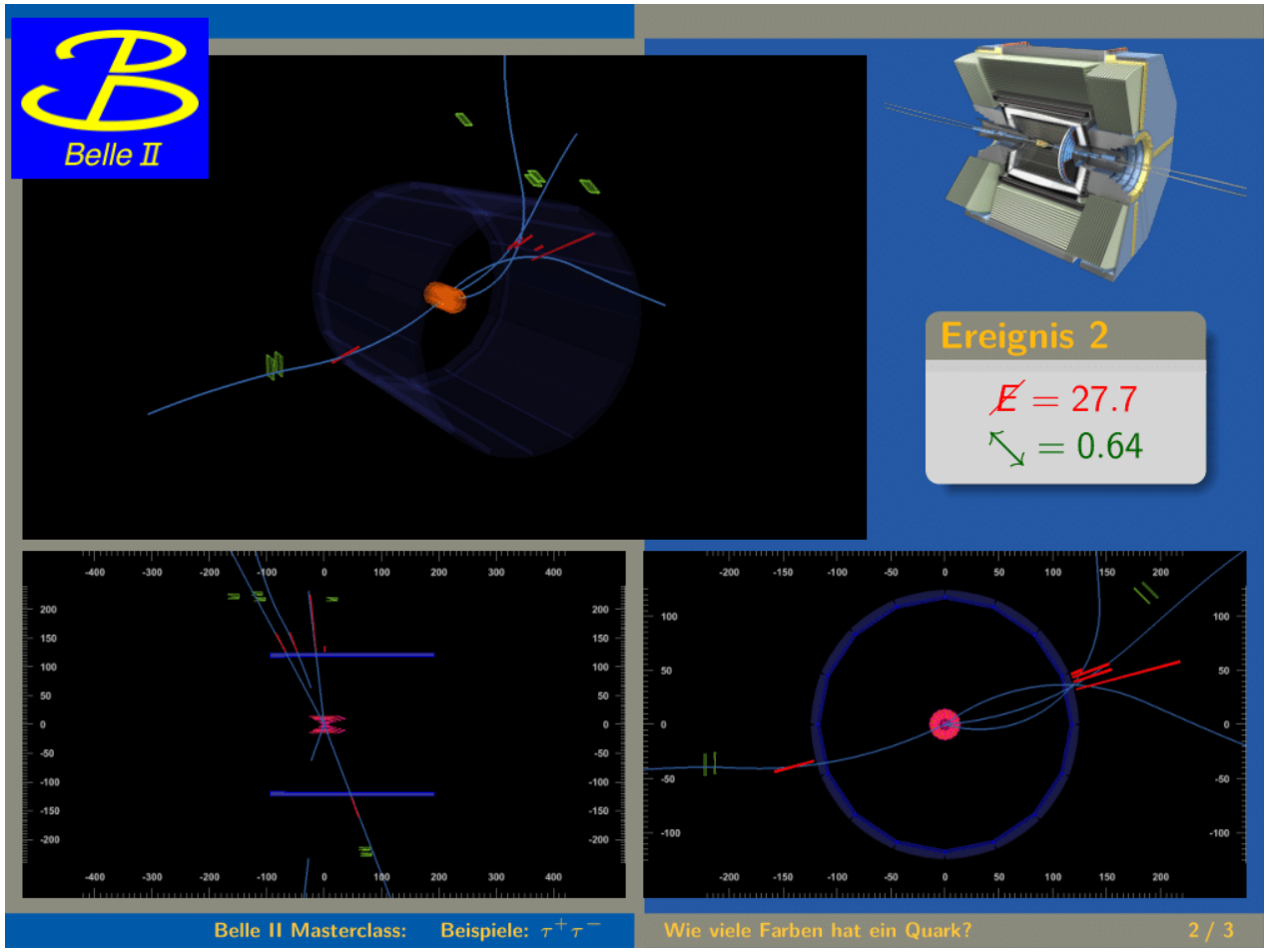
Muon/AntiMuon events



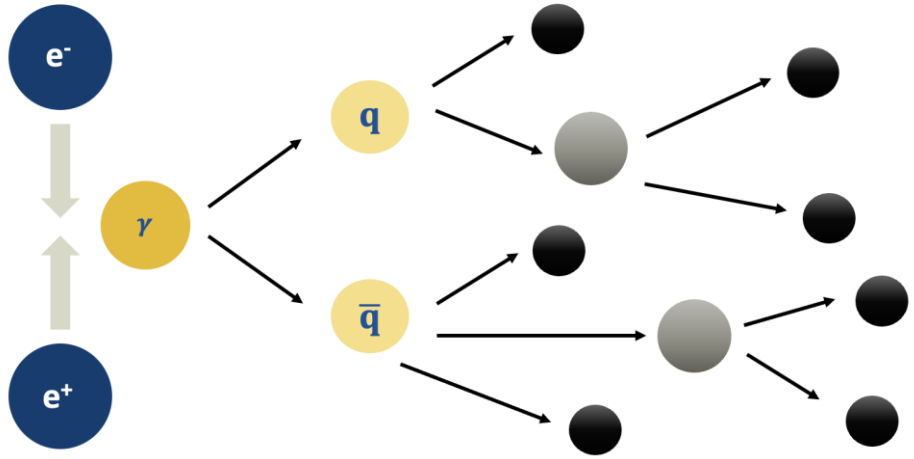


Tau/AntiTau events

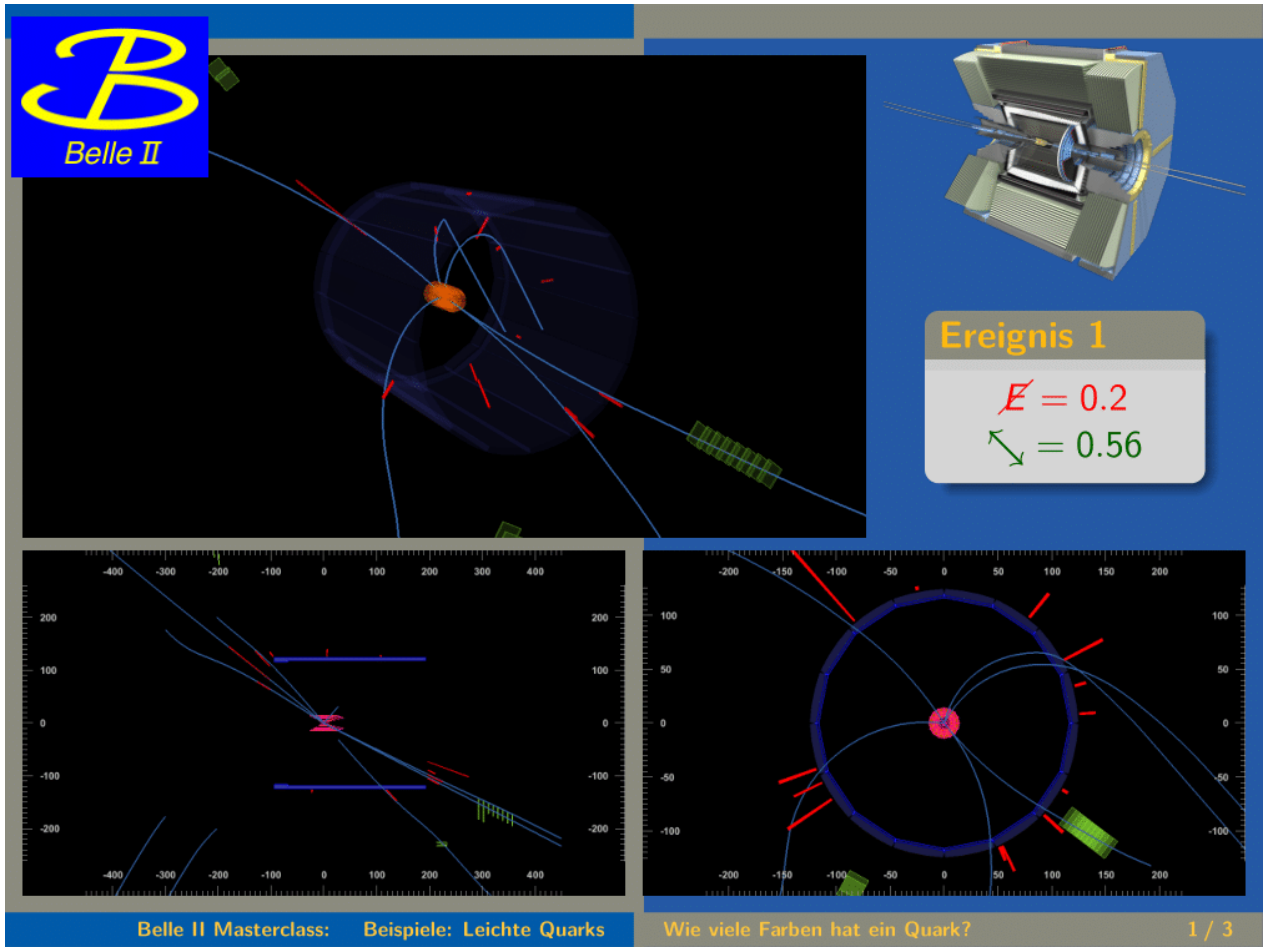


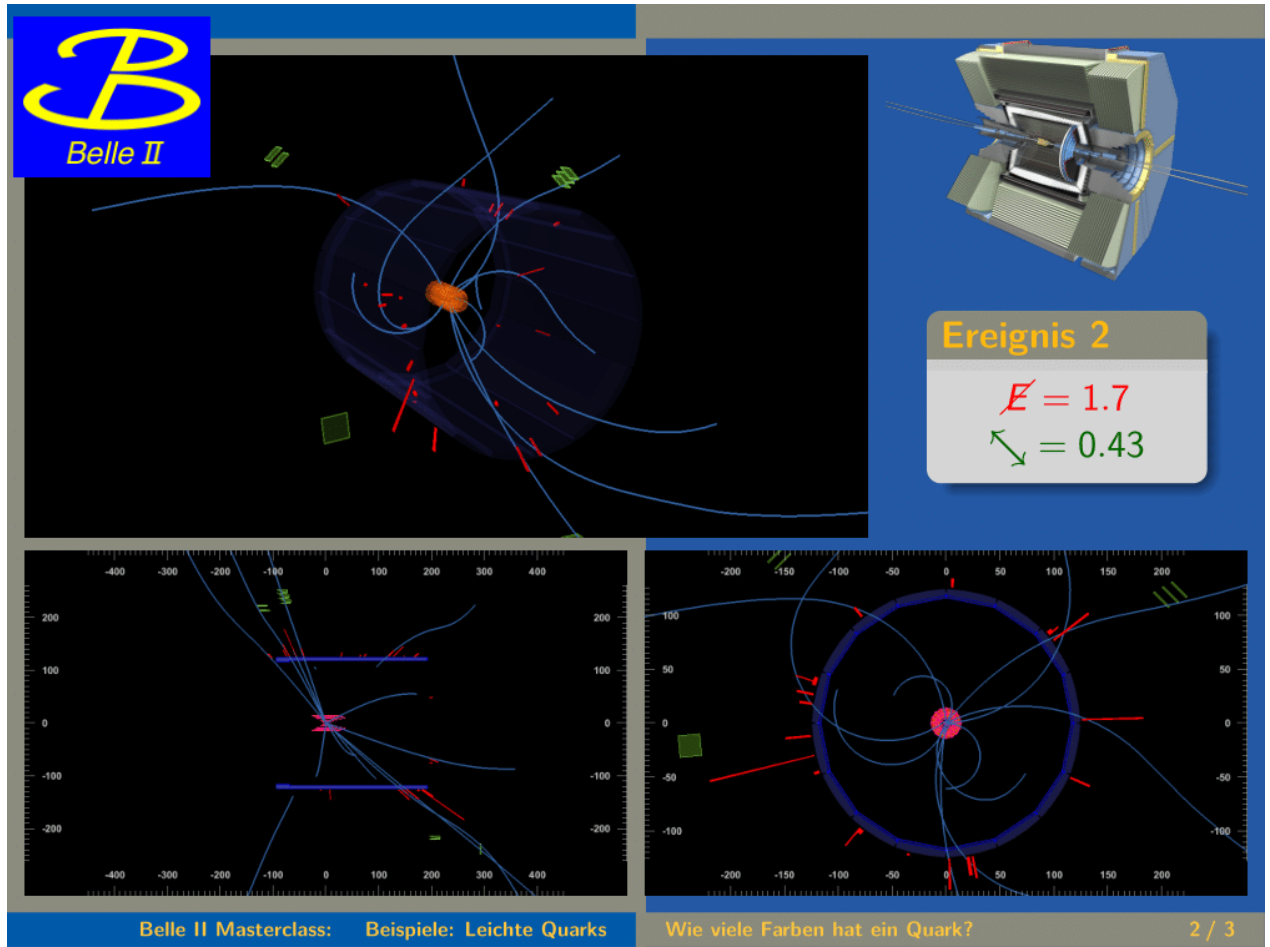


Light Quark/Antiquark events

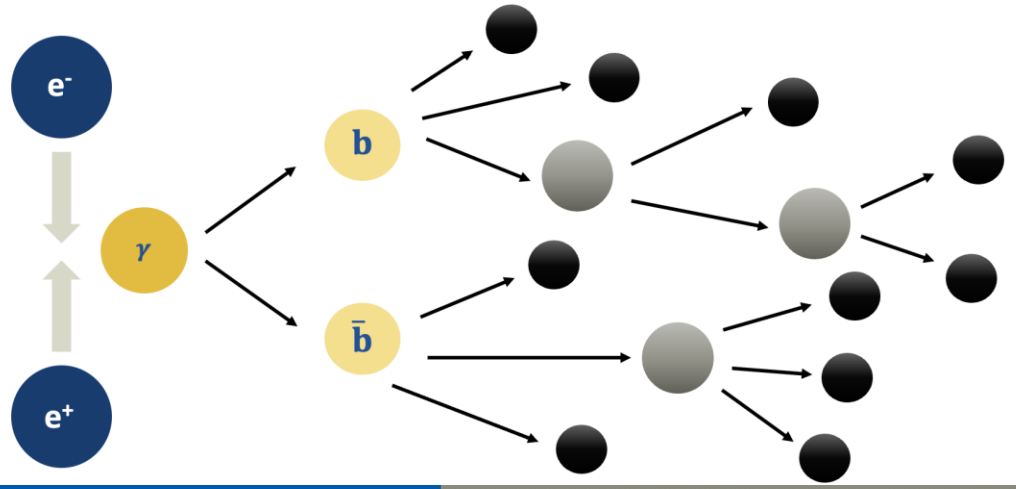


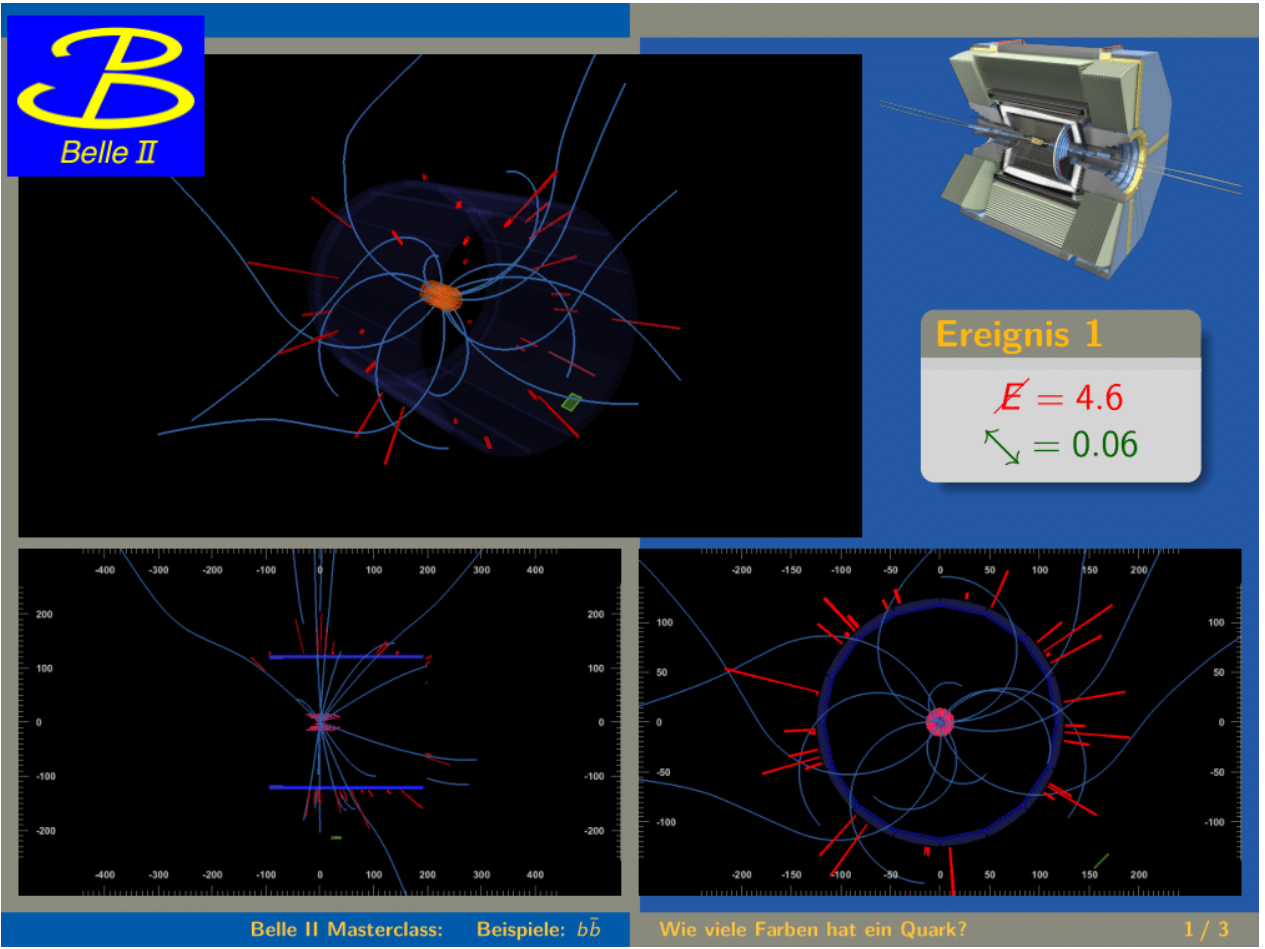
- Decay into a large variety of final states

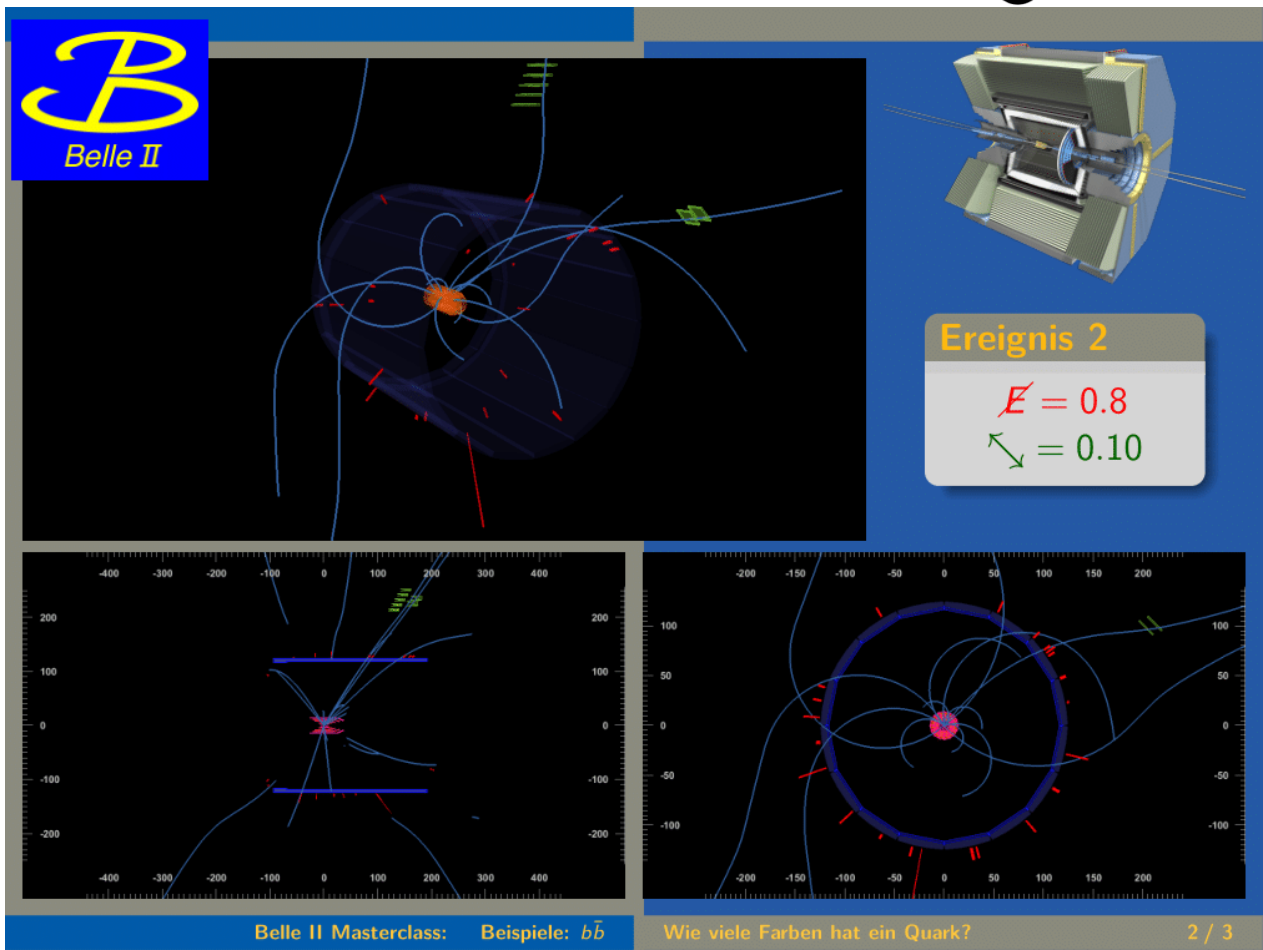


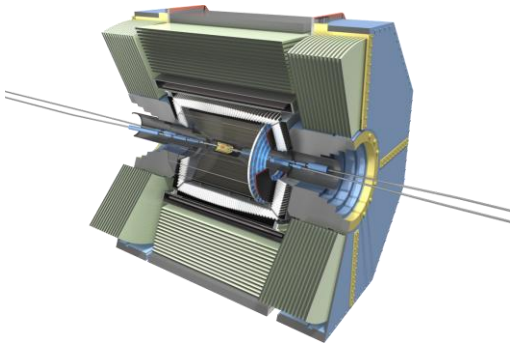


b/Anti-b Quark events









Start

How many tracks do you count in the event?

≤ 1

Other

2

How large is $\not{E}$?

≤ 5.9

How many tracks do have the green signals on their edge?

0

e^+e^-

2

$\mu^+\mu^-$

1

$\tau^+\tau^-$

≥ 6

$\tau^+\tau^-$

3

4

Is the event shape roughly like this: 

yes

$\tau^+\tau^-$

unsure/no

How large is $\not{E}$?

≥ 0

How large is ↘ ?

≥ 0.6

$\tau^+\tau^-$

≤ 0.59

$\bar{q}q$

≤ −0.1

$\bar{q}q$

5 – 11

How large is ↘ ?

≥ 0.16

$\bar{q}q$

≤ 0.15

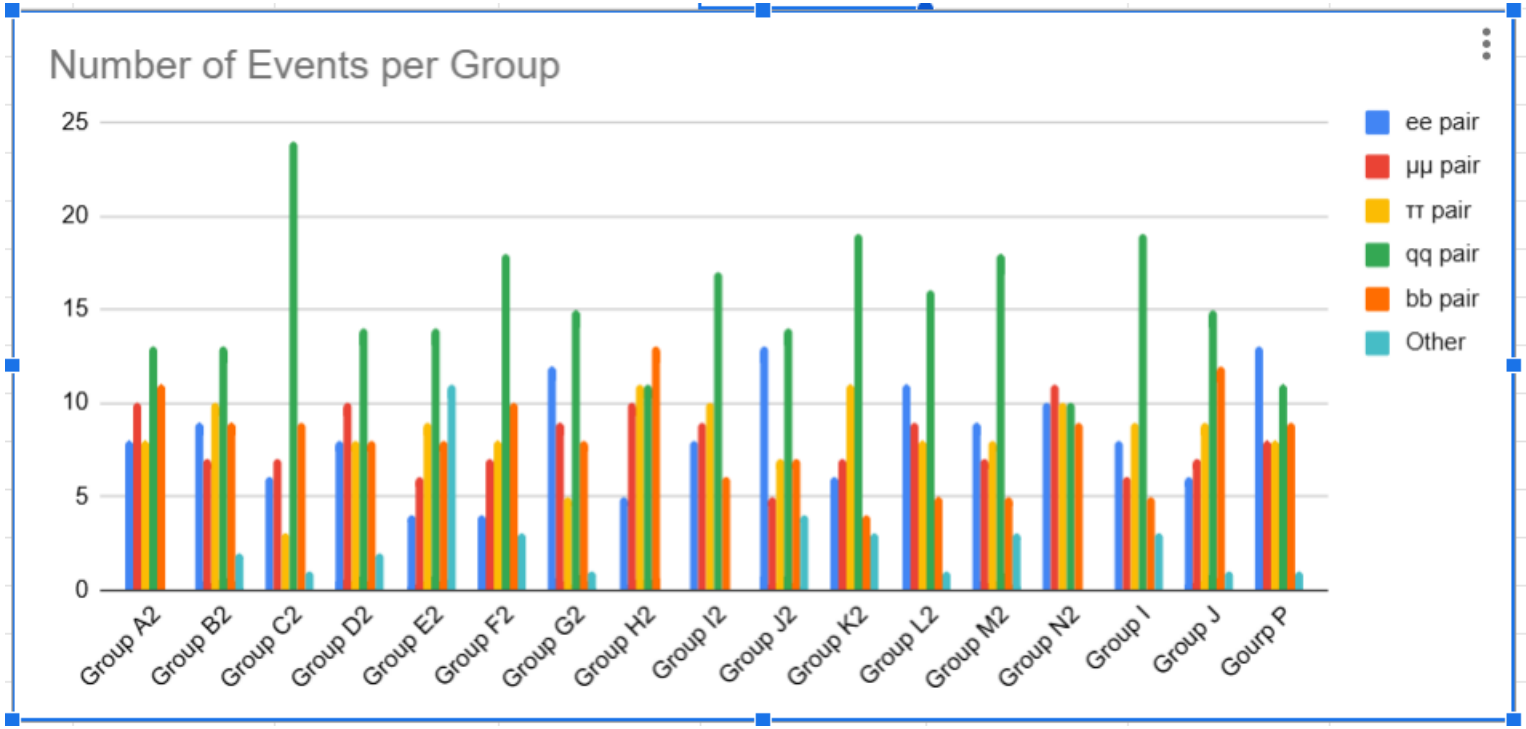
$\bar{b}b$

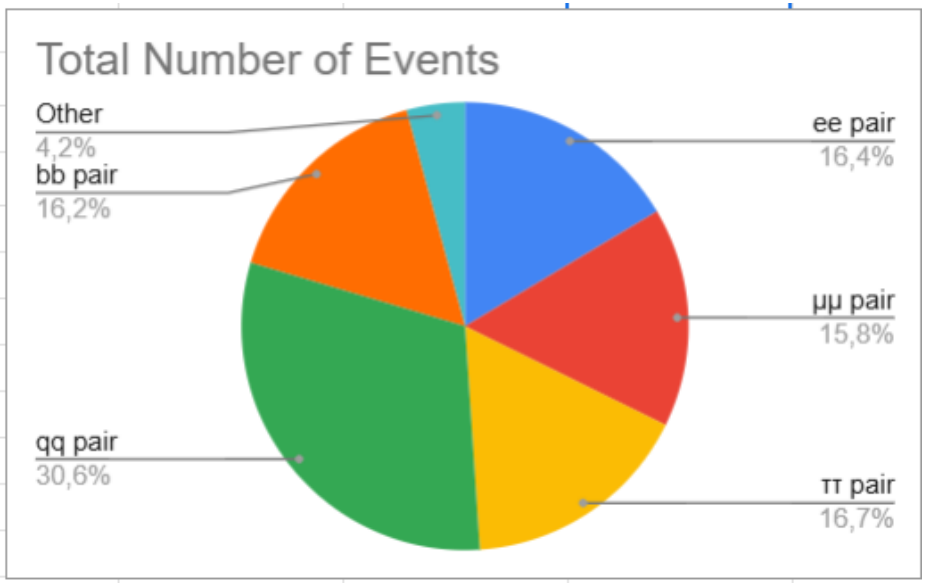
≥ 12

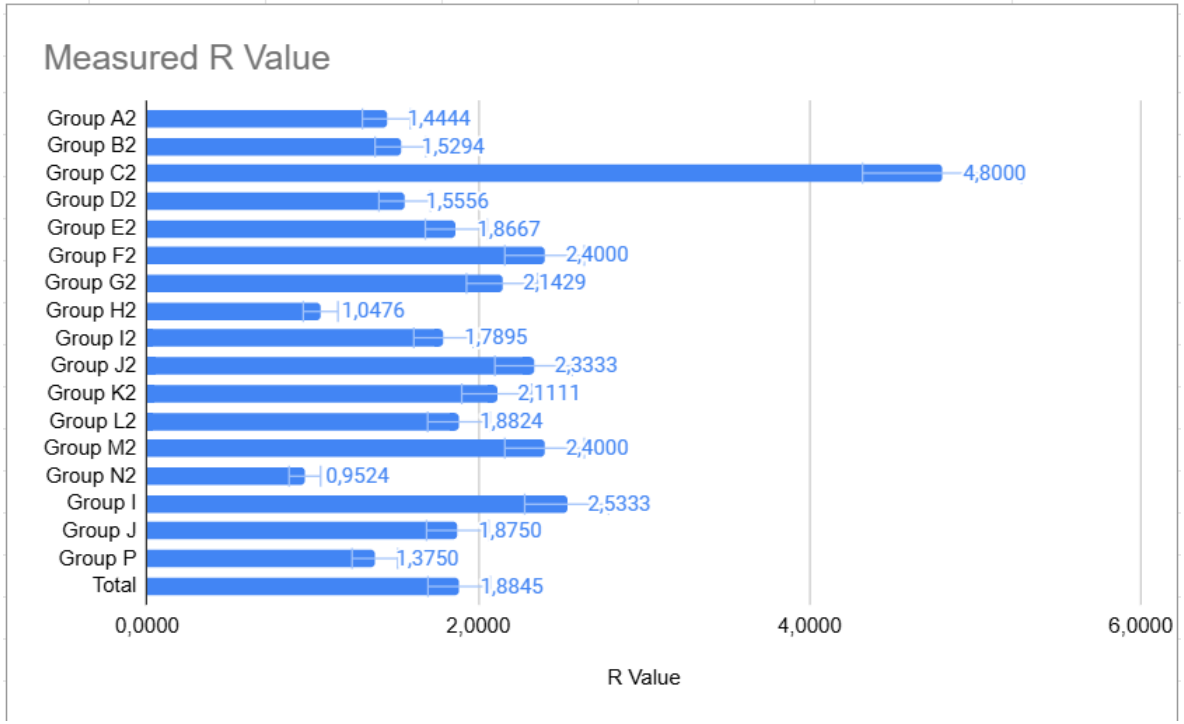
$\bar{b}b$

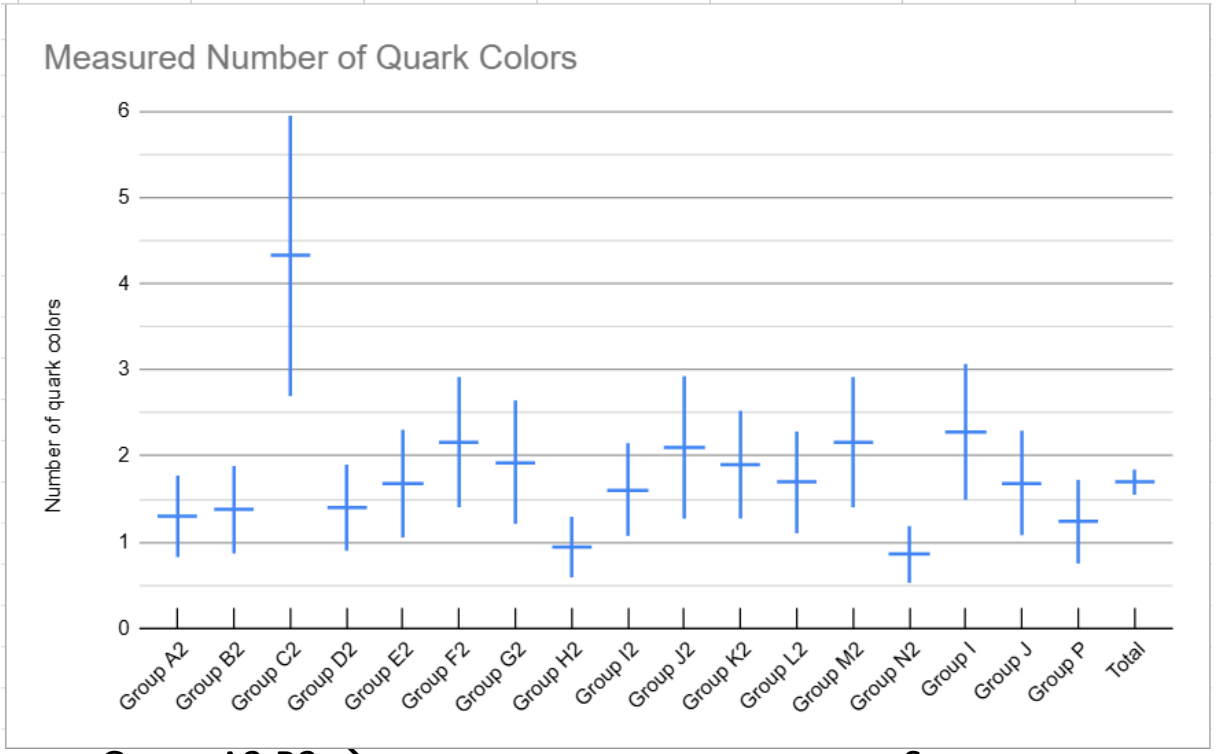
Results

24 students, 17 groups, 50 events each: 850 events in total









Group A2,B2 → ……..

S

R = 1.885 ± 0.163

$N_{color} = 1.696$

$N_{color} - 1\,\sigma = 1.550$

$N_{color} + 1\,\sigma = 1.842$