Štúdium b jetu a náboja top kvarku ako funkcia R_{cut}

Mgr. Philip Jendrichovsky

Úvod

- **Účasť na konferenciach**

  -Praha (10.9-11.9 2009)

  -Bratislava (10.2- 11.10.2010)

- **Prezentovanie výsledkov na videokonferencii:**

  - Štúdium b jetu ako funkcia R_{cut}

  - Štúdium b jetu a náboja top kvarku ako funkcia R_{cut}

Definicie

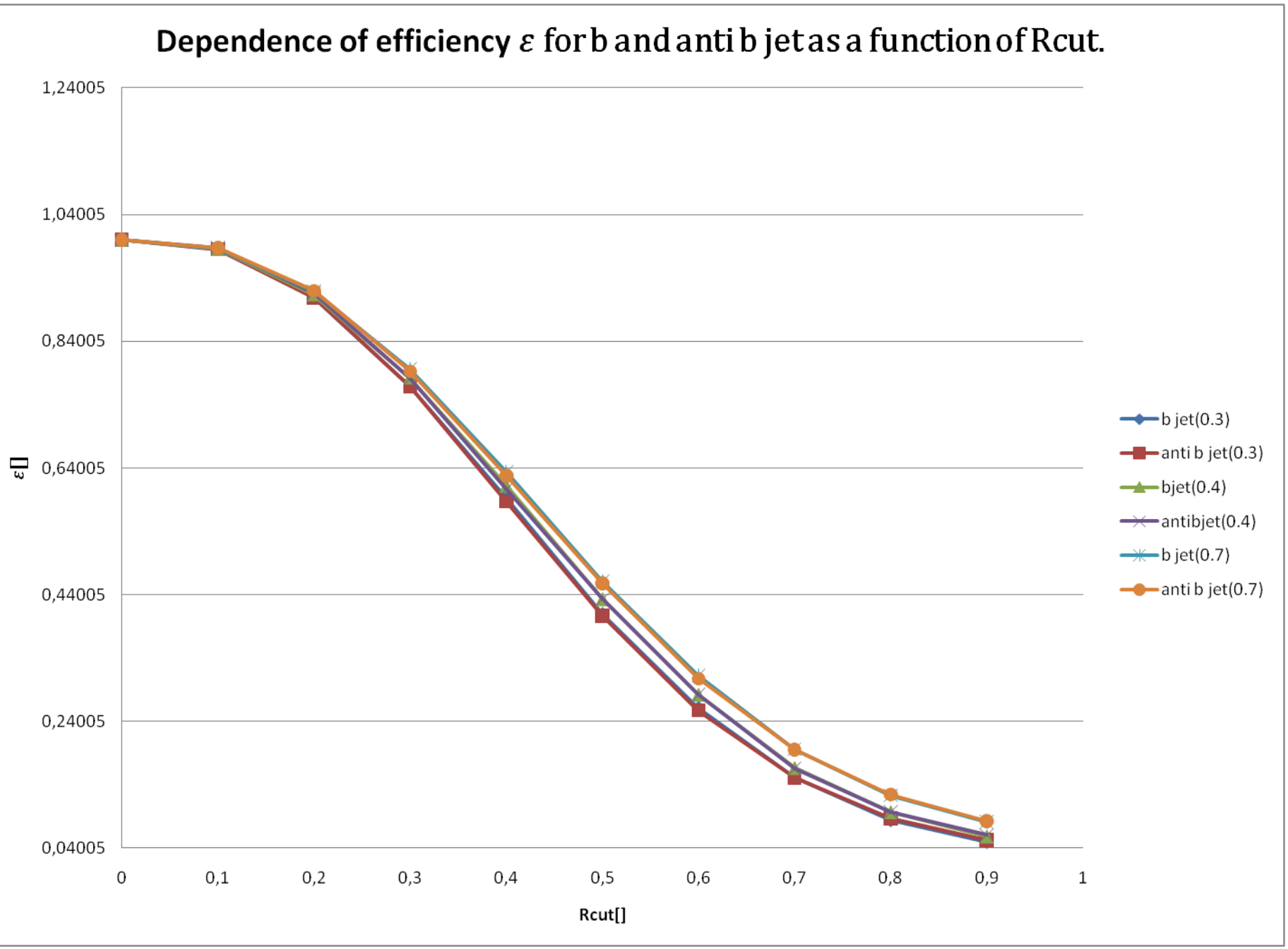
1. Váhovacia formula pre b jet: $Q_{jet} = \frac{\Sigma |\vec{p}_i \cdot \vec{p}_{jet}|^{0.5} Q_i}{\Sigma |\vec{p}_i \cdot \vec{p}_{jet}|^{0.5}}$
2. Pomer R: $R = \frac{\Sigma p_t}{P_t}$ Σp_t is a sum of the transverse momentum of all tracks and P_t is transverse momentum of b jet or anti b jet.
3. Rcut: b jet akceptovaný ak $R \geq R_{cut}$

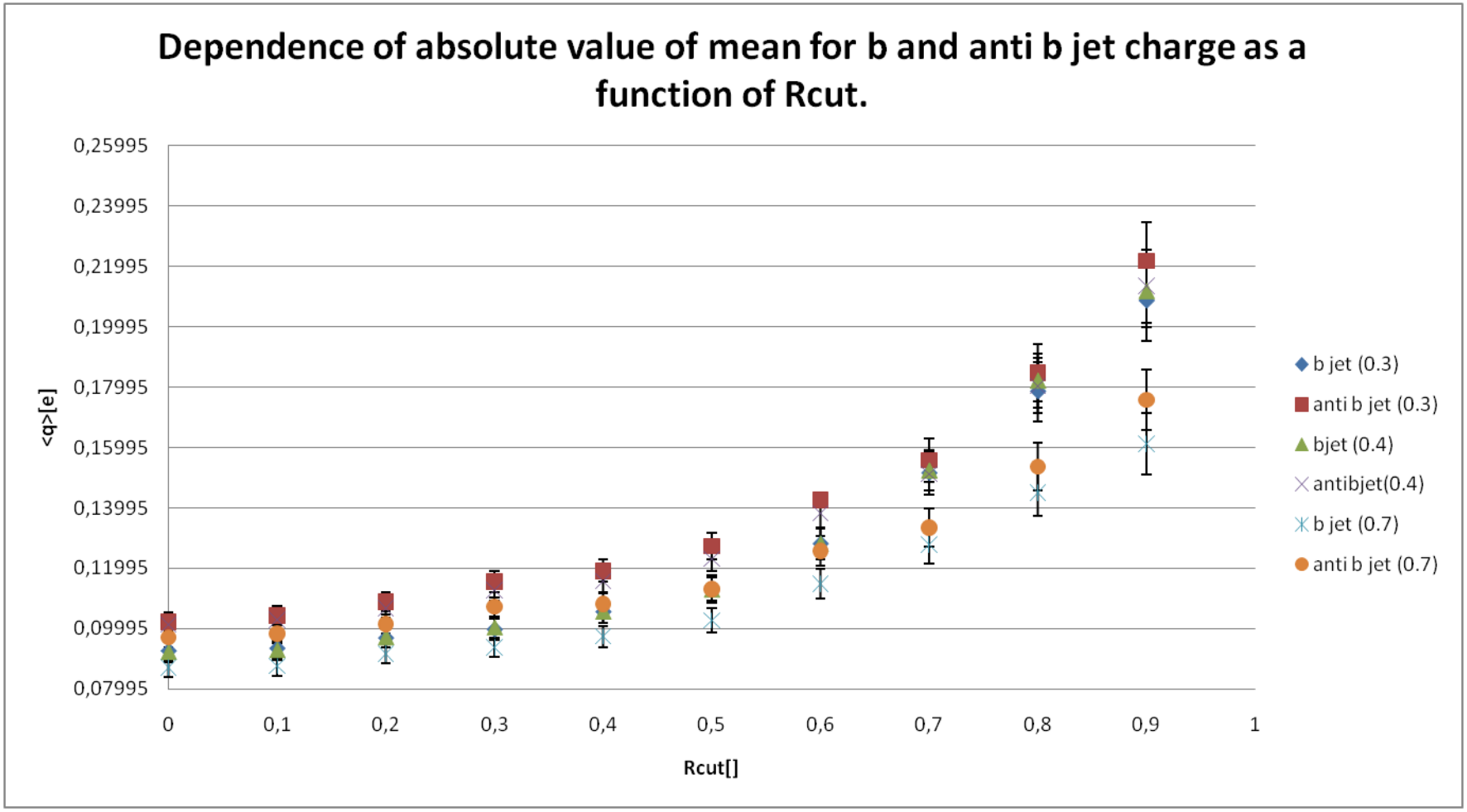
   R_{cut}= 0.,0.1,0.2,…,0.9;
4. Efficiency: $\varepsilon = \frac{N_R}{N_0}$ N_R is number of entries for R_{cut}, N_0 is number of entries for R_{cut}=0.
5. Jet charge purity: $P = \frac{\int_{-1}^{0} f(Q_{jet}) dQ_{jet}}{\int_{-1}^{1} f(Q_{jet}) dQ_{jet}}$ $f(Q_{jet})$ is distribution function of Q_{jet}.
6. εD^2 This is a multiplication efficiency ε and square of value D. The formula of D is:

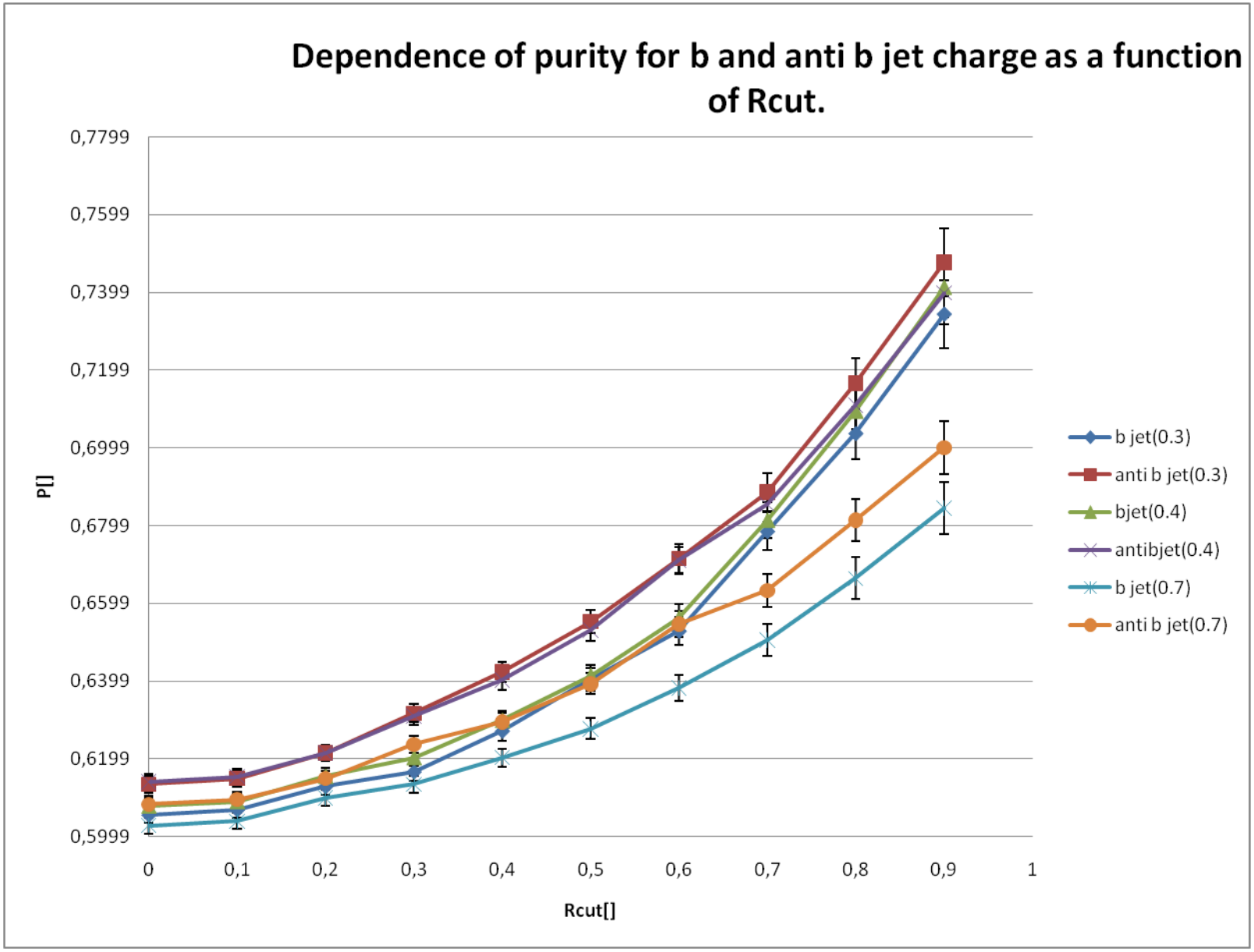
$$D = 2 * P - 1$$

PARAMETERS FOR JETCHARGE CALCULATION

- Size of cone around jet for assoc. tracks: cone_tr=0.3,0.4, 0,7
- D0 cut on selected tracks: $D0_{cut}$=0.15
- Pt cut on selected tracks: Pt_{cut}=1.5
- Limit on number of track used in calc. jet charge: TrLimit=100
- Top mass assumed in kinematic pairing: Mtop=175


Dependence of efficiency ε for b and anti b jet as a function of Rcut.
1,24005
1,04005
0,84005
0,64005
0,44005
0,24005
0,04005
ε[]
0
0,1
0,2
0,3
0,4
0,5
0,6
0,7
0,8
0,9
1
Rcut[]
b jet(0.3)
anti b jet(0.3)
bjet(0.4)
antibjet(0.4)
b jet(0.7)
anti b jet(0.7)


Dependence of absolute value of mean for b and anti b jet charge as a function of Rcut.
0,25995
0,23995
0,21995
0,19995
0,17995
0,15995
0,13995
0,11995
0,09995
0,07995
<q>[e]
0
0,1
0,2
0,3
0,4
0,5
0,6
0,7
0,8
0,9
1
Rcut[]
b jet (0.3)
anti b jet (0.3)
bjet (0.4)
antibjet(0.4)
b jet (0.7)
anti b jet (0.7)


Dependence of purity for b and anti b jet charge as a function of Rcut.
P[]
0,7799
0,7599
0,7399
0,7199
0,6999
0,6799
0,6599
0,6399
0,6199
0,5999
0
0,1
0,2
0,3
0,4
0,5
0,6
0,7
0,8
0,9
1
Rcut[]
b jet(0.3)
anti b jet(0.3)
bjet(0.4)
antibjet(0.4)
b jet(0.7)
anti b jet(0.7)

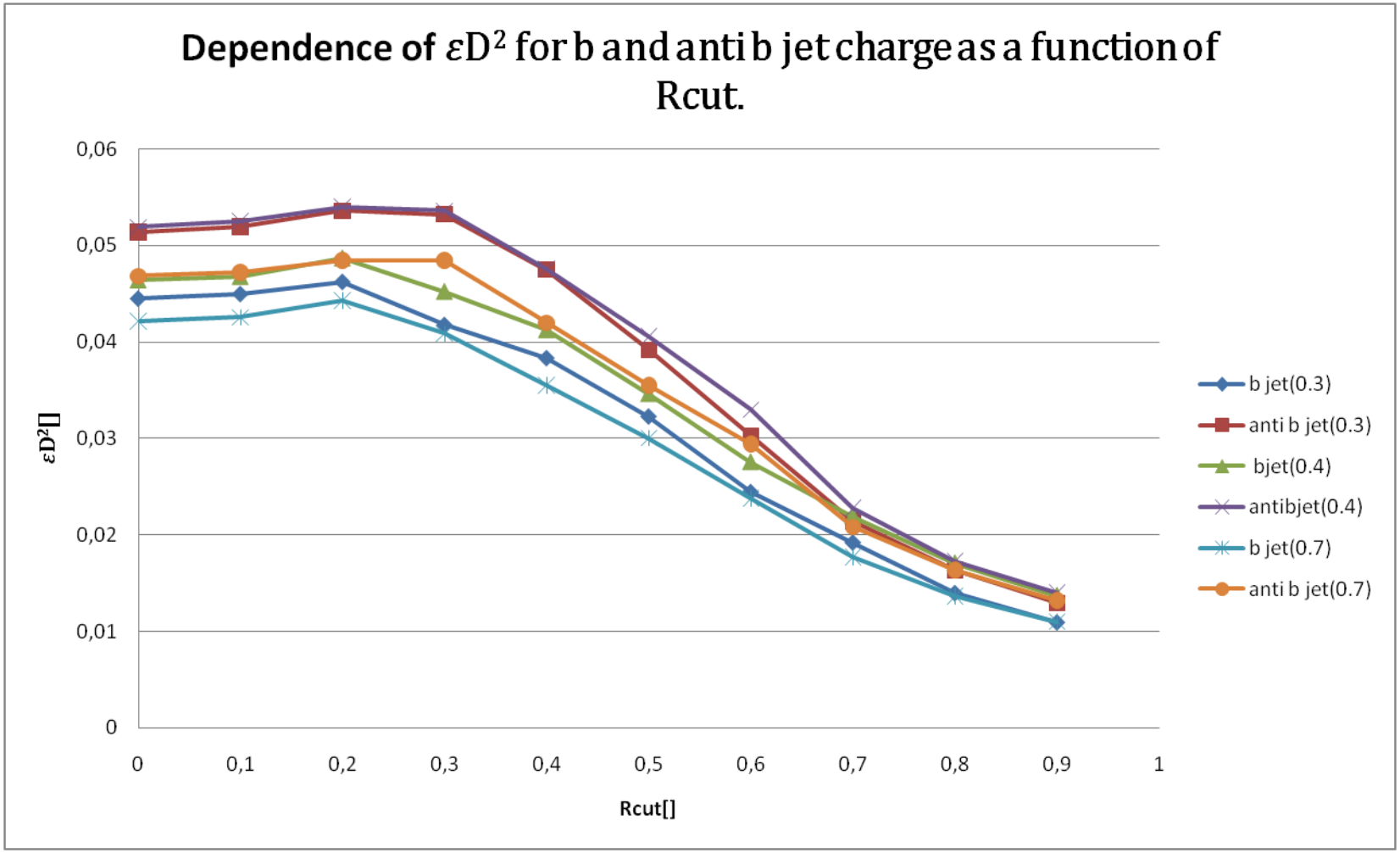
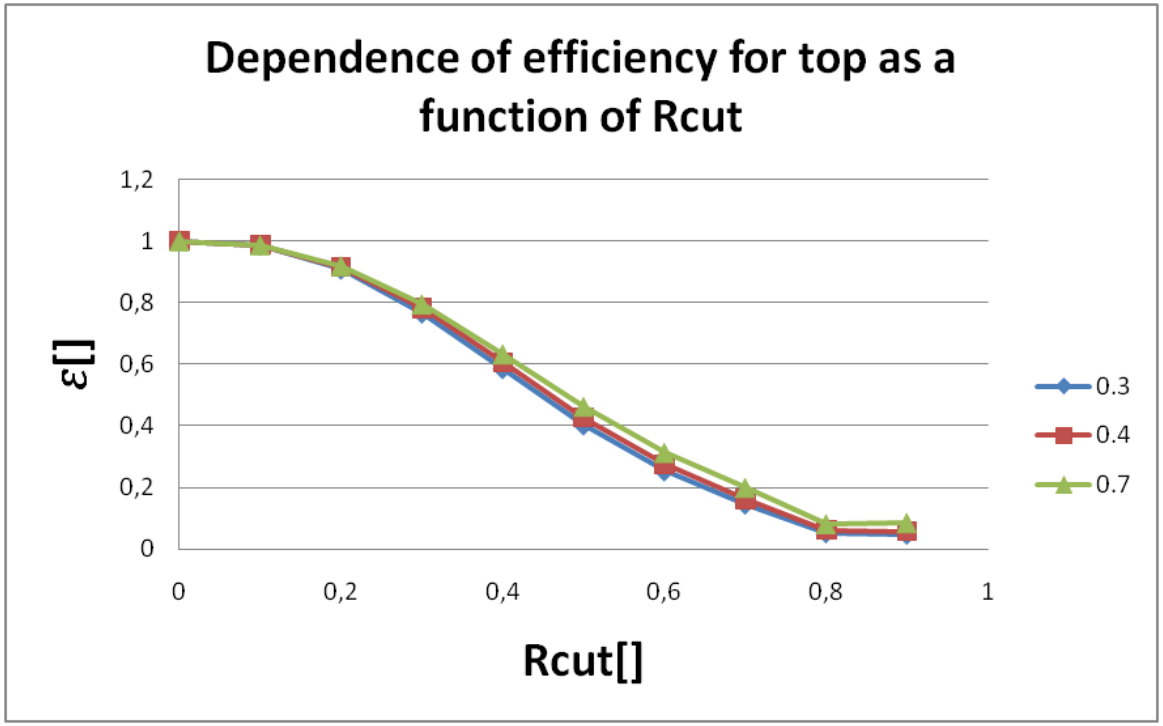

Dependence of εD² for b and anti b jet charge as a function of Rcut.
0,06
0,05
0,04
0,03
0,02
0,01
0
εD²[]
0
0,1
0,2
0,3
0,4
0,5
0,6
0,7
0,8
0,9
1
Rcut[]
b jet(0.3)
anti b jet(0.3)
bjet(0.4)
antibjet(0.4)
b jet(0.7)
anti b jet(0.7)

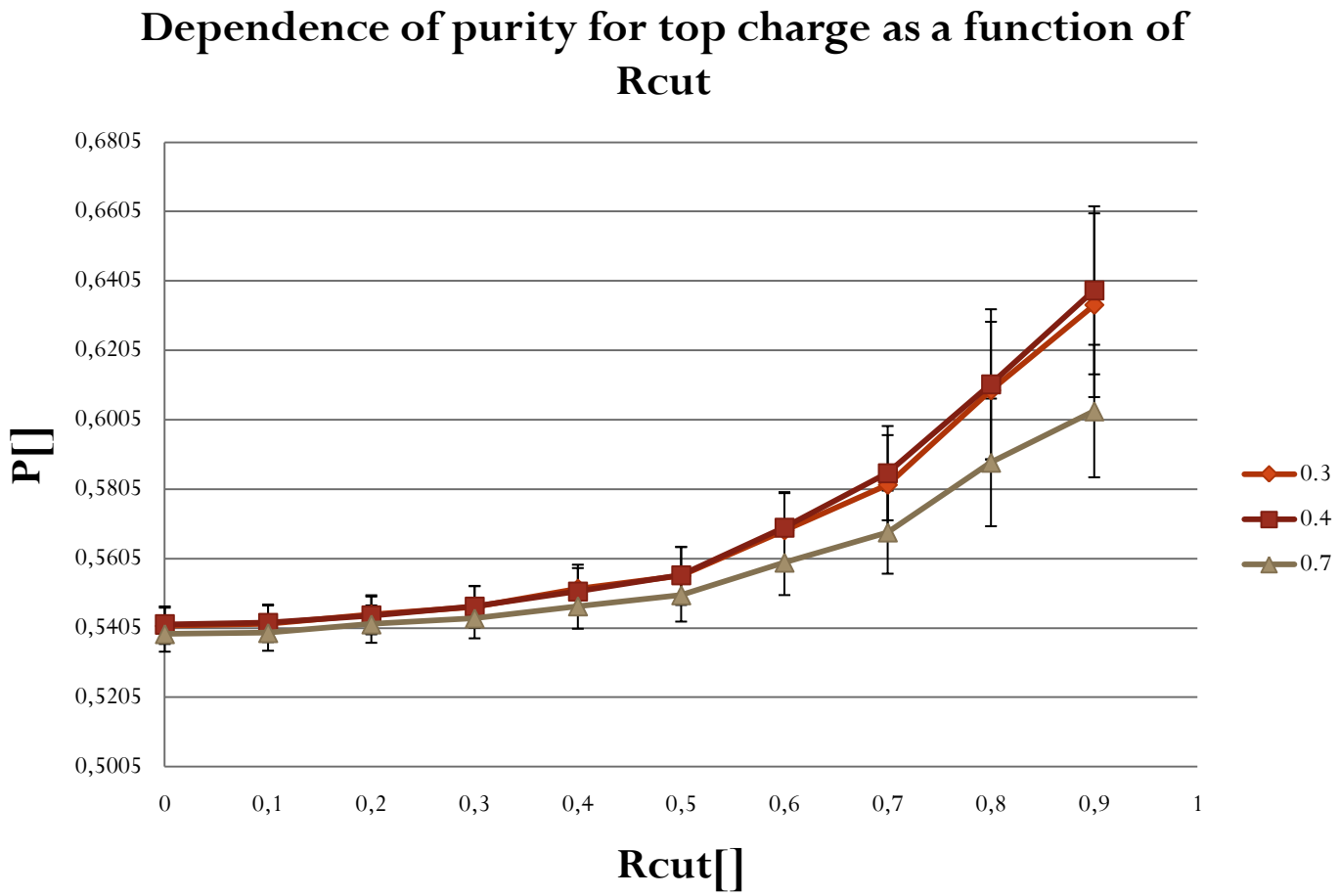
Table1. *This describes efficiency of b and anti b jet for cone_tr=0.3 and 0.7.*

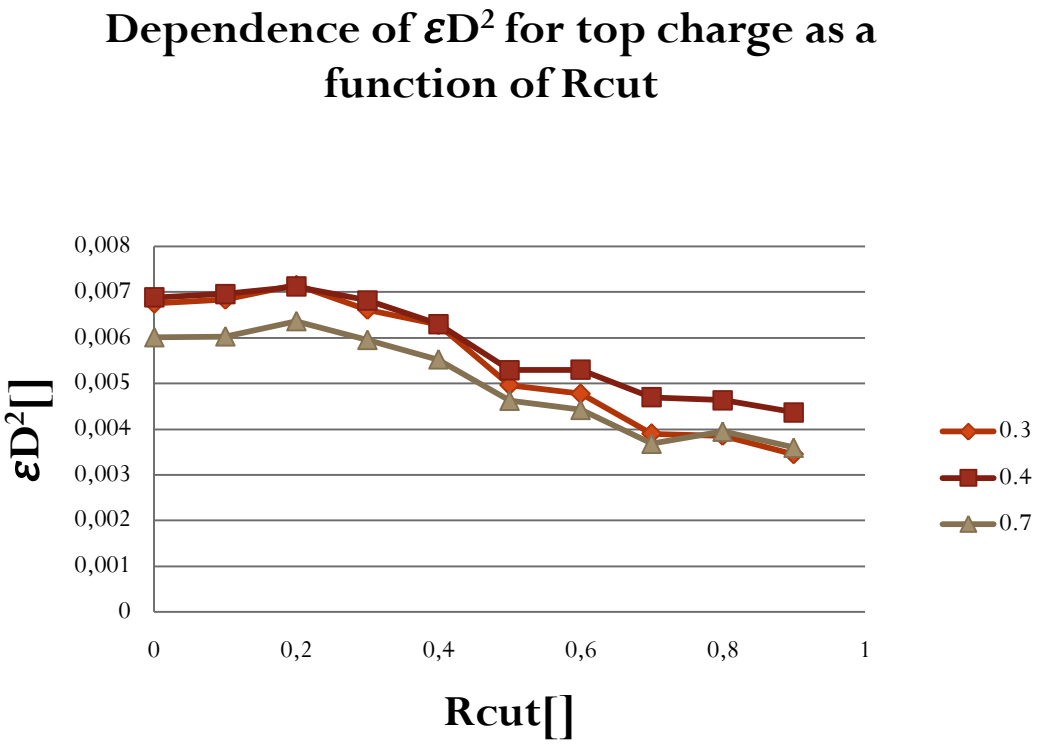
Efficiency	0.3	0.7
b jet	0,9866	1,006
anti b jet	0,9861	1,007

Efficiency of b and anti b jet for cone_tr is ratio number of entries for Rcut=0 for cone_tr =0.3,0.7 divided by number of entries for Rcut=0 for cone_tr=0.4. Efficiency between b and anti b jet for cone_tr is a same.

Top charge approach kinematic pairing

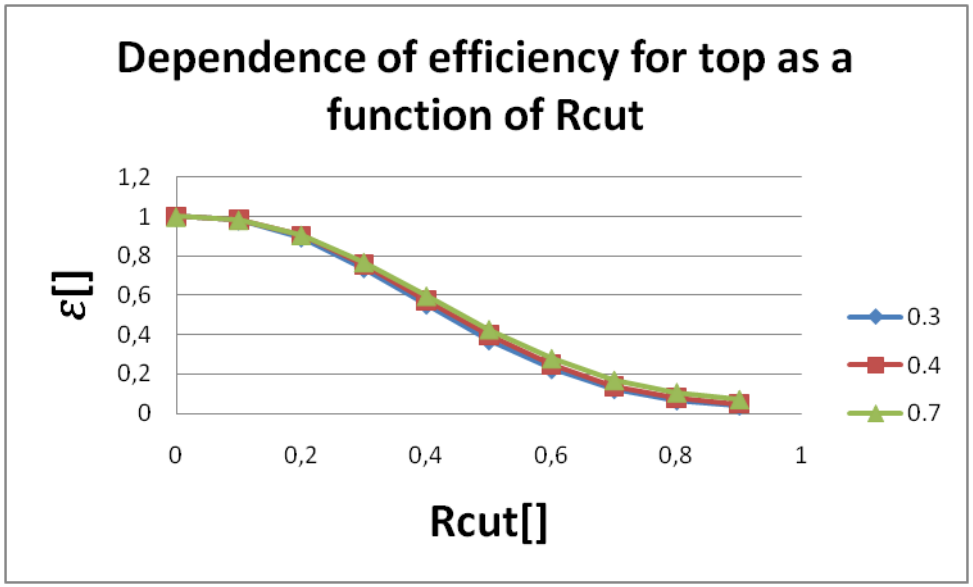


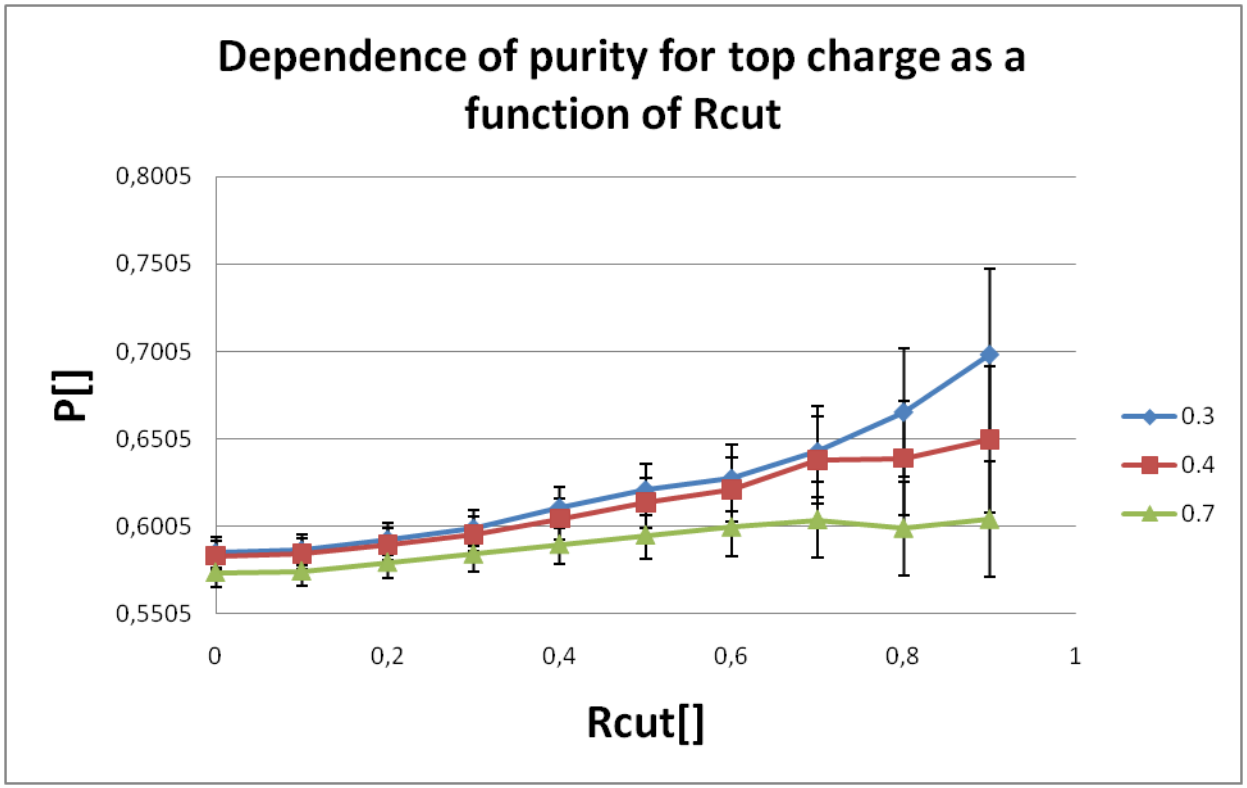

Dependence of purity for top charge as a function of Rcut
P[]
0,6805
0,6605
0,6405
0,6205
0,6005
0,5805
0,5605
0,5405
0,5205
0,5005
0
0,1
0,2
0,3
0,4
0,5
0,6
0,7
0,8
0,9
1
Rcut[]
0.3
0.4
0.7


Dependence of εD² for top charge as a function of Rcut
0,008
0,007
0,006
0,005
0,004
0,003
0,002
0,001
0
εD²[]
0
0,2
0,4
0,6
0,8
1
Rcut[]
0.3
0.4
0.7

Top charge approach mlbscut

Mlbscutmax= 21000




Dependence of purity for top charge as a function of Rcut
P[]
0,8005
0,7505
0,7005
0,6505
0,6005
0,5505
0
0,2
0,4
0,6
0,8
1
Rcut[]
0.3
0.4
0.7

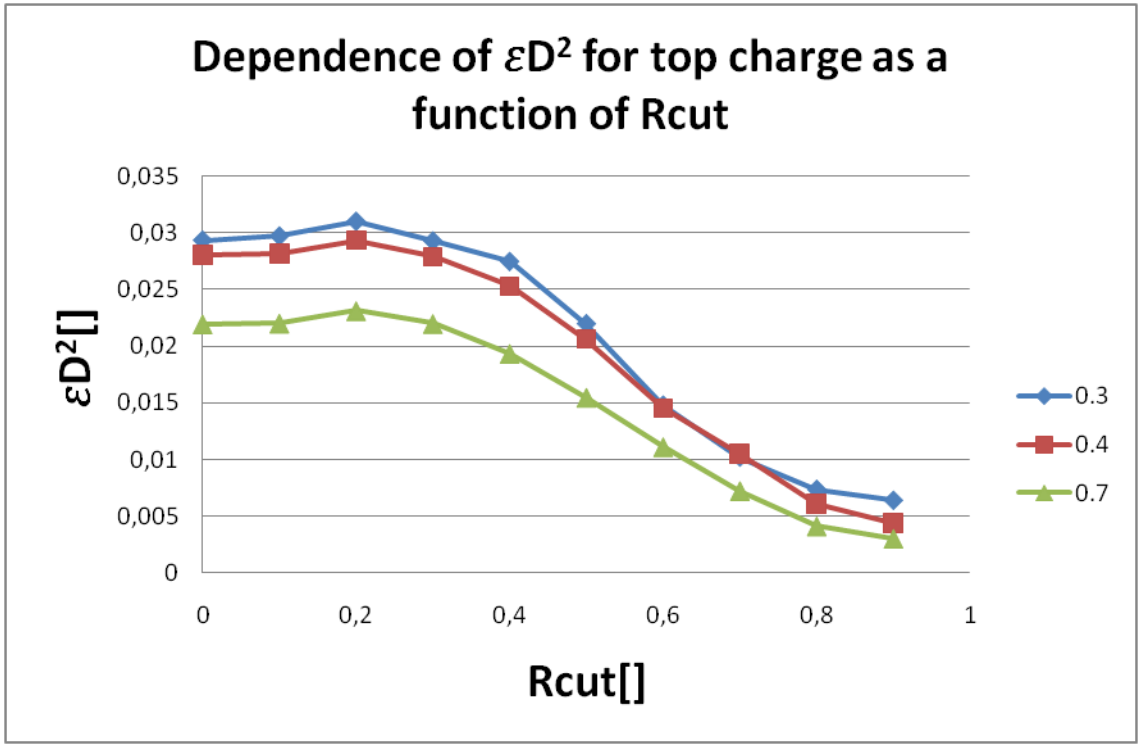

Dependence of εD² for top charge as a function of Rcut
0,035
0,03
0,025
0,02
0,015
0,01
0,005
0
εD²[]
0
0,2
0,4
0,6
0,8
1
Rcut[]
0.3
0.4
0.7

Table2 . This describes efficiency of top for cone_tr= 0.3,0.7.

Efficiency	0.3	0.7
kinematic	0,983455	1,009256
mlbscut	0,984118	1,007941

Efficiency of top for cone_tr is ratio number of entries for Rcut=0 for cone_tr=0.3,0,7 divided by number of entries for Rcut=0 for cone_tr=0.4.

Zhrnutie

- Purity a stredná hodnota naboja pre b a anti b jet vzhľadom na rastúce R_{cut} narastá.
- Efficiency pre b a anti b jet vzhľadom na rastúce R_{cut} klesá.
- Sensitivity pre b anti b jet má maximum pre Rcut 0.2 a 0.3.
- Purity a pre top a anti top kvark vzhľadom na rastúce R_{cut} narastá.
- Efficiency pre top a anti top kvark vzhľadom na rastúce R_{cut} klesá.
- Sensitivity pre top a anti top kvark má maximum pre Rcut 0.2 a 0.3.
- Najväčšia efficiency je pre cone 0.7.
- Najväčšia purity a sensitivity je pre cone 0.3.

Ďakujem za pozornosť