

INTERNATIONAL MASTERCLASSES HANDS ON PARTICLE PHYSICS

**International
Masterclasses 2013**

Teammeeting NTW, 14.11.2012 - Uta Bilow



Teilnehmer

Neue Länder:

- Rumänien (Bukarest)
- Türkei (Ankara)
- Zypern (Nicosia)
- Palestina (Birzeit)
- Ägypten (Alexandria)
- Indien (Mumbai)

„Reanimiert“:

- Südafrika (Durban)

→ 37 Länder



Anmeldungen, bislang

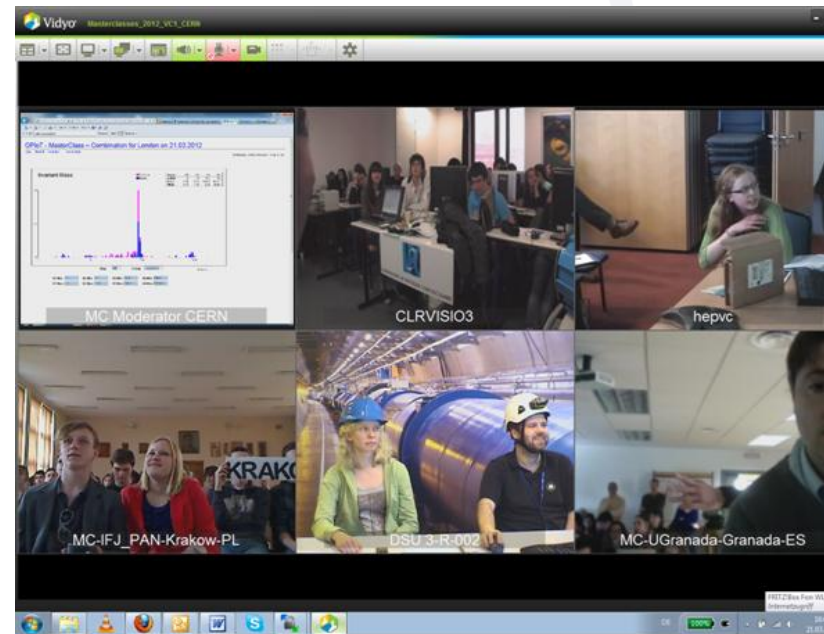
- 129 Institute, 160 Masterclasses (2012: 117 / 143)
- 35 Video-Konferenzen mit i.d.R. 5 Instituten
- 11 ATLAS W
- 12 ATLAS Z
- 9 CMS
- 3 ALICE

17 Institute:

- Aachen
- Berlin/Zeuthen
- Bonn
- Darmstadt
- Dortmund (2)
- Dresden
- Erlangen
- Frankfurt
- Freiburg
- Göttingen
- Hamburg
- Heidelberg (2)
- München
- Siegen
- Tübingen
- Würzburg
- Wuppertal (2)

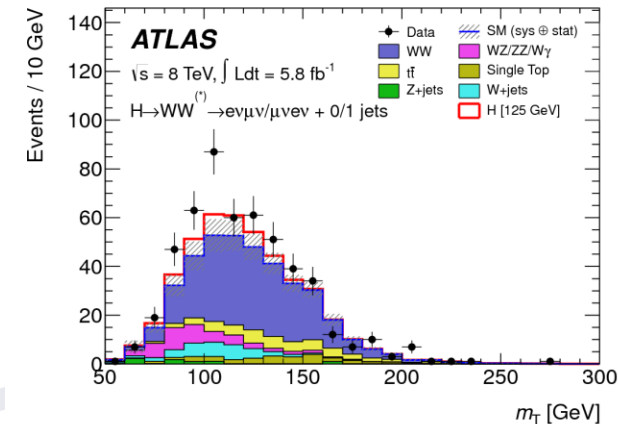
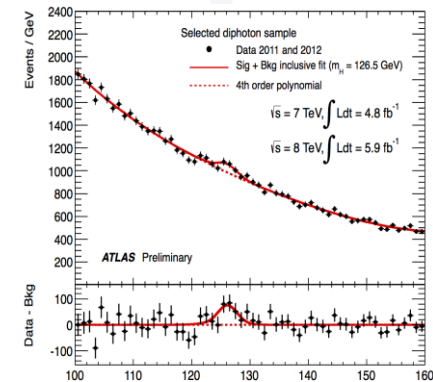
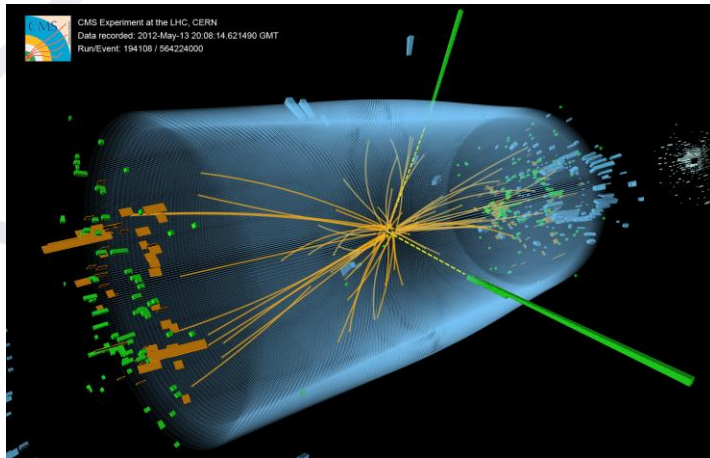
Lehrertage:

- Dresden 9.3.
- Berlin/Zeuthen 14.3.
- München 18.3.



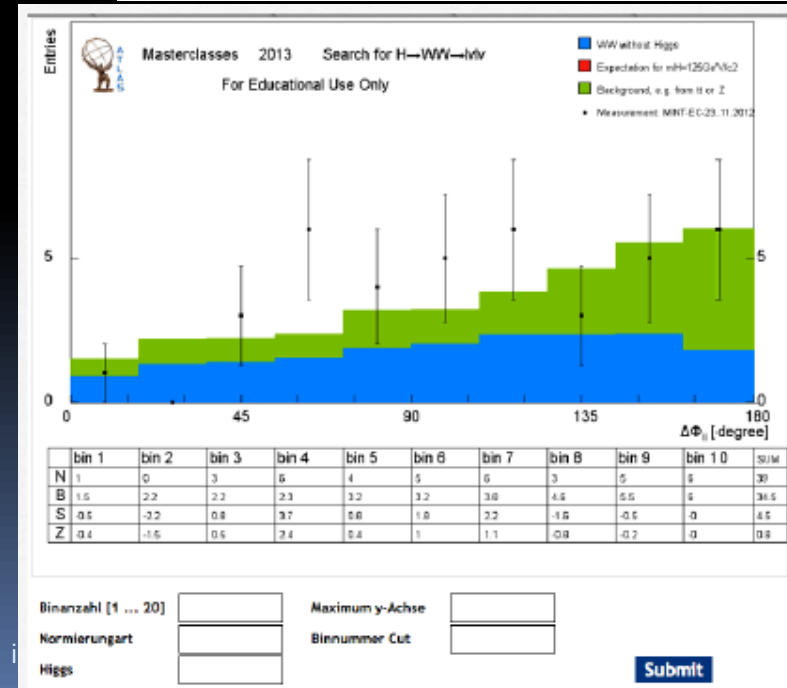
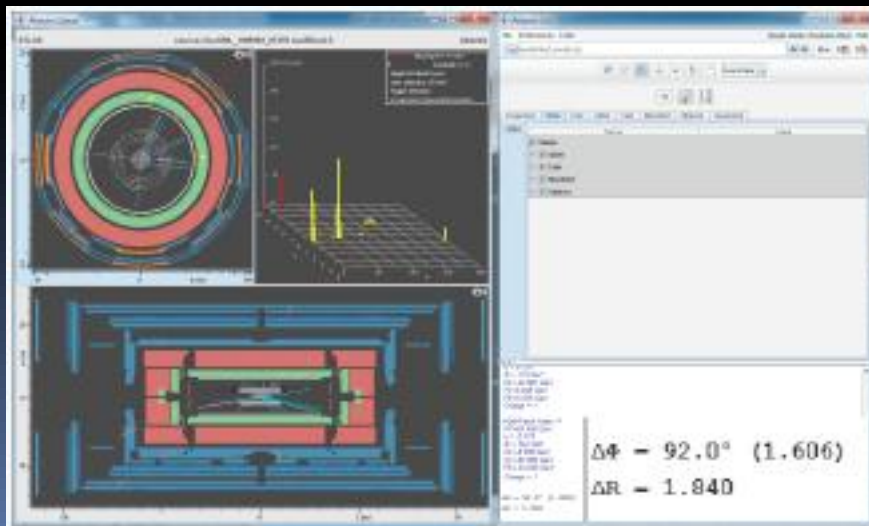
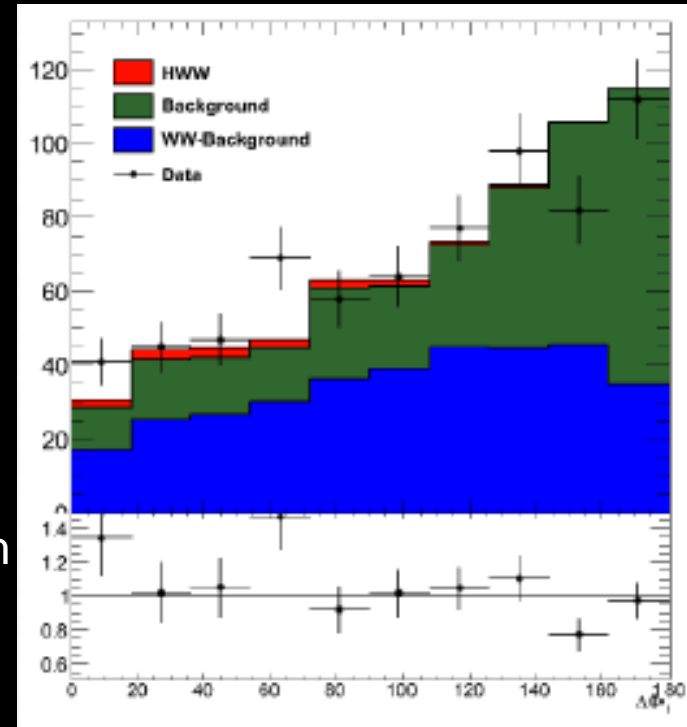
Messungen für 2013

- Mehr echte Daten, neuere Daten
- Mehr Herausforderung
- Entdeckungen nachvollziehen!
- Aktuelle Forschungs-Highlights einbinden



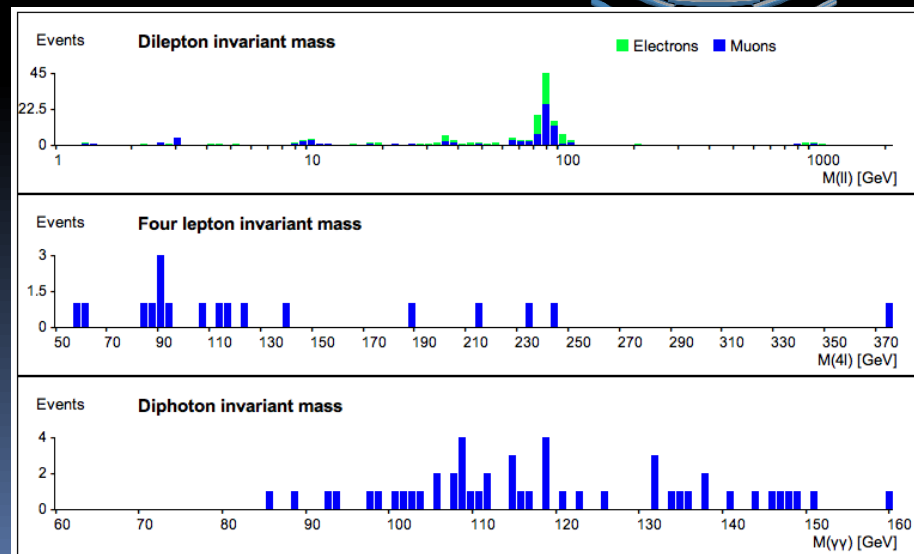
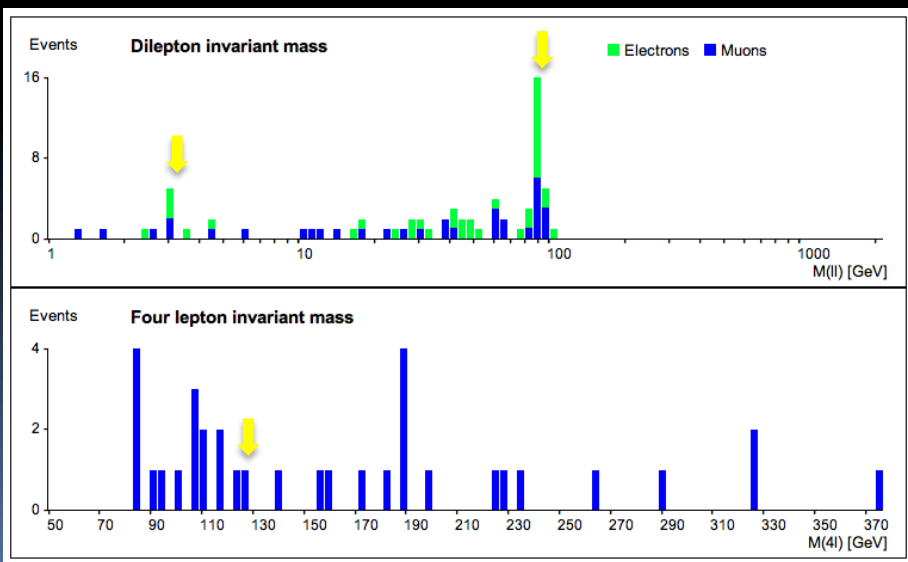
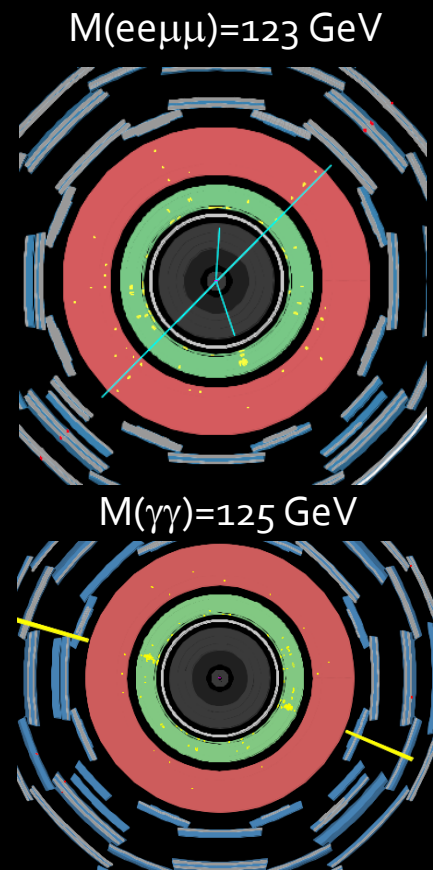
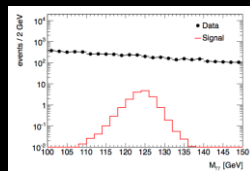
New ATLAS W-Path with real WW (+H) events

- Measurements
 - W+/W- ratio
 - Angular distribution between leptons in WW events
- Improvements
 - 2011 real data: 693 Higgs candidates mixed with 5307 W and other events
 - Histogram tool has been improved
 - spreadsheet and histogram websites connected with database
- New measurement tested



New ATLAS Z-Path with Higgs search

- Event display program – HYPATIA
 - Invariant mass of 2 electrons, 2 muons, 4 leptons, 2 photons
- Mixed samples: $ll, \gamma\gamma, 4l \rightarrow$ 50 events per pair of students
 - 45% Z, 5% Upsilon, 5% J/psi, 5% Z', 10% 4 lepton and 30% $\gamma\gamma$
- Higgs candidate events within 1fb^{-1} of 2011 ATLAS data
 - According to ATLAS pub
 - Add MC 125 Higgs (1fb^{-1} & 10fb^{-1})
- OPlot:
 - M_{ll} and/or $M_{\gamma\gamma}$ and/or M_{4ll} to be discussed locally
 - Moderator: 1 slide with 3 invariant masses; Invariant mass as a tool to identify particles, to discover new particles, and to search for exotic particles
- Web pages
 - Introduce Higgs part,
 - Describe new measurements
 - Prepare material for discussions, ...



CMS Masterclass

Measurements

- J/Ψ for schools, workshops
- W/Z for international masterclasses

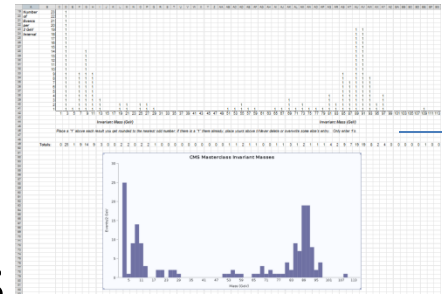
Improvements

- Better transfer of results
- Now in 11 languages
- Add a small number of Higgs candidates

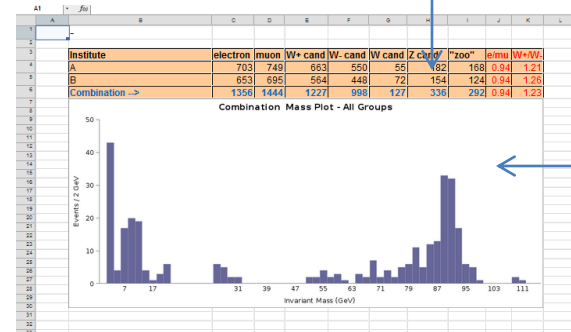
New

- Masterclass on the road
- Tested improvements in Beijing

Close to ready for Masterclasses 2013



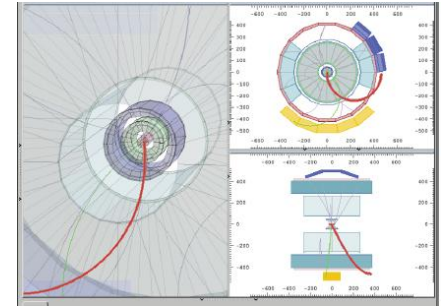
A	B	C	D	E	F	G	H	I	J
1	tab mc...	electron	muon	W+ cand	W- cand	W cand	Z cand	"zoo"	sum events
2	1	68	42	38	40	0	11	10	99
3	2	66	42	43	35	0	9	12	100
4	3	37	56	36	24	13	10	17	100
5	4	47	51	25	2	15	4	0	48
6	5	55	42	43	38	2	11	6	100
7	6	38	33	35	36	0	17	12	100
8	7	38	33	35	36	0	17	12	100
9	8	0	33	35	36	0	17	12	100
10	9	43	64	40	53	0	7	0	100
11	10	37	48	44	33	3	7	13	100
12	11	43	38	39	25	4	13	19	100
13	12	42	37	40	24	4	11	21	100
14	13	42	52	28	39	30	18	4	99
15	14	44	50	41	39	0	6	14	100
16	15	44	26	36	38	0	6	0	70
17	16	0	3	0	0	2	1	0	3
18	17	37	59	47	30	1	10	12	100
19	18	30	27	28	17	1	3	0	62
20	19	32	13	29	15	0	2	4	50
21		703	749	663	550	55	182	268	<-- Institute Totals
22							4/mu =	W+/W- =	
23							0.938984771	1.2054545454	455



ALICE Masterclass

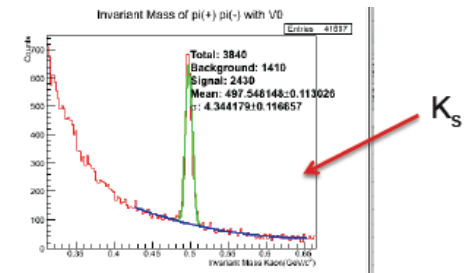
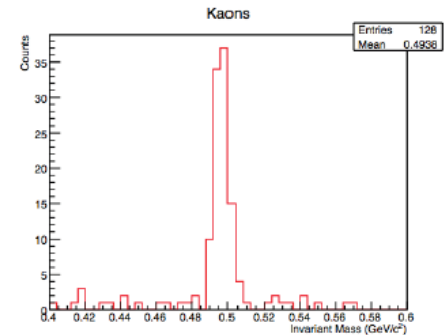
Measurement

- Option 1...Strangeness: decay patterns of V0s: K0s, Λ , anti- Λ from p-p collisions
- Option 2...Measure nuclear suppression factor R_{AA}



New and noteworthy

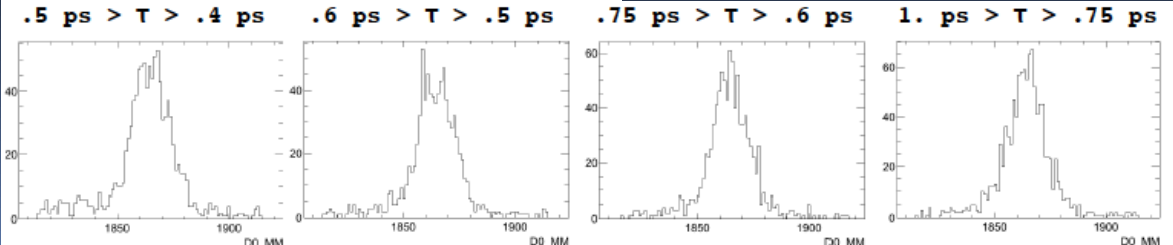
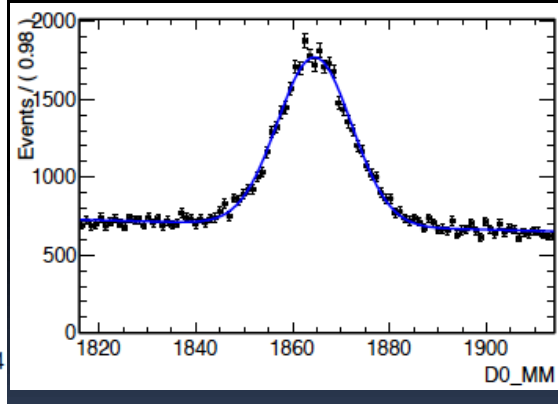
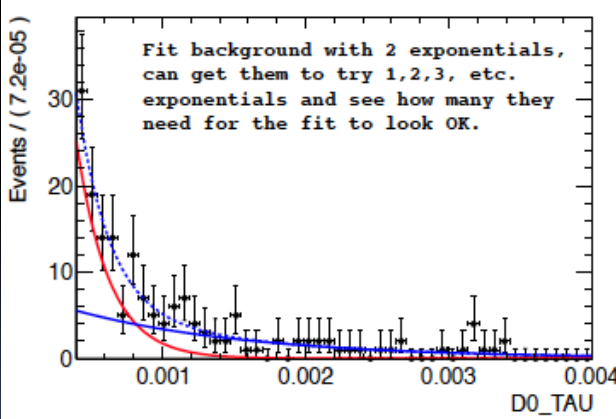
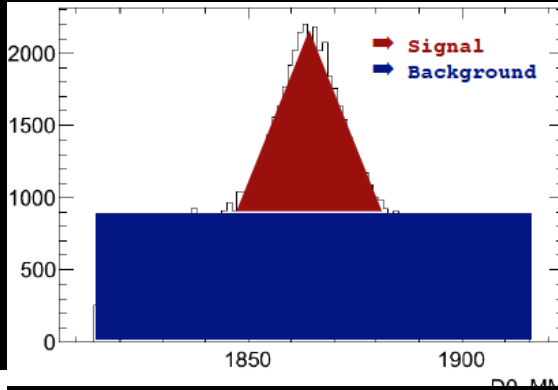
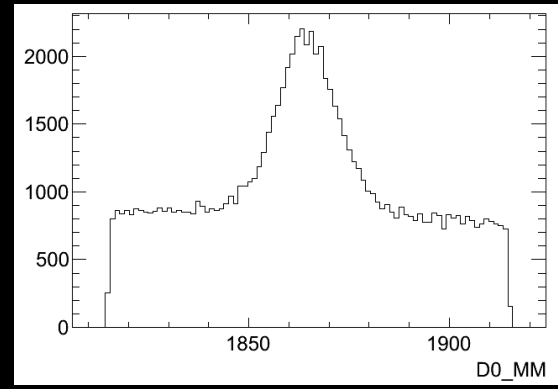
- visual analysis: 30 events (2012) , 15 events 2013
- Small sample Pb-Pb at 7 TeV, large 2.76 TeV sample
- p-Pb collisions in 2012 show different result from Pb-Pb samples: evidence of hot plasma



LHCb - lifetime of D^0

- $D^0 \rightarrow K\pi$ →
 - 2010 minimum bias data
 - Usual kinematic/geometric/PID/event variables are available in the ntuple
 - Signal vs Background (side bands) → S+B Fit
 - S/B optimization using cuts on various given distributions
 - Fit lifetime ...

$T_{\text{fitted}} = 473 \pm 7 \text{ ps}$
 $T_{\text{PDG}} = 410 \pm 1.5 \text{ ps}$



- Targeted at undergrads or summer school students from other experiments,
- can be adopted/simplified for a Masterclass 2013
- Plans are to be ready and have a few institutes join in 2013