

Analysis:

$$D^0 \rightarrow \pi^+ \pi^-$$

Simulation:

$$Y(4S): 1.0 - 1.5T$$

$$CT: 1.0 - 1.5T$$

$$\beta\gamma = 0.237$$

Require that m_{D^0} be within ± 0.14 PDG value

FastSim V0.2.7, Kosta's PacMC_CT

Figures of merit:

RMS of m_{D^0} , m_{ES} , ΔE

Reconstruction efficiency

m_{D^0} , m_{ES} , ΔE fitted with two Gaussians (common mean), polynomial background

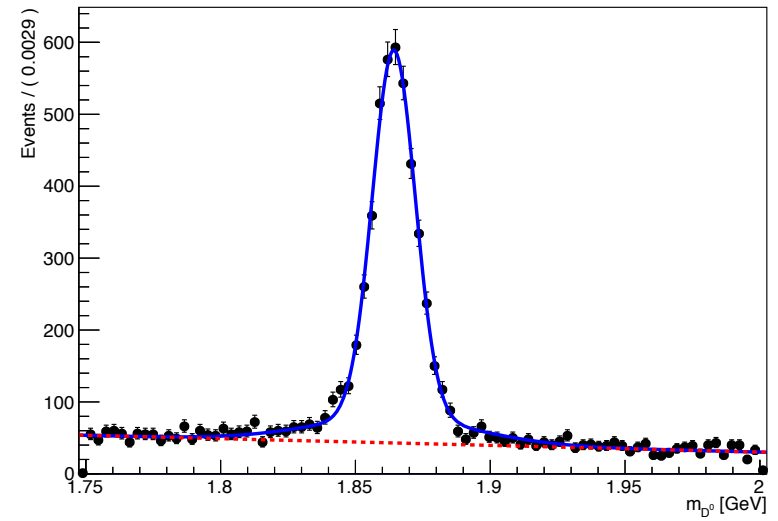
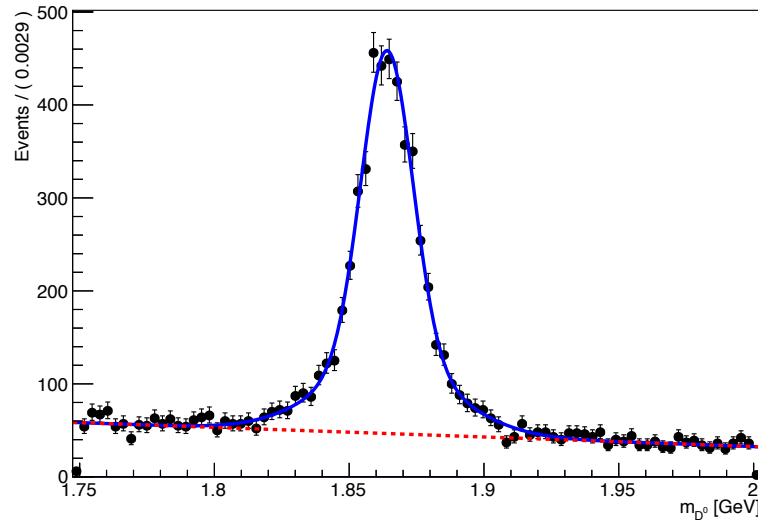
Similar analysis of detector configurations at 4S done by Rolf Andreassen last year for $D^0 \rightarrow K_s \pi^+ \pi^-$

Fits to m_{D^0}

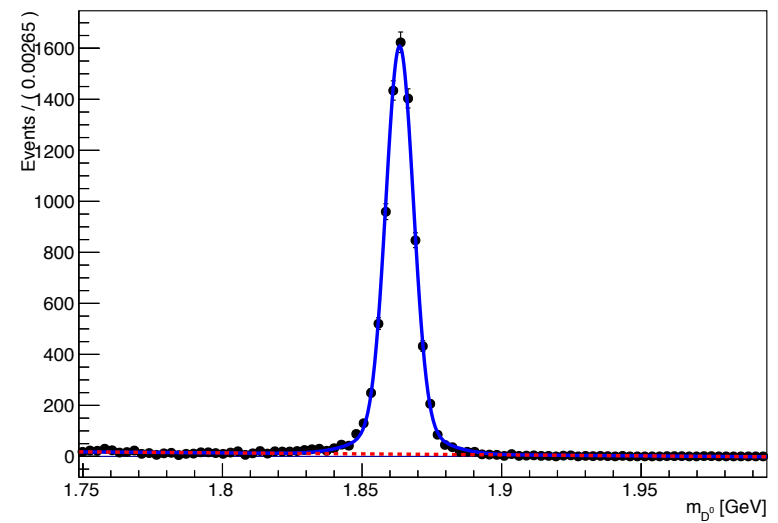
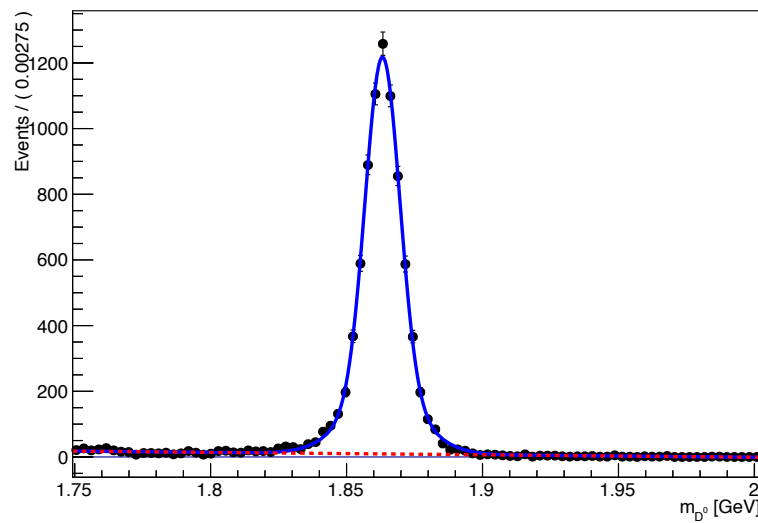
1.0 T

1.5 T

Y(4S)

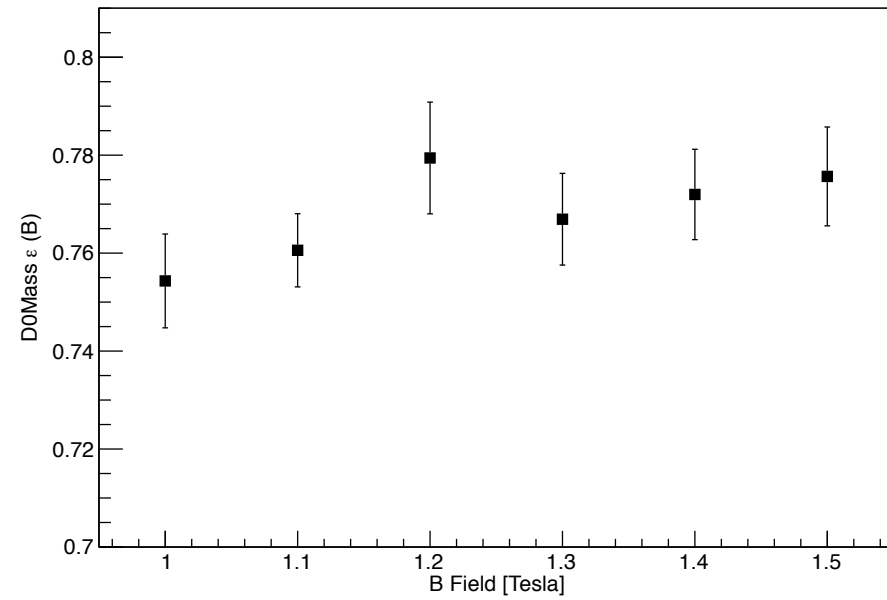
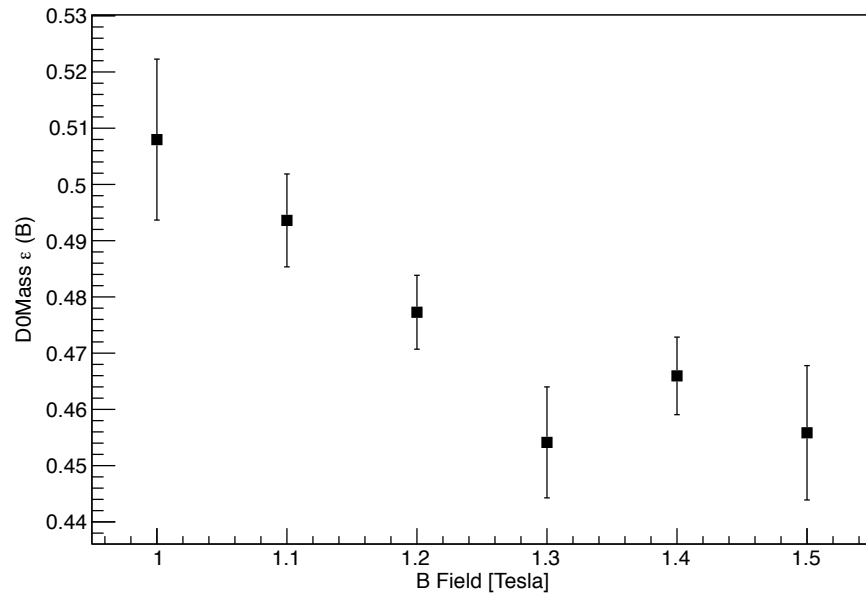


CT



m_{D^0} reconstruction efficiency

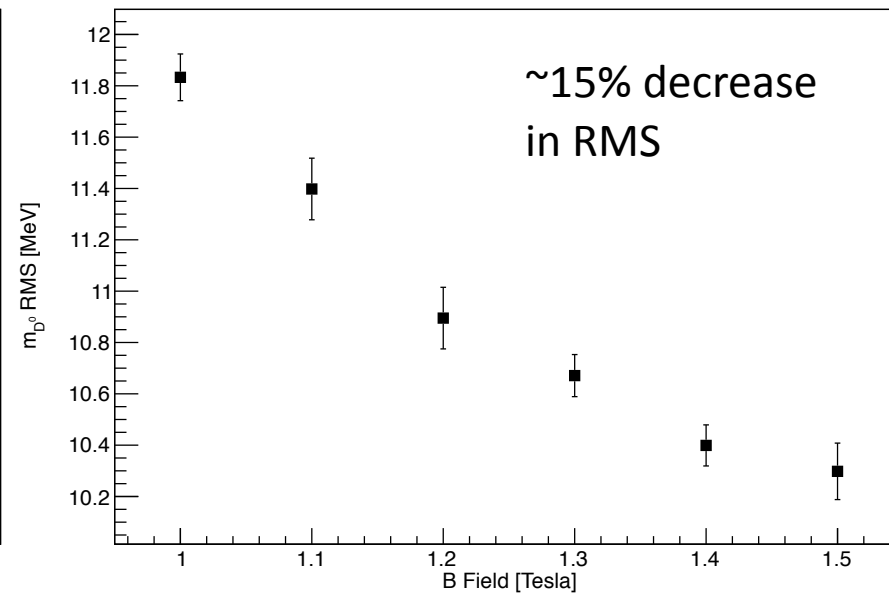
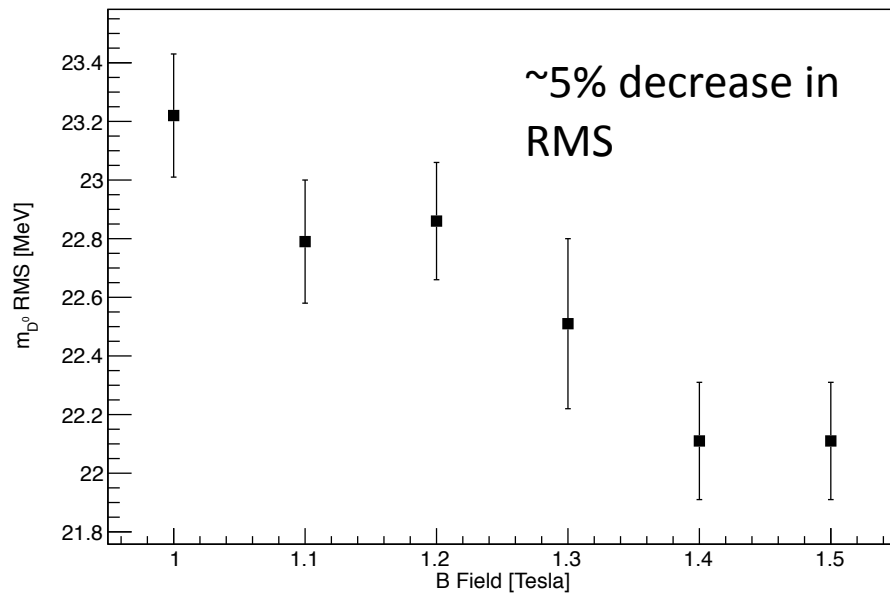
Y(4S) CT



m_{D^0} RMS

Y(4S)

CT

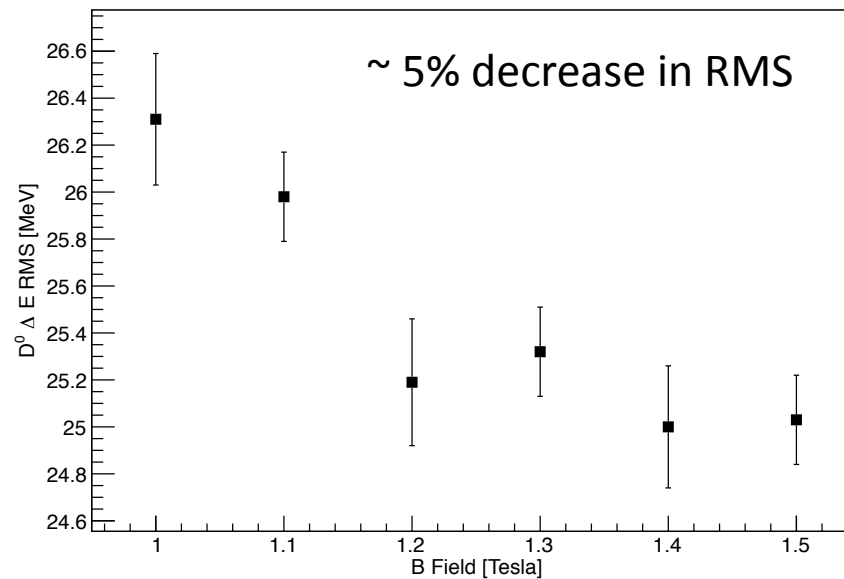
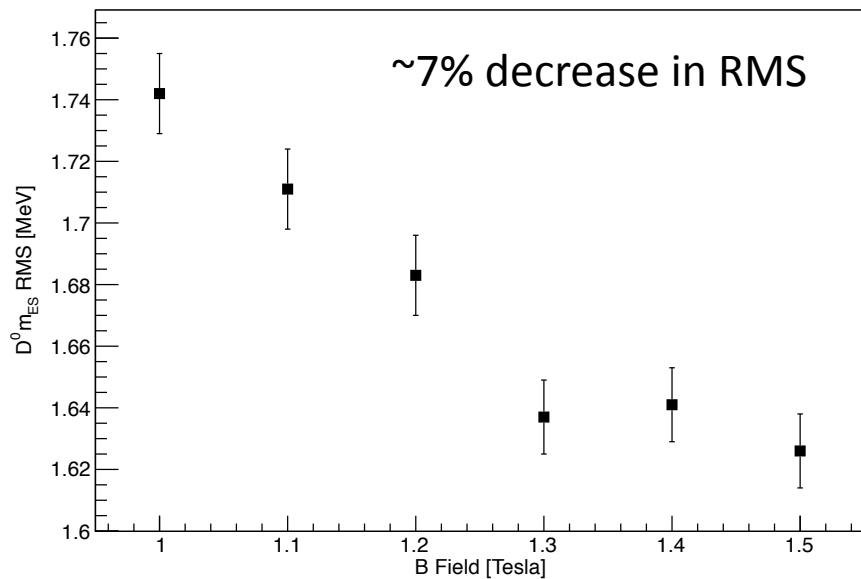


B-Field [T]	m_{D^0} RMS Y(4S) [MeV]	m_{D^0} RMS CT [MeV]
1.0	23.22 ± 0.21	11.833 ± 0.091
1.1	22.79 ± 0.21	11.398 ± 0.12
1.2	22.86 ± 0.20	10.895 ± 0.12
1.3	22.51 ± 0.29	10.671 ± 0.082
1.4	22.11 ± 0.20	10.399 ± 0.08
1.5	22.11 ± 0.20	10.399 ± 0.11

RMS (at Charm Threshold)

m_{ES}

ΔE



B-Field [T]	m_{ES} RMS CT [MeV]	ΔE RMS CT [MeV]
1.0	1.742 ± 0.013	26.31 ± 0.28
1.1	1.711 ± 0.013	25.98 ± 0.19
1.2	1.683 ± 0.012	25.19 ± 0.27
1.3	1.637 ± 0.012	25.32 ± 0.19
1.4	1.641 ± 0.012	25.00 ± 0.26
1.5	1.626 ± 0.012	25.03 ± 0.19

Conclusion

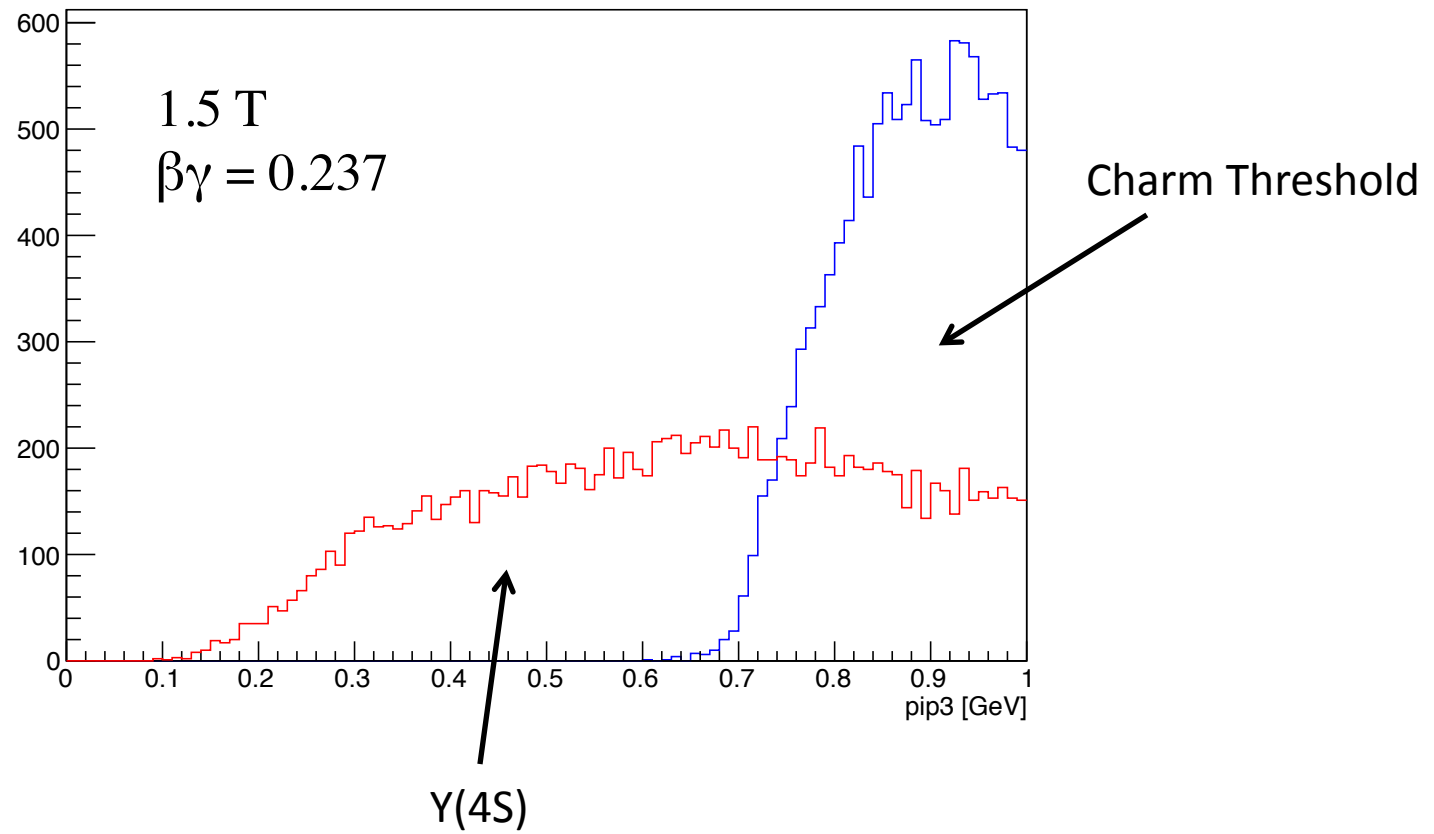
- At Y(4S): Increasing B-field from 1.0 T to 1.5 T results in ~5% improvement in m_{D^0} resolution, but ~10% decrease in reconstruction efficiency
- At charm threshold: Increasing B-field from 1.0 T to 1.5 T results in ~15% improvement in m_{D^0} resolution (with 5% and 7% improvement in ΔE and m_{ES} resolution respectively) and with little (2%) change in reconstruction efficiency at $\beta\gamma = 0.237$
- A full analysis would take into account centre of mass boost, $\beta\gamma$

Acknowledgements

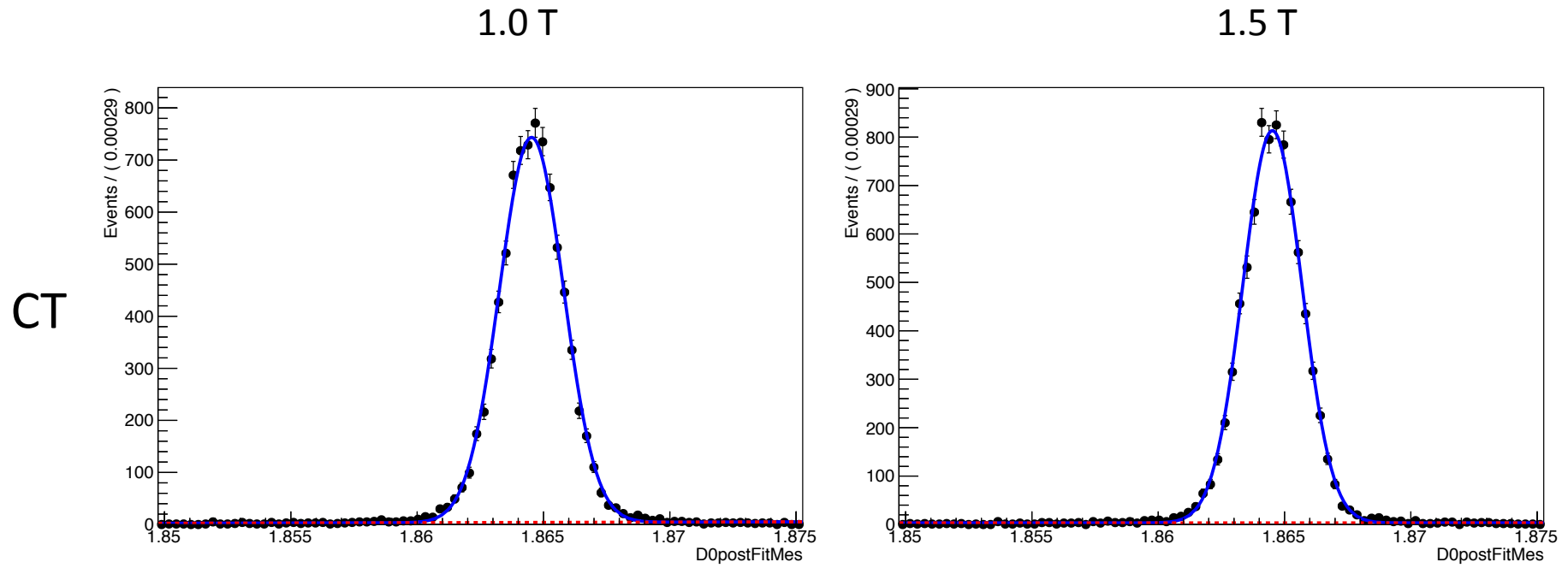
Thanks to Adrian Bevan and everyone else at Queen Mary

Backup Slides

Pion Momenta



Fits to m_{ES}



Fits to ΔE

