



DØ Trigger List

All Experimenters Meeting

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For the DØ Trigger Board



DØ trigger list

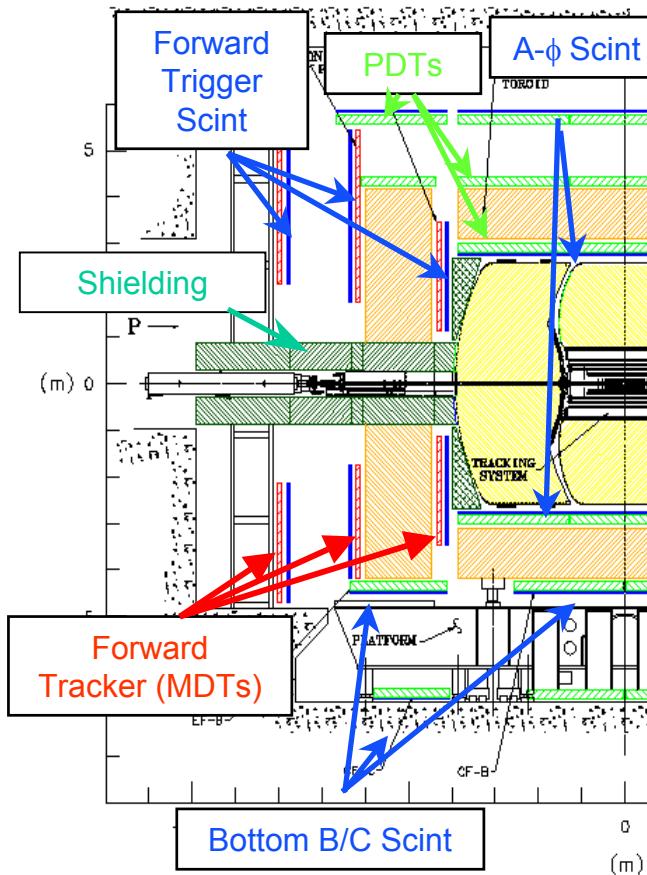
- Current list:
“global_CMT-8.20”
- “CMT” = Calorimeter,
Muon, Tracking
- V8.2 running since 22
Aug 02.
- 87 triggers on the list
 - ◆ 24 electron/photon
 - ◆ 14 jet
 - ◆ 26 muon
 - ◆ 17 combination
 - ◆ 6 normalization

trigger name	L1 trigger	L2 filter	L3 filter	L1 xs (fb)	L2 rej	L3 rej	L3xs (fb)
min_bias	Afastz			39830	1	1	39830
zero_bias	ALiveBX						
2EM_1PSI	CEM(2,2.5eta1.6)						
2EM_JP1I_TRK			ele(2,2.5)	65	1	12	5.42
3EM_MN	CEM(3,2.5eta1.6)		ele(2,2.5)trk(2,2.5)	65	1	31	2.10
3EM_MN_TRK			ele(2,2.5)	11	1	5.5	2.00
EM_L0	CEM(1,5)		trk(2,2.5)	11	1	2	5.50
EM_L0_SH			ele(1,10.)	64	1	12	5.33
CEM_2CJT5	CEM(1,5)CJT(2,5)		ele(1,7.,sh)	64	1	11	5.62
2EM_MN	CEM(2,5)^2			8	1	1	8.00
EM_HI_2EM5_EMFR8	CEM(2,5)^2		ele(2,7.)	4	1	17	0.24
EM_HI_2EM5			ele(1,40.,vl)	4	1	104	0.04
EM_HI_2EM5_SH			ele(1,,30.)	4	1	60	0.07
EM_HI_2EM5_SH_TR			ele(1,20.,sh)	4	1	36	0.10
EM_HI_2EM5_TR			ele(1,12.,sh)trk(1,1)	4	1	137	0.03
EM_HI_2EM5_TRK			trk(1,25.)	4	1	59	0.07
EM_HI_EMFR8	CET(11,0)		ele(1,10.)	4.6	1	104	0.04
EM_HI			ele(1,,30.)	4.6	1	51	0.07
EM_HI_SH			ele(1,20.,sh)	4.6	1	25	0.18
EM_HI_SH_TR			ele(1,12.,sh)trk(1,1)	4.6	1	92	0.05
EM_HI_TR			trk(1,25.)	4.6	1	64	0.07
EM_HI_L2	CET(1,10)^2		ele(1,30.)	4.6	1.2	47	0.08
2EM_MD10_CEM10	CEM(2,5)CEM(1,10)		ele(1,15.,sh)jj(2,15)	4.6	1	2.2	0.70
EM_MD_2CJT5	CEM(1,10)CJT(2,5)		ele(1,10.)tau(2,10.)	2	1	16	0.90
EM_HI_2CJT5	CEM(1,10)CJT(2,5)^2		ele(1,10.)tau(2,10.)	2	1	4.5	0.44
2TAU_EM10_2CJT5	CEM(1,10)CJT(2,5)*3			1.3	1	1	1.30
CEM10_2CJT7	CEM(1,10)CJT(2,7)			0.6	1	1	0.60
CEM10_2CJT10	CEM(1,10)CJT(2,10)			0.5	1	1	0.50
CEM15_2CJT7	CEM(1,15)CJT(2,7)			0.3	1	2	0.15
2EM_HI	CET(2,10)		ele(1,10.)	0.3	1	18	0.05
EM_EMFR8	CEM(1,15)		ele(1,40.,vl)	1	1	11	0.09
EM_MX			ele(1,30.)	1	1	6	0.17
EM_MX_SH			ele(1,20.,sh)	1	1	32	0.03
EM_MX_TR			trk(1,25.)	1	1	2.2	0.00
JT_25TT_NG	CJT(2,5)		jt(1,25.)	11	1	2.2	5.00
JT_45TT			jt(1,45.)	11	1	29	0.38
JT_45TT_L2	CJT(2,5)^2		jt(1,30.)		8	5	0.29
JT_45TT	CJT(3,5)		jt(1,45.)		11	5	0.29
JT_50TT_JT_65PV	CJT(3,5)^2		jt(1,50.)	2.7	56	0.05	
JT_95TT	CJT(4,5)		jt(1,95.)	0.86	1	61	0.04
JT_70TT_JT_95PV	CJT(4,5)^2		jt(1,70.)	0.86	1	147	0.01
4J10	CJT(4,5)^2		jt(4,10.)	0.86	1	161	0.01
JT_125TT	CJT(4,7)		jt(1,125.)	0.2	1	174	0.00
JT_95TT_JT_125PV	CJT(3,7)		jt(1,95.)jt(1,125.,pv)	0.2	1	159	0.00
SUT15			jt(3,15.)	0.7	1	3.5	0.00
MU_C_L2MO_L3L0	mu1pxbxo_fz		mu1(pxbo_fz)	15	4.6	1.2	2.96
MU_F_L2MO_L3L0	mu1pxbxo_fz		mu1(pxbo_fz)	12	2.1	1	5.71
mu2pxbxo_fz			mu1(pxbo_fz)	0.1	1	1	0.10
2MU_B_L2MO	mu2pxbxo_fz^2		mu1(pxbo_fz)	0.1	2.4	1	0.04
mu2pxbxo_fz			mu2(pxbo_fz)	0.2	1	1	0.20
2MU_C_L2MO	mu2pxbxo_fz^2		mu1(pxbo_fz)	0.2	1	1	0.00
MU_L2MO	mu1pxbxo_fz		mu1(pxbo_fz)	18	4.3	1	4.19
MU_W_L2MO_L3L0			mu1(pxbo_fz)	18	4.3	1.1	3.81
MU_W_L2M5_TRK10	mu1pxbxo_fz^2		mu1(pxbo_fz)	18	8.6	57	0.07
MU_W_L2MO_TRK3	mu1pxbxo_fz^3		trk(1,10.)	18	4	2.5	1.80
MU_W_EM10	mu1pxbxo_fz	CEM(1,5)	trk(1,3.)	0.26	1	7.7	0.03
MU_W_EM20_2TRK3	mu1pxbxo_fz^4	CEM(1,5)	em(1,10.)	0.26	1	10	0.03
mu1pxbxo_fz			trk(2,3.)	18	4	1	0.00
MU_A_L3L0	mu1pxbxo_fz		mu1(pxbo_fz)	26	1	1	20.00
MU_A_L2MO_L3L0	mu1pxbxo_fz^2		mu1(pxbo_fz)	26	1	1.9	13.68
MU_A_L2MS_L3L0	mu1pxbxo_fz^3		mu1(pxbo_fz)	26	3.2	1.1	7.39
2MU_A_L2L2	mu1pxbxo_fz^4		mu1(pxbo_fz)	26	9.3	1.1	2.54
mu2pxbxo_fz			mu2(eta-phi)	26	16	1	1.63
2MU_V_L2MO	mu2pxbxo_fz^2		mu1(pxbo_fz)	0.2	1	1	0.20
2MU_W_L2MO_2TRKL	mu2pxbxo_fz^2		mu1(pxbo_fz)	0.3	1	1	0.30
mu2pxbxo_fz			mu1(pxbo_fz)	0.3	1	1.8	0.17
2MU_A_L3L0	mu2pxbxo_fz^2		mu1(pxbo_fz)	0.3	2.9	1	0.10
2MU_A_L2MO	mu2pxbxo_fz^2		mu1(pxbo_fz)	0.3	2.9	1.1	0.09
2MU_A_L2MO_L3L0	mu1pxbxo_fz	CEM(1,5)	mu1(pxbo_fz)	0.3	1	1	0.30
MU_EM_L2MO_L3L0	mu1pxbxo_fz	CEM(1,5)^2	mu1(pxbo_fz)	0.3	1.8	1.1	0.27
MU_EM			mu1(pxbo_fz)	0.5	1	1	0.00
MU_EM_CEM5	mu1pxbxo_fz	CEM(1,5)	mu1(pxbo_fz)	0.5	1	1	0.50
MU_EM_CEM5	mu1pxbxo_fz	CEM(1,5)^2	mu1(pxbo_fz)	0.5	1	1	0.50
MU_EM20	mu1pxbxo_fz	CEM(2,2.5eta1.6)^2	mu1(pxbo_fz)	0.5	1	10	0.02
MU_EM20	mu1pxbxo_fz	CEM(2,2.5eta1.6)^2	trk(2,2.5)	0.3	1	1.9	0.16
MU_EM20	mu1pxbxo_fz	CEM(2,2.5eta1.6)^2	trk(2,5.)	2420	1	1	2420
MU_EM20	mu1pxbxo_fz	CEM(2,2.5eta1.6)^2	trk(2,5.)	13	6.5	1.7	0.12
MU_EM20	mu1pxbxo_fz	CEM(2,2.5eta1.6)^2	trk(2,5.)	0.8	1	16	0.05
MU_EM20	mu1pxbxo_fz	CEM(2,2.5eta1.6)^2	trk(2,5.)	0.8	4.4	3.7	0.26
MU_EM20	mu1pxbxo_fz	CEM(2,2.5eta1.6)^2	trk(2,5.)	0.8	2.2	0.2	0.13
MU_EM20	mu1pxbxo_fz	CEM(2,2.5eta1.6)^2	trk(2,5.)	0.5	18	2.6	0.11
zero_bias^2	ALiveBX^2		trk(2,5.)	0.34	1	2	0.17
zero_bias_GapN	ALiveBX_ALMNorth[v]			32000	1	1	32000
JT_25TT_GAPN	CJT(2,5)_ALMNorth[v]		jt(1,25.)	0.08	1	16	0.05
zero_bias_GapS	ALiveBX_ALMSouth[v]			33000	1	1	33000
JT_25TT_GAPS	CJT(2,5)_ALMSouth[v]		jt(1,25.)	0.5	1	1.4	0.36
zero_bias_GapSN	ALiveBX_ALMSouth[v]_ALMNorth[v]			330000	1	1	350
JT_25TT_GAPSN	CJT(2,5)_ALMSouth[v]_ALMNorth[v]		jt(1,25.)	0.05	1	1.6	0.03

Trigger levels & objects

- Level 1:
average rejection:
 ~ 7000

- ◆ Calorimeter towers: 0.2×0.2 $\eta \times \phi$
 - ▲ $EM > 2.5, 5, 10, 15$
 - ▲ $Tot > 3, 5, 7, 10$
 - ▲ $|\eta| < 2.4$
- ◆ Muon scintillator
 - ▲ Timing
 - ▲ Roads
 - ▲ $|\eta| < 2.0$



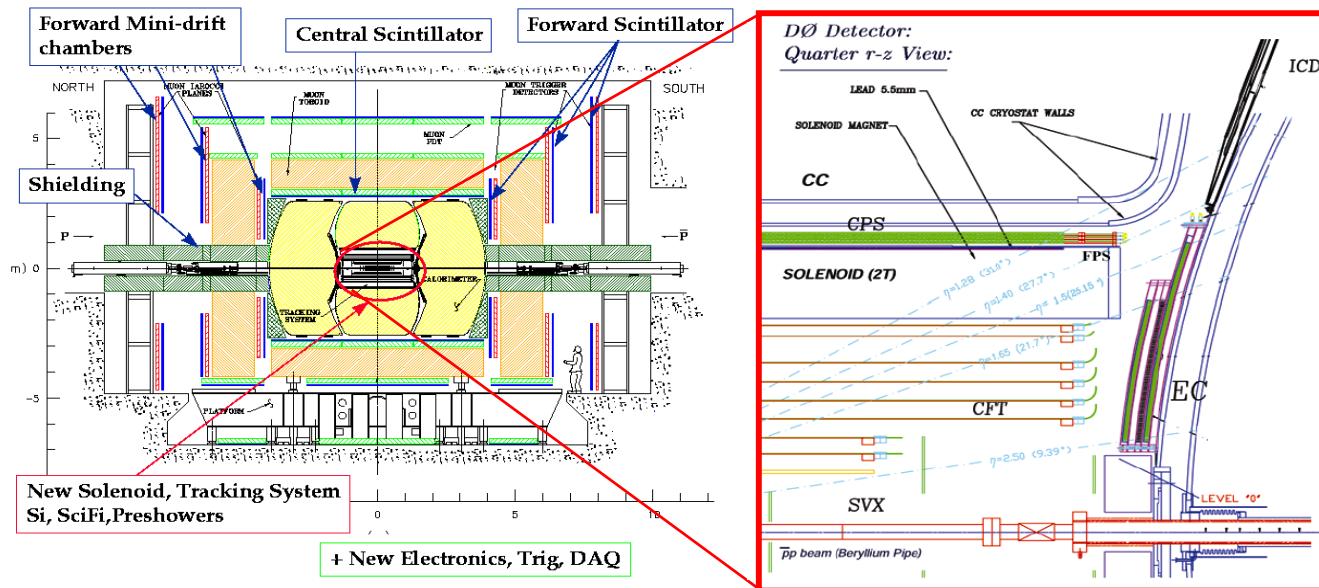
- Level 2:
average rejection ~ 2

- ◆ Clusters of calorimeter towers
- ▲ Electron/photons candidates
- ▲ Jets
- ◆ Muon scint + wire chambers
- ▲ Muon system tracks



Trigger levels & objects

- Level 3: average rejection ~3
 - ◆ Precision cal readout: electron/photon, jets, hadronic tau candidates
 - ◆ Tracks (Central fiber tracker + silicon microstrip detector)





Example Triggers

Name	Signal	L1	L2	L3
EM_MX_TR	$W \rightarrow e\nu$	Cal EM tower > 15 GeV		Track > 25 GeV
MU_JT20_L2 MO	top $\rightarrow \mu + \text{jets}$	Muon scint + Cal tot tower > 5 GeV	Local muon track	Jet cluster > 20 GeV
EM15_2JT15	top $\rightarrow e + \text{jets}$	EM tower > 10, 2 tot towers > 5	EM cluster > 10, Jet cluster > 10	Emcluster > 1 5 GeV, 2 Jet clusters > 15 GeV



Unprescaled triggers

- High Pt signals
 - ◆ Single e, di-electron: $W \rightarrow e\nu$, $Z \rightarrow ee$, top, new physics
 - ◆ di-muon: $Z \rightarrow \mu\mu$, top, new physics
 - ◆ lepton+jets: top $\rightarrow e+jets$, $\mu+jets$, $WH \rightarrow e+jets$, $\mu+jets$, ...
 - ◆ EM+mu: top $\rightarrow e+\mu$, $W\gamma \rightarrow \mu\nu\gamma$, new physics
 - ◆ High Et jets (> 125 GeV): QCD, new physics
- Selected b-decays
 - ◆ Di- μ : $J/\Psi \rightarrow \mu\mu$
 - ◆ EM+ μ : $b\bar{b}$ → $e\mu+jets$
- Rapidity gaps
 - ◆ Double-gap + jet



Prescaled triggers

- High cross section processes, monitor triggers run with prescales
- Examples:
 - ◆ Inclusive single muons
 - ◆ Low- Et single EM and di-EM
 - ◆ Lower Et inclusive jets (25 GeV, 45 GeV)