Annexe X
Chemins de déclenchement – $H \rightarrow \tau\tau$

HLT Path	L1 Seed	Tau filter to match
HLT_VLooseIsoPFTau 120_Trk50_eta2p1_v	L1_SingleTau100er	hltPFTau120TrackPt50LooseAbsOrRelVLooseIso
HLT_VLooseIsoPFTau 140_Trk50_eta2p1_v	L1_SingleTau100er	hltPFTau140TrackPt50LooseAbsOrRelVLooseIso
HLT_DoubleMedium Iso_PFTau35_Trk1 _eta2p1_Reg_v	L1_DoubleIso Tau*er, * in 26, 27, 28, 30, 32, 39	hltDoublePFTau35TrackPt1MediumIsolationDz02Reg
HLT_DoubleMedium CombinedIsoPFTau 35Trk1_eta2p1_Reg_v	L1_DoubleIso Tau*er, * in 26, 27, 28, 30, 32, 39	hltDoublePFTau35TrackPt1MediumCombinedIsolationDz02Reg

Tableau X.1 – *Chemins de déclenchement utilisés en 2016 pour le canal $\tau_h\tau_h$.*

HLT Path	L1 Seed	Muon filter to match	Tau filter to match
HLT_IsoMu22_v	L1_SingleMu20	hltL3crIsoL1sMu20L1f0L2f10Q L3f22QL3trkIsoFiltered0p09	-
HLT_IsoMu22 _eta2p1_v	L1_SingleMu20er	hltL3crIsoL1sSingleMu20er L1f0L2f10QL3f22QL3trkIso Filtered0p09	-
HLT_VLooseIso PFTau120_Trk50 _eta2p1_v	L1_SingleTau100er	-	hltPFTau120TrackPt50LooseAbs OrRelVLooseIso
HLT_VLooseIso PFTau140_Trk50 _eta2p1_v	L1_SingleTau100er	-	hltPFTau140TrackPt50LooseAbs OrRelVLooseIso
HLT_IsoMu19 _eta2p1_LooseIso PFTau20_v	L1_Mu18er _Tau20er	hltL3crIsoL1sMu18er TauJet20erL1f0L2f10Q L3f19QL3trkIsoFiltered 0p09hltOverlapFilter IsoMu19LooseIsoPFTau20	hltPFTau20TrackLooseIso AgainstMuonhltOverlapFilter IsoMu19LooseIsoPFTau20
HLT_IsoMu19 _eta2p1_LooseIso PFTau20 _Sin- gleL1_v	L1_SingleMu18er **or** L1_SingleMu20er	hltL3crIsoL1sSingleMu18erIor SingleMu20erL1f0L2f10Q L3f19QL3trkIsoFiltered0p09 hltOverlapFilterSingleIsoMu19 LooseIsoPFTau20	hltPFTau20TrackLooseIsoAgainst MuonhltOverlapFilterSingleIso Mu19LooseIsoPFTau20

Tableau X.2 – *Chemins de déclenchement utilisés en 2016 pour le canal $\mu\tau_h$.*

HLT Path	L1 Seed	Electron filter to match	Tau filter to match
HLT_Ele25_eta2p1 _WPTight_Gsf_v	L1_SingleEG40 **or** SingleIsoEG24er **or** L1_SingleIso EG22er	hltEle25erWPTightGsfTrack Iso-Filter	-
HLT_VLooseIso PFTau120_Trk50 _eta2p1_v	L1_SingleTau100er	-	hltPFTau120TrackPt50LooseAbs OrRelVLooseIso
HLT_VLooseIso PFTau140_Trk50 _eta2p1_v	L1_SingleTau100er	-	hltPFTau140TrackPt50LooseAbs OrRelVLooseIso
HLT_Ele24_eta2p1 _WPLoose_Gsf _LooseIsoPF-Tau20 _Sin-gleL1_v	L1_SingleEG40 **or** SingleIsoEG24er **or** L1_SingleIso EG22er	Run < 276215 and MC hltEle24WPLooseL1SingleIsoEG 22erGsfTrackIsoFilterhltOverlap FilterSingleIsoEle24WPLoose GsfLooseIsoPFTau20	hltPFTau20TrackLooseIso hl-tOverlapFilterSingleIsoEle24 WPLooseGsfLooseIsoPFTau20
HLT_Ele24_eta2p1 _WPLoose_Gsf _LooseIsoPF-Tau20_v	L1_IsoEG22er _Tau20er_dEta _Min0p2	276215 ⩽ Run < 278270 hltEle24WPLooseL1IsoEG22er Tau20erGsfTrackIsoFilter hltO-verlapFilterIsoEle24 WPLooseG-sfLooseIsoPFTau20	hltPFTau20TrackLooseIso hltO-verlapFilterIsoEle24 WPLooseG-sfLooseIsoPFTau20
HLT_Ele24_Eta2p1 _WPLoose_Gsf _LooseIsoPF-Tau30_v	L1_IsoEG22er_Iso Tau26er_dEta _Min0p2	278270 ⩽ Run hltEle24WPLooseL1IsoEG22er IsoTau26erGsfTrackIsoFilter hl-tOverlapFilterIsoEle24 WPLoo-seGsfLooseIsoPFTau30	hltPFTau30TrackLooseIso hltO-verlapFilterIsoEle24 WPLooseG-sfLooseIsoPFTau30

Tableau X.3 – *Chemins de déclenchement utilisés en 2016 pour le canal $e\tau_h$.*

HLT Path	L1 Seed	Muon filter to match	Electron filter to match
HLT_Mu23_TrkIsoVVL _Ele12_CaloIdL _Tra-ckIdL_IsoVL_v	L1_Mu12_EG10	Runs B-F and MC hltMu23TrkIsoVVLEle12CaloIdL TrackIdLIsoVLMuon legL3IsoFiltered23	hltMu23TrkIsoVVLEle12CaloIdL TrackIdLIsoVLElectronlegTrack IsoFilter
HLT_Mu8_TrkIsoVVL _Ele23_CaloIdL _Tra-ckIdL_IsoVL_v	L1_Mu5_EG15	hltMu8TrkIsoVVLEle23CaloIdL TrackIdLIsoVLMuon legL3IsoFiltered8	hltMu8TrkIsoVVLEle23CaloIdL TrackIdLIsoVLElectronlegTrack IsoFilter
HLT_Mu23_TrkIsoVVL _Ele12_CaloIdL _TrackIdL _IsoVL_DZ_v	L1_Mu12_EG10	Runs G-H hltMu23TrkIsoVVLEle12CaloIdL TrackIdLIsoVLMuon legL3IsoFiltered23 **and** hltMu23TrkIsoVVLEle12CaloIdL TrackIdLIsoVLDZFilter	hltMu23TrkIsoVVLEle12CaloIdL TrackIdLIsoVLElectron legTrackIsoFilter **and** hltMu23TrkIsoVVLEle12CaloIdL TrackIdLIsoVLDZFilter
HLT_Mu8_TrkIsoVVL _Ele23_CaloIdL _TrackIdL _IsoVL_DZ_v	L1_Mu5_EG15	hltMu8TrkIsoVVLEle23CaloIdL TrackIdLIsoVLMuon legL3IsoFiltered8 **and** hltMu8TrkIsoVVLEle23CaloIdL TrackIdLIsoVLDZFilter	hltMu8TrkIsoVVLEle23CaloIdL TrackIdLIsoVLElectron legTrackIsoFilter **and** hltMu8TrkIsoVVLEle23CaloIdL TrackIdLIsoVLDZFilter

Tableau X.4 – *Chemins de déclenchement utilisés en 2016 pour le canal eμ.*

HLT Path	L1 Seed	Tau filter to match
HLT_MediumCharged IsoPFTau180High PtRelaxedIso_Trk50 _eta2p1_v	L1_SingleTau80 to140er	hltPFTau180TrackPt50LooseAbsOrRelMediumHighPtRelaxed IsoIso **and** hltSelectedPFTau180MediumChargedIsolation L1HLTMatched
HLT_DoubleMedium ChargedIsoPFTau 40_Trk1_TightID _eta2p1_Reg_v	L1_DoubleIsoTau *er2p1, * in 28, 30, 32, 33, 34, 35, 36, 38, 70	hltDoublePFTau40TrackPt1MediumChargedIsolationAndTight OOSCPhotonsDz02Reg
HLT_DoubleTight ChargedIsoPFTau40 _Trk1_eta2p1_Reg_v	L1_DoubleIsoTau *er2p1, * in 28, 30, 32, 33, 34, 35, 36, 38, 70	hltDoublePFTau40TrackPt1TightChargedIsolationDz02Reg
HLT_DoubleTight ChargedIsoPFTau 35_Trk1_TightID _eta2p1_Reg_v	L1_DoubleIsoTau *er2p1, * in 28, 30, 32, 33, 34, 35, 36, 38, 70	hltDoublePFTau35TrackPt1TightChargedIsolationAndTight OOSCPhotonsDz02Reg

Tableau X.5 – *Chemins de déclenchement utilisés en 2017 pour le canal $\tau_h\tau_h$.*

HLT Path	L1 Seed	Muon filter to match	Tau filter to match
HLT_IsoMu24_v	L1_SingleMu22	hltL3crIsoL1sSingleMu22L1f0L2 f10QL3f24QL3trkIsoFiltered0p07	-
HLT_IsoMu27_v	L1_SingleMu22 **or** L1_SingleMu25	hltL3crIsoL1sMu22Or25L1f0L2 f10QL3f27QL3trkIsoFiltered0p07	-
HLT_Medium ChargedIsoPF Tau180HighPt RelaxedIso_Trk50 _eta2p1_v	L1_SingleTau80 to140er	-	hltPFTau180TrackPt50LooseAbs OrRelMediumHighPtRelaxed IsoIso **and** hltSelectedPF Tau180MediumChargedIsolation L1HLTMatched
HLT_IsoMu20 _eta2p1_Loose ChargedIsoPF Tau27_eta2p1 _CrossL1_v	L1_Mu18er2p1 _Tau24er2p1	hltL3crIsoL1sMu18erTau24erIor Mu20erTau24erL1f0L2f10QL3f20Q L3trkIsoFiltered0p07hltOverlap FilterIsoMu20LooseChargedIso PFTau27L1Seeded	hltSelectedPFTau27LooseCharged IsolationAgainstMuonL1HLT MatchedhltOverlapFilterIso Mu20LooseChargedIsoPFTau27 L1Seeded

Tableau X.6 – *Chemins de déclenchement utilisés en 2017 pour le canal $\mu\tau_h$.*

HLT Path	L1 Seed	Electron filter to match	Tau filter to match
HLT_Ele27_WP Tight_Gsf_v	L1_SingleEGXX **or** L1_SingleEG XXer2p1 **or** L1 _SingleIsoEGXX **or** L1_SingleIso EGXXer2p1	hltEle27WPTightGsfTrackIsoFilter	-
HLT_Ele32_WP Tight_Gsf_v	L1_SingleEGXX **or** L1_SingleEG XXer2p1 **or** L1 _SingleIsoEGXX **or** L1_SingleIso EGXXer2p1	hltEle32WPTightGsfTrackIsoFilter	-
HLT_Ele35_WP Tight_Gsf_v	L1_SingleEGXX **or** L1_SingleEG XXer2p1 **or** L1 _SingleIsoEGXX **or** L1_SingleIso EGXXer2p1	hltEle35noerWPTightGsfTrackIso Filter	-
HLT_Medium ChargedIsoPF Tau180HighPt RelaxedIso_Trk50 _eta2p1_v	L1_SingleTau80 to140er	-	hltPFTau180TrackPt50LooseAbs OrRelMediumHighPtRelaxed IsoIso **and** hltSelectedPF Tau180MediumChargedIsolation L1HLTMatched
HLT_Ele24_eta2p1 _WPTight_Gsf _LooseChar-gedIso PF-Tau30_eta2p1 _CrossL1_v	L1_LooseIsoEG22er 2p1_IsoTau26er2p1 _dR_Min0p3	hltEle24erWPTightGsfTrack Iso-FilterForTauhltOverlap FilterI-soEle24WPTightGsf LooseIsoPF-Tau30	hltSelectedPFTau30LooseCharged IsolationL1HLTMatchedhlt OverlapFilterIsoEle24WPTight GsfLooseIsoPFTau30

Tableau X.7 – *Chemins de déclenchement utilisés en 2017 pour le canal eτ_h.*

HLT Path	L1 Seed	Muon filter to match	Electron filter to match
HLT_Mu23_TrkIso VVL_Ele12_CaloIdL _Tra-ckIdL_IsoVL_DZ	???	hltMu23TrkIsoVVLEle12CaloIdL TrackIdLIsoVLMuonlegL3Iso Filtered23	hltMu23TrkIsoVVLEle12CaloIdL TrackIdLIsoVLElectronlegTrack IsoFilter
HLT_Mu8_TrkIso VVL_Ele23_CaloIdL _Tra-ckIdL_IsoVL_DZ	???	hltL3fL1sMu7EG23f0Filtered8 **or** hltMu8TrkIsoVVLEle23Calo IdLTrackIdLIsoVLMuonlegL3 IsoFiltered8	hltMu8TrkIsoVVLEle23CaloIdL TrackIdLIsoVLElectronleg TrackIsoFilter

Tableau X.8 – *Chemins de déclenchement utilisés en 2017 pour le canal eμ.*

HLT Path	L1 Seed	Tau filter to match
HLT_MediumCharged IsoPFTau180High PtRelaxedIso_Trk50 _eta2p1_v	L1_SingleTau80 to140er	hltPFTau180TrackPt50LooseAbsOrRelMediumHighPtRelaxed IsoIso **and** hltSelectedPFTau180MediumChargedIsolation L1HLTMatched
HLT_DoubleMedium ChargedIsoPFTau 40_Trk1_TightID _eta2p1_Reg_v	L1_DoubleIsoTau *er2p1, * in 28, 30, 32, 33, 34, 35, 36, 38, 70	hltDoublePFTau40TrackPt1MediumChargedIsolationAndTight OOSCPhotonsDz02Reg
HLT_DoubleTight ChargedIsoPFTau40 _Trk1_eta2p1_Reg_v	L1_DoubleIsoTau *er2p1, * in 28, 30, 32, 33, 34, 35, 36, 38, 70	hltDoublePFTau40TrackPt1TightChargedIsolationDz02Reg
HLT_DoubleTight ChargedIsoPFTau 35_Trk1_TightID _eta2p1_Reg_v	L1_DoubleIsoTau *er2p1, * in 28, 30, 32, 33, 34, 35, 36, 38, 70	hltDoublePFTau35TrackPt1TightChargedIsolationAndTight OOSCPhotonsDz02Reg
HLT_DoubleMedium ChargedIsoPFTau HPS35_Trk1_eta2p1 _Reg_v	L1_DoubleIsoTau *er2p1, * in 28, 30, 32, 33, 34, 35, 36, 38, 70	hltHpsDoublePFTau35TrackPt1MediumChargedIsolation Dz02Reg

Tableau X.9 – *Chemins de déclenchement utilisés en 2018 pour le canal $\tau_h\tau_h$.*

HLT Path	L1 Seed	Muon filter to match	Tau filter to match
HLT_IsoMu24_v	L1_SingleMu22	hltL3crIsoL1sSingleMu22L1f0L2 f10QL3f24QL3trkIsoFiltered0p07	-
HLT_IsoMu27_v	L1_SingleMu22 **or** L1_SingleMu25	hltL3crIsoL1sMu22Or25L1f0L2 f10QL3f27QL3trkIsoFiltered0p07	-
HLT_Medium ChargedIsoPF Tau180HighPt RelaxedIso_Trk50 _eta2p1_v	L1_SingleTau80 to140er	-	hltPFTau180TrackPt50LooseAbs OrRelMediumHighPtRelaxed IsoIso **and** hltSelectedPF Tau180MediumChargedIsolation L1HLTMatched
HLT_IsoMu20 _eta2p1_Loose ChargedIsoPF Tau27_eta2p1 _CrossL1_v	L1_Mu18er2p1 _Tau24er2p1	hltL3crIsoL1sMu18erTau24erIor Mu20erTau24erL1f0L2f10QL3f20Q L3trkIsoFiltered0p07hltOverlap FilterIsoMu20LooseChargedIso PFTau27L1Seeded	hltSelectedPFTau27LooseCharged IsolationAgainstMuonL1HLT MatchedhltOverlapFilterIso Mu20LooseChargedIsoPFTau27 L1Seeded

Tableau X.10 – *Chemins de déclenchement utilisés en 2018 pour le canal $\mu\tau_h$.*

HLT Path	L1 Seed	Electron filter to match	Tau filter to match
HLT_Ele32_WPTight_Gsf_v	L1_SingleEGXX **or** L1_SingleEGXXer2p1 **or** L1_SingleIsoEGXX **or** L1_SingleIsoEGXXer2p1	hltEle32WPTightGsfTrackIsoFilter	-
HLT_Ele35_WPTight_Gsf_v	L1_SingleEGXX **or** L1_SingleEGXXer2p1 **or** L1_SingleIsoEGXX **or** L1_SingleIsoEGXXer2p1	hltEle35noerWPTightGsfTrackIsoFilter	-
HLT_MediumChargedIsoPFTau180HighPtRelaxedIso_Trk50_eta2p1_v	L1_SingleTau80to140er	-	hltPFTau180TrackPt50LooseAbsOrRelMediumHighPtRelaxedIsoIso **and** hltSelectedPFTau180MediumChargedIsolationL1HLTMatched
HLT_Ele24_eta2p1_WPTight_Gsf_LooseChargedIso PFTau30_eta2p1_CrossL1_v **or** HLT_Ele24_eta2p1_WPTight_Gsf_LooseChargedIsoPFTauHPS30_eta2p1_CrossL1_v	L1_LooseIsoEG22er2p1_IsoTau26er2p1_dR_Min0p3	hltEle24erWPTightGsfTrackIsoFilterForTauhltOverlapFilterIsoEle24WPTightGsfLooseIsoPFTau30	hltSelectedPFTau30LooseChargedIsolationL1HLTMatchedhltOverlapFilterIsoEle24WPTightGsfLooseIsoPFTau30

Tableau X.11 – *Chemins de déclenchement utilisés en 2018 pour le canal eτ_h.*

HLT Path	L1 Seed	Muon filter to match	Electron filter to match
HLT_Mu23_TrkIsoVVL_Ele12_CaloIdL_TrackIdL_IsoVL_DZ	???	hltMu23TrkIsoVVLEle12CaloIdLTrackIdLIsoVLMuonlegL3IsoFiltered23	hltMu23TrkIsoVVLEle12CaloIdLTrackIdLIsoVLElectronlegTrackIsoFilter
HLT_Mu8_TrkIsoVVL_Ele23_CaloIdL_TrackIdL_IsoVL_DZ	???	hltL3fL1sMu7EG23f0Filtered8 **or** hltMu8TrkIsoVVLEle23CaloIdLTrackIdLIsoVLMuonlegL3IsoFiltered8	hltMu8TrkIsoVVLEle23CaloIdLTrackIdLIsoVLElectronlegTrackIsoFilter

Tableau X.12 – *Chemins de déclenchement utilisés en 2018 pour le canal eμ.*

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