Level 2 e/γ menu

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```
#################################################
##            Active HLT signatures            ##
## signature              prescale forcedAccept ##
##  e10                          1          0 ##
##  2e15i                        1          0 ##
##  e25i                         1          0 ##
##  e60                          1          0 ##
##  g10                          1          0 ##
##  2g20i                        1          0 ##
##  g60                          1          0 ##
##  L2_Zee                       1          0 ##
##  L2_Jpsiee                    1          0 ##
#################################################
```

```
#############################################
##          Active LVL1 menu items         ##
##        menu item        prescale    mask ##
##  EM01                          1      on ##
##  L1_2EM15I                     1      on ##
##  L1_EM25I                      1      on ##
##  L1_EM60                       1      on ##
#############################################
```

- Four electron signatures and three photon signatures now existing at level 2 plus two topological signatures: Z→ee and J/ψ→ee
- Different instances of the same hypothesis algorithm in `TrigEgammaHypo`:
  - electrons: `TrigL2Calo`, `TrigL2IDCalo`
  - photons: `TrigL2Photon`
  - initialised each instance with different parameters (cuts on reconstructed quantities)
- Uses `TriggerMenu` Python class from John Baines and its methods to add multiple signatures and enable/disable signatures
- e10 and g10 intended to be loose signatures
  - There must be a loose signature in ESD/AOD production simply to trigger the production of data objects so that features (tracks, vertices, clusters) down the chain are kept in POOL

Topological signatures

- Two topological signatures exist: Z→ee and J/ψ→ee (should have another one for H →γγ…)
  - Code adapted from di-muon signature by Carlo: `TrigHypothesis/TrigEgammaHypo/TrigL2DielectronMass`
  - Start with (loosely selected) TrigElectrons from e10 and search for pairs with the right invariant mass
  - Uses error on track Zvtx to apply cut on two TrigElectrons coming fro same vertex (configurable: can be turned on/off)
    - Designed for 99.7% efficiency for tracks with common origin (if errors ok)

```
HLTConfig                    INFO ============================
XMLSignature                 INFO  signature L2_Zee
XMLSignature                 INFO ============================
XMLSignature                 INFO  L2_Zee
XMLTE                        INFO     *    teL2topoZee 0 L2
XMLTE                        INFO     *       *    L2_e10 1 L2
XMLTE                        INFO     *       *       *    teL2e10trSiTrack 2 L2
XMLTE                        INFO     *       *       *       *    teL2e10trIDSCAN 3 L2
XMLTE                        INFO     *       *       *       *       *    teL2em10clhy 4 L2
XMLTE                        INFO     *       *       *       *       *       *    teL2em10cl 5 L2
XMLTE                        INFO     *       *       *       *       *       *       *    EM01 6 L2
XMLTE                        INFO     *       *    L2_e10 1 L2
XMLTE                        INFO     *       *       *    teL2e10trSiTrack 2 L2
XMLTE                        INFO     *       *       *       *    teL2e10trIDSCAN 3 L2
XMLTE                        INFO     *       *       *       *       *    teL2em10clhy 4 L2
XMLTE                        INFO     *       *       *       *       *       *    teL2em10cl 5 L2
XMLTE                        INFO     *       *       *       *       *       *       *    EM01 6 L2
```

Conclusions on level 2 e/γ menu

- **What was shown relies on Python configuration and existing e/gamma algos and “old” Steering**
- **It is sure to change in rel.13 with new Steering (see Carlo’s talk), but current implementation allows some more reality in CSC studies**
- **Hypothesis algorithms parameters (cuts) should be updated after recent and future optimisation studies**

Current default configuration

```
L2CaloHypo_e10_L2              DEBUG Initialization completed successfully
L2CaloHypo_e10_L2              DEBUG AcceptAll           = True
L2CaloHypo_e10_L2              DEBUG EtaBins        = 0 0.75 1.5 1.8 2 2.5
L2CaloHypo_e10_L2              DEBUG EThr           = 7000 7000 7000 7000 7000 (lo)/90000 90000 90000 90000 90000
     (hi)
L2CaloHypo_e10_L2              DEBUG HADEThr        = 999000 999000 999000 999000 999000 (lo)/999000 999000 999000
     999000 999000 (hi)
L2CaloHypo_e10_L2              DEBUG CARCOREthr     = 0 0 0 0 0
L2CaloHypo_e10_L2              DEBUG CAERATIOthr    = 0 0 0 0 0
L2CaloHypo_e10_L2              DEBUG dPHICLUSTERthr = 0.1
L2CaloHypo_e10_L2              DEBUG dETACLUSTERthr = 0.1
L2CaloHypo_e15i_L2             DEBUG Initialization completed successfully
L2CaloHypo_e15i_L2             DEBUG AcceptAll           = False
L2CaloHypo_e15i_L2             DEBUG EtaBins        = 0 0.75 1.5 1.8 2 2.5
L2CaloHypo_e15i_L2             DEBUG EThr           = 11000 11000 11000 11000 11000 (lo)/90000 90000 90000 90000
     90000 (hi)
L2CaloHypo_e15i_L2             DEBUG HADEThr        = 1000 1000 3500 1500 1000 (lo)/999000 999000 999000 999000
     999000 (hi)
L2CaloHypo_e15i_L2             DEBUG CARCOREthr     = 0.88 0.86 0.87 0.9 0.9
L2CaloHypo_e15i_L2             DEBUG CAERATIOthr    = 0.7 0.55 0.65 0.8 0.8
L2CaloHypo_e15i_L2             DEBUG dPHICLUSTERthr = 0.1
L2CaloHypo_e15i_L2             DEBUG dETACLUSTERthr = 0.1
L2CaloHypo_e25i_L2             DEBUG Initialization completed successfully
L2CaloHypo_e25i_L2             DEBUG AcceptAll           = False
L2CaloHypo_e25i_L2             DEBUG EtaBins        = 0 0.75 1.5 1.8 2 2.5
L2CaloHypo_e25i_L2             DEBUG EThr           = 21000 21000 21000 21000 21000 (lo)/90000 90000 90000 90000
     90000 (hi)
L2CaloHypo_e25i_L2             DEBUG HADEThr        = 1000 1000 4000 1500 1000 (lo)/999000 999000 999000 99 9000
     999000 (hi)
L2CaloHypo_e25i_L2             DEBUG CARCOREthr     = 0.92 0.91 0.91 0.93 0.92
L2CaloHypo_e25i_L2             DEBUG CAERATIOthr    = 0.8 0.7 0.75 0.85 0.9
L2CaloHypo_e25i_L2             DEBUG dPHICLUSTERthr = 0.1
L2CaloHypo_e25i_L2             DEBUG dETACLUSTERthr = 0.1
L2CaloHypo_e60_L2              DEBUG Initialization completed successfully
L2CaloHypo_e60_L2              DEBUG AcceptAll           = False
L2CaloHypo_e60_L2              DEBUG EtaBins        = 0 0.75 1.5 1.8 2 2.5
L2CaloHypo_e60_L2              DEBUG EThr           = 53000 53000 53000 53000 53000 (lo)/90000 90000 90000 90000 90000
     (hi)
```

Current default configuration

```
L2CaloHypo_e60_L2          DEBUG HADEThr       = 999000 999000 999000 999000 999000 (lo)/999000 999000 999000 999000 999000 (hi)
L2CaloHypo_e60_L2          DEBUG CARCOREthr    = 0.93 0.92 0.92 0.93 0.92
L2CaloHypo_e60_L2          DEBUG CAERATIOthr   = 0.85 0.75 0.8 0.85 0.85
L2CaloHypo_e60_L2          DEBUG dPHICLUSTERthr = 0.1
L2CaloHypo_e60_L2          DEBUG dETACLUSTERthr = 0.1
L2PhotonHypo_g10_L2        DEBUG Initialization completed successfully
L2PhotonHypo_g10_L2        DEBUG AcceptAll          = False
L2PhotonHypo_g10_L2        DEBUG EtaBins       = 0 0.8 1.5 1.8 2 2.5
L2PhotonHypo_g10_L2        DEBUG ETthr         = 7000 7000 7000 7000 7000 (lo)/90000 90000 90000 90000
L2PhotonHypo_g10_L2        DEBUG HADEThr       = 999000 999000 999000 999000 999000 (lo)/999000 999000
L2PhotonHypo_g10_L2        DEBUG CARCOREthr    = 0 0 0 0 0
L2PhotonHypo_g10_L2        DEBUG CAERATIOthr   = 0 0 0 0 0
L2PhotonHypo_g10_L2        DEBUG dPHICLUSTERthr = 0.1
L2PhotonHypo_g10_L2        DEBUG dETACLUSTERthr = 0.1
L2PhotonHypo_g20i_L2       DEBUG Initialization completed successfully
L2PhotonHypo_g20i_L2       DEBUG AcceptAll          = False
L2PhotonHypo_g20i_L2       DEBUG EtaBins       = 0 0.8 1.5 1.8 2 2.5
L2PhotonHypo_g20i_L2       DEBUG ETthr         = 17000 17000 17000 17000 17000 (lo)/90000 90000 90000
L2PhotonHypo_g20i_L2       DEBUG HADEThr       = 726 1000 2672 969 1000 (lo)/999000 999000 999000 9990
L2PhotonHypo_g20i_L2       DEBUG CARCOREthr    = 0.931 0.923 0.923 0.931 0.923
L2PhotonHypo_g20i_L2       DEBUG CAERATIOthr   = 0.726 0.75 0.848 0.844 0.848
L2PhotonHypo_g20i_L2       DEBUG dPHICLUSTERthr = 0.1
L2PhotonHypo_g20i_L2       DEBUG dETACLUSTERthr = 0.1
L2PhotonHypo_g60_L2        DEBUG Initialization completed successfully
L2PhotonHypo_g60_L2        DEBUG AcceptAll          = False
L2PhotonHypo_g60_L2        DEBUG EtaBins       = 0 0.8 1.5 1.8 2 2.5
L2PhotonHypo_g60_L2        DEBUG ETthr         = 55000 55000 55000 55000 55000 (lo)/90000 90000 90000
L2PhotonHypo_g60_L2        DEBUG HADEThr       = 1247 1000 3180 956 1000 (lo)/999000 999000 999000 999
L2PhotonHypo_g60_L2        DEBUG CARCOREthr    = 0.956 0.953 0.945 0.946 0.923
L2PhotonHypo_g60_L2        DEBUG CAERATIOthr   = 0.848 0.75 0.791 0.733 0.917
L2PhotonHypo_g60_L2        DEBUG dPHICLUSTERthr = 0.1
L2PhotonHypo_g60_L2        DEBUG dETACLUSTERthr = 0.1
```

Current default configuration

```
L2DielectronHypo_Zee_L2
L2DielectronHypo_Zee_L2
    successfully:
L2DielectronHypo_Zee_L2
L2DielectronHypo_Zee_L2
L2DielectronHypo_Zee_L2
L2DielectronHypo_Zee_L2
L2DielectronHypo_Zee_L2
L2DielectronHypo_Zee_L2
L2dielectronHypo_Jpsi_L2
L2dielectronHypo_Jpsi_L2
    successfully:
L2dielectronHypo_Jpsi_L2
L2dielectronHypo_Jpsi_L2
L2dielectronHypo_Jpsi_L2
L2dielectronHypo_Jpsi_L2
L2dielectronHypo_Jpsi_L2
L2dielectronHypo_Jpsi_L2
```

```
DEBUG Initialization:
DEBUG Initialization completed

DEBUG AcceptAll             = False
DEBUG OppositeCharge        = True
DEBUG CommonVertex          = True
DEBUG ValidElectron         = True
DEBUG LowerMassCut          = 70000
DEBUG UpperMassCut          = 120000
DEBUG Initialization:
DEBUG Initialization completed

DEBUG AcceptAll             = False
DEBUG OppositeCharge        = True
DEBUG CommonVertex          = True
DEBUG ValidElectron         = True
DEBUG LowerMassCut          = 2100
DEBUG UpperMassCut          = 4100
```