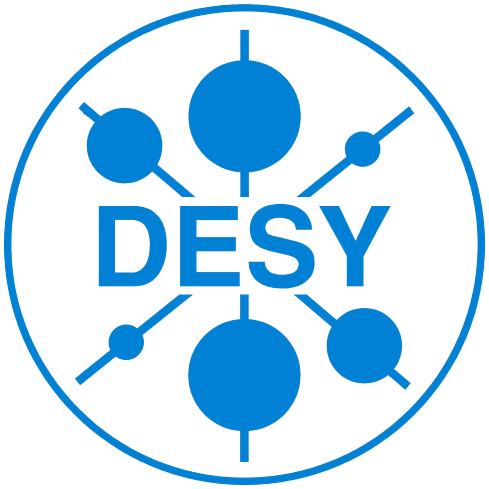


Overlap between
$H \to \tau\tau \to \ell\ell$ & $H \to WW \to (\ell\nu)(\ell\nu)$

A. Raspereza

Ka-HH Tau Meeting, January 24th 2014

Event Lists

Event lists provided by Guillelmo

```
Data ->

http://ceballos.web.cern.ch/ceballos/random/log_hww.txt

run, event, lepton_type, njets

lepton_type = 0/1/2/3 = mm/me/em/ee

**********************************************************

MC ->

http://ceballos.web.cern.ch/ceballos/random/log_hww_mc.txt

run, event, lepton_type, njets, processId

lepton_type = 0/1/2/3 = mm/me/em/ee

processId = 10001/10010/24/26 = ggH/qqH/ZH/WH
```

EE Channel

EE Channel : Overlap in Data (8TeV)

Events selected in H → WW → (eν)(eν)	Overlap with H → ττ → ee	Fraction of overlap
163	6	3.7%

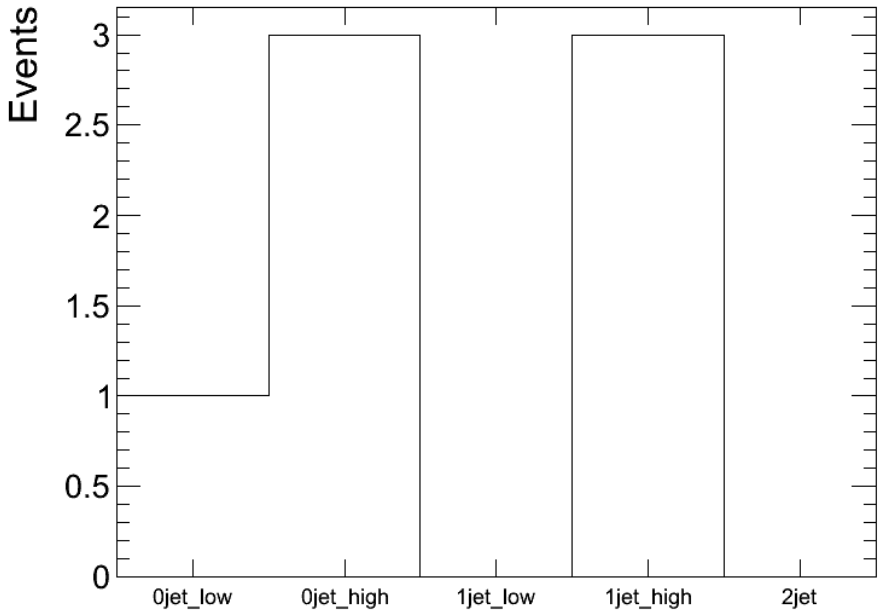
```
*****************************************************************
*   Overlap between H->WW->(ev)(ev) and H->tautau->ee (Data 8 TeV) *
*****************************************************************
*     Run     *     Event    *   Category  *     mT * Discriminant *
*****************************************************************
*    208427   *  608590842   *   1jet_high *  120.0 *      0.0267  *
*    191062   *  291486799   *   1jet_low  *  94.84 *      0.0007  *
*    200091   *  424329783   *   1jet_high *  113.3 *      0.0012  *
*    201164   *  152090235   *   1jet_high *  122.7 *      0.0058  *
*    206745   * 1202877783   *   1jet_high *  74.25 *      0.0101  *
*    207320   *  126687068   *   1jet_high *  104.3 *      0.0501  *
*****************************************************************
```

EE : Overlap in gg → H(125) → WW MC sample

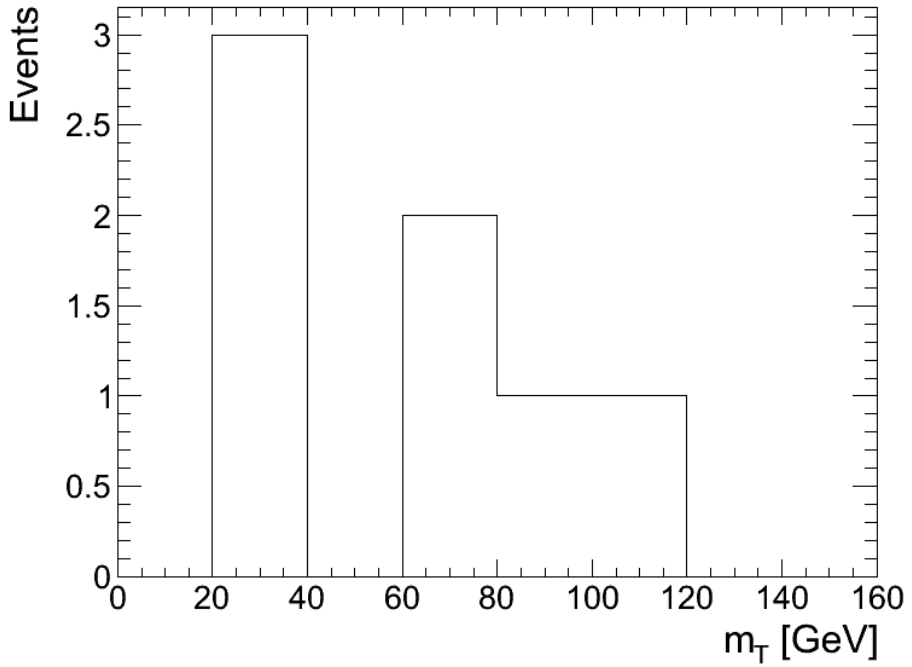
gg → H events selected in H → WW → (eν)(eν)	Overlap with H → ττ → ee	Fraction of overlap
996	7	0.7%

Overlapping events →

event category

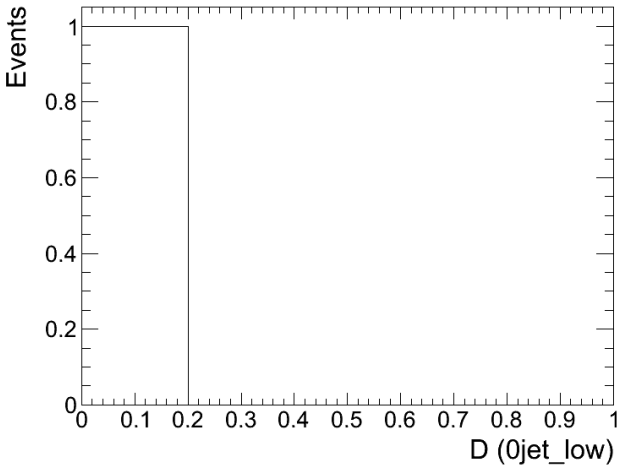


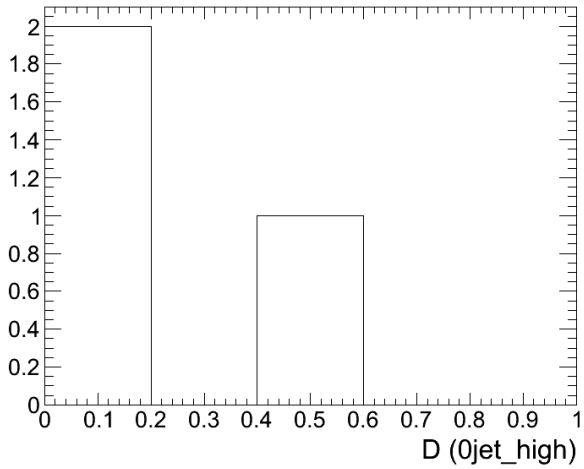
transverse mass

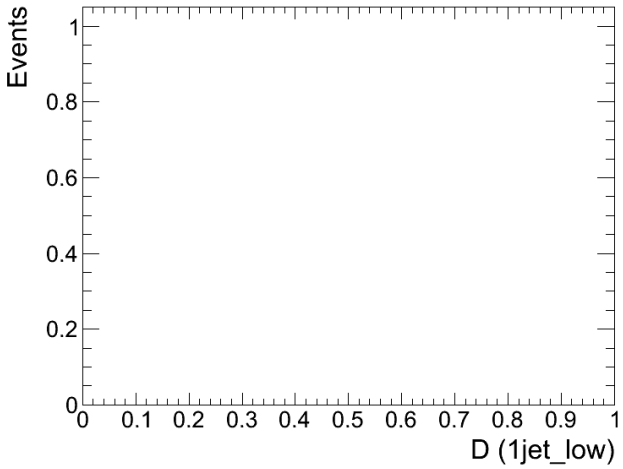


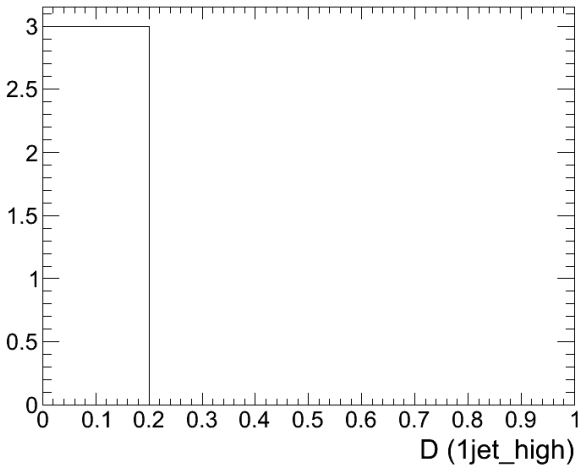
EE : Overlap in gg → H(125) → WW MC sample

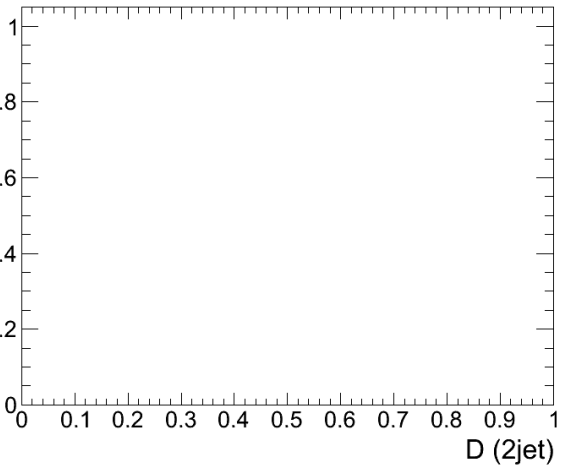
Final discriminant distributions for overlapping events









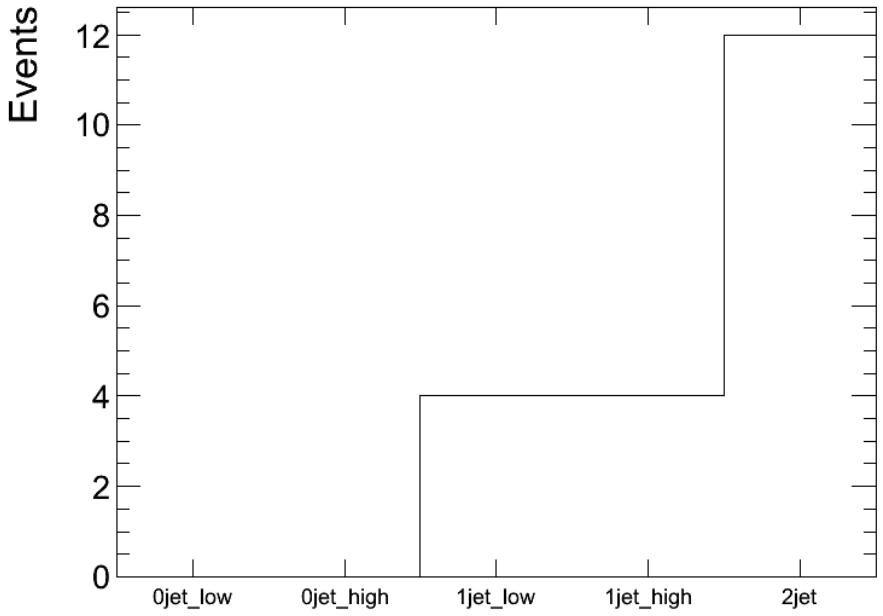


EE : Overlap in qqH(125) → WW MC sample

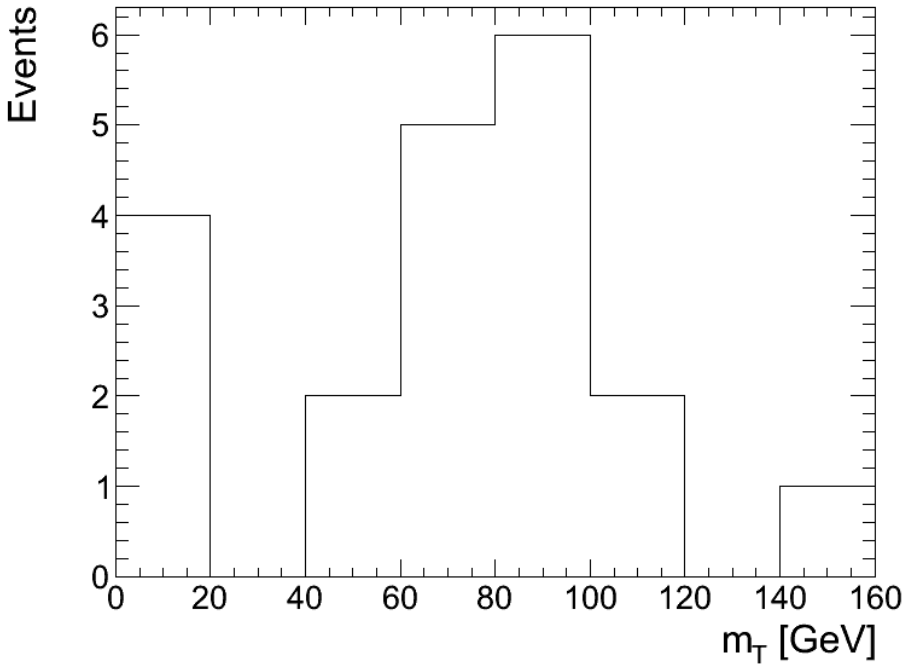
qqH events selected in H → WW → (eν)(eν)	Overlap with H → ττ → ee	Fraction of overlap
1309	20	1.5%

Overlapping events →

event category

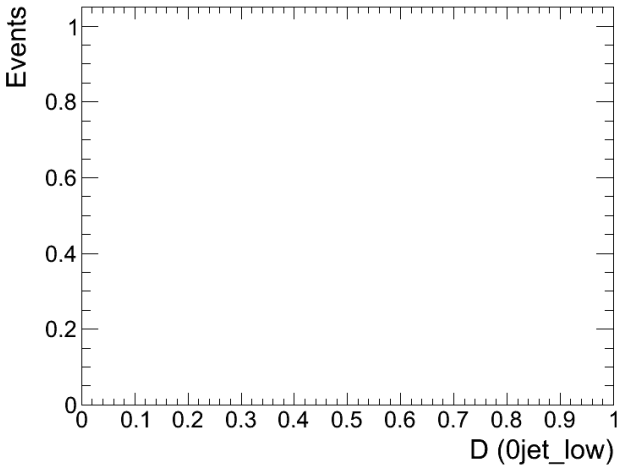


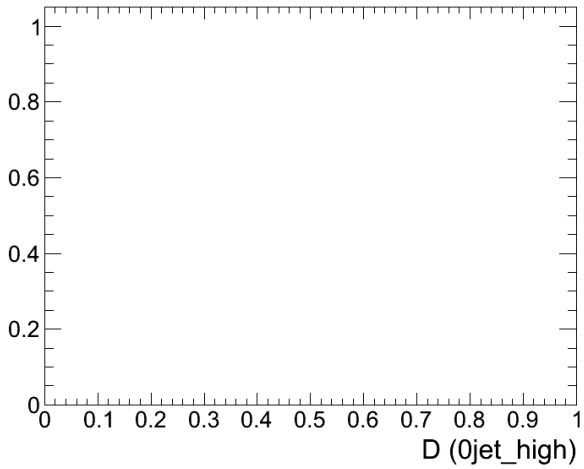
transverse mass

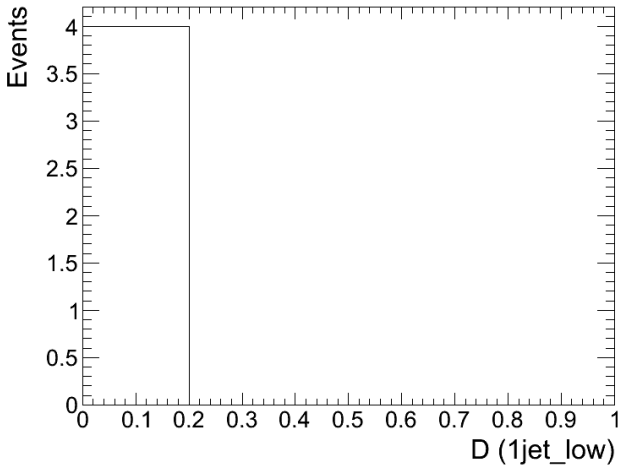


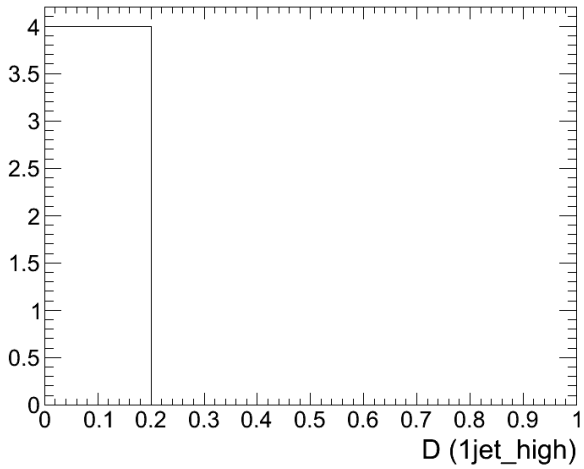
EE : Overlap in qqH(125) → WW MC sample

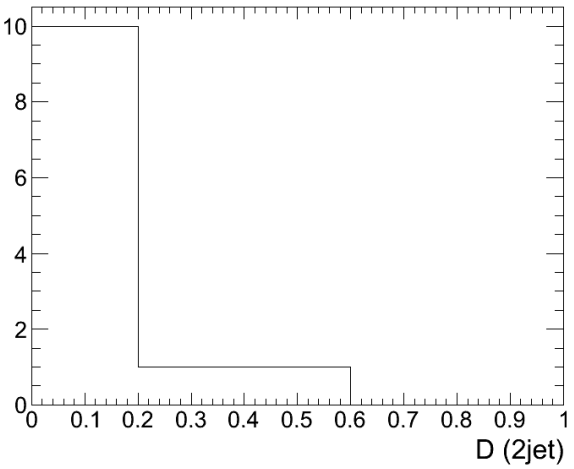
Final discriminant distributions for overlapping events











MuMu Channel

MuMu Channel : Overlap in Data (8TeV)

Events selected in H → WW → (μν)(μν)	Overlap with H → ττ → μμ	Fraction of overlap
412	14	3.4%

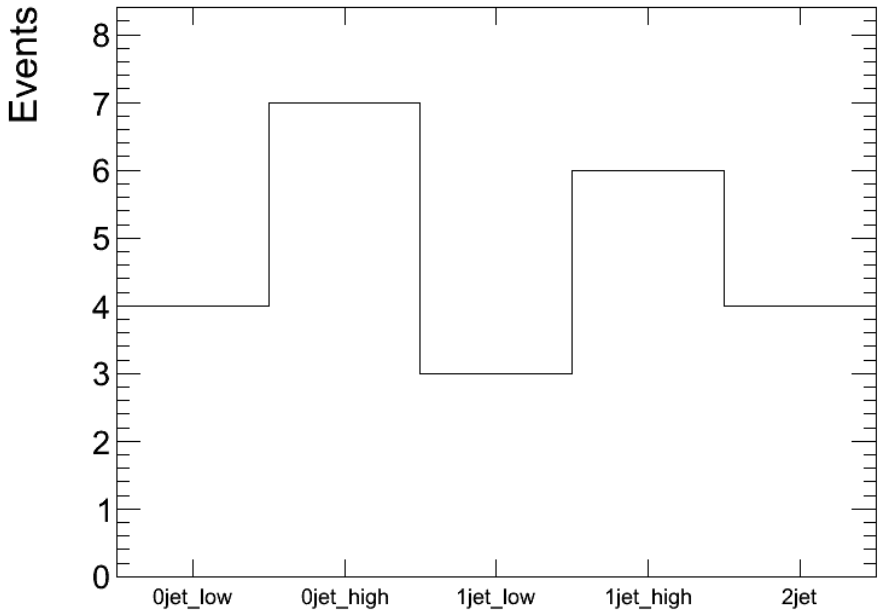
```
*************************************************************************
* Overlap between H->WW->(mu+v)(mu+v) and H->tautau->mumu (Data 8 TeV) *
*************************************************************************
*     Run     *     Event     *   Category  *     mT    *  Discriminant  *
*************************************************************************
*    191856   *  22076100   *   1jet_low  *   114.70 *      0.00236   *
*    195915   * 165840105   *   1jet_high *   83.677 *      0.00679   *
*    195950   * 142452903   *   1jet_high *   119.43 *      0.00100   *
*    199703   * 335870579   *   2jets     *   116.75 *      0.00280   *
*    202973   * 524560011   *   1jet_high *   116.63 *      0.00100   *
*    198954   * 201676449   *   0jet_high *   89.302 *      0.03145   *
*    202504   * 567801127   *   1jet_high *   110.73 *      0.00587   *
*    206596   * 348537853   *   2jets     *   104.12 *      0.00125   *
*    203894   * 462434242   *   1jet_low  *   113.03 *      0.00100   *
*    207099   * 872091742   *   0jet_low  *   97.997 *      0.00470   *
*    204114   *  44512699   *   1jet_high *   97.937 *      0.01215   *
*    206448   * 870544451   *   1jet_high *   96.995 *      0.03960   *
*    206575   *  89494711   *   1jet_high *   90.271 *      0.00101   *
*    207490   *  55077913   *   0jet_high *   101.14 *      0.00100   *
*************************************************************************
```

MuMu : Overlap in gg → H(125) → WW MC sample

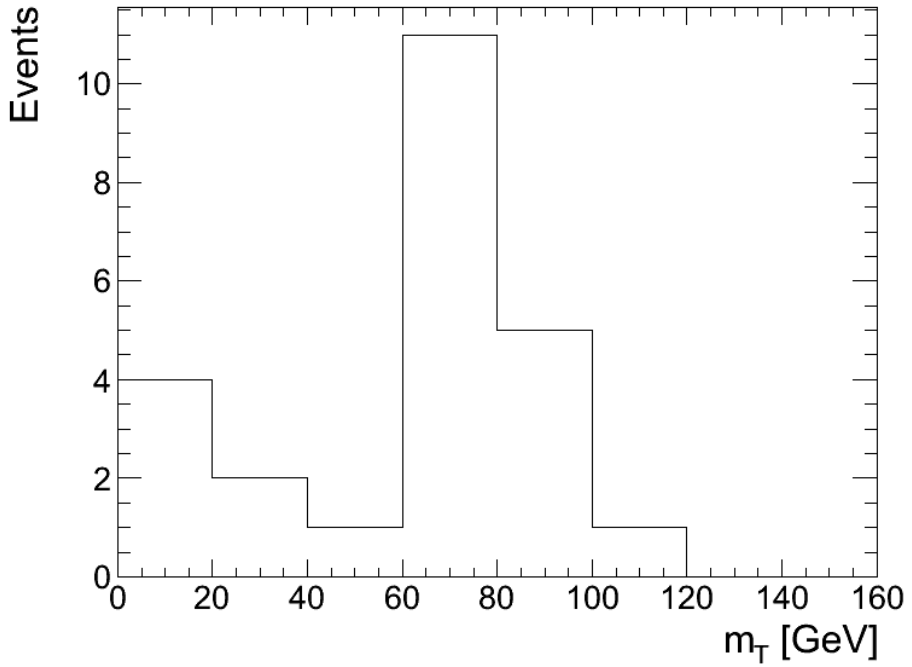
gg → H events selected in H → WW → (μν)(μν)	Overlap with H → ττ → μμ	Fraction of overlap
2032	24	1.2%

Overlapping events →

event category

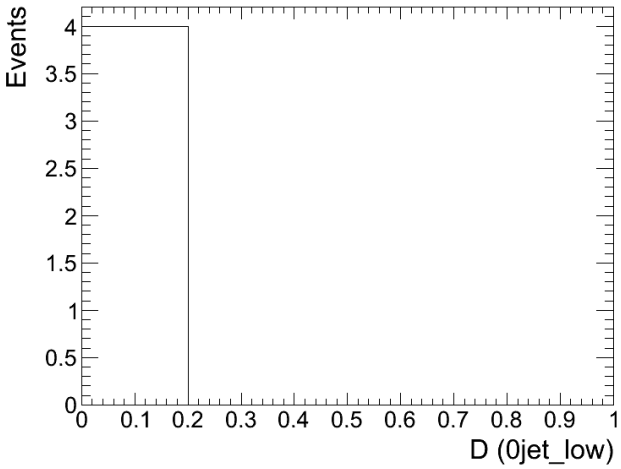


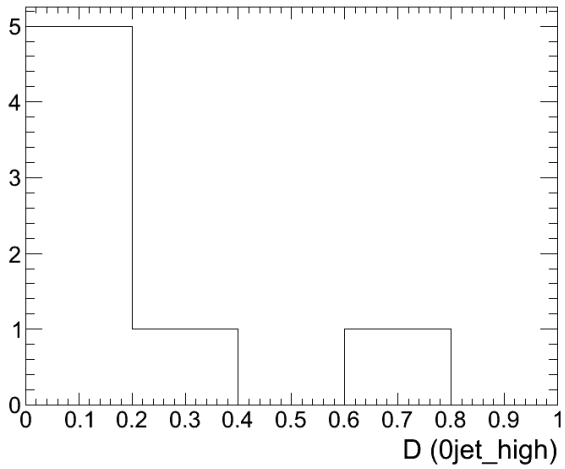
transverse mass

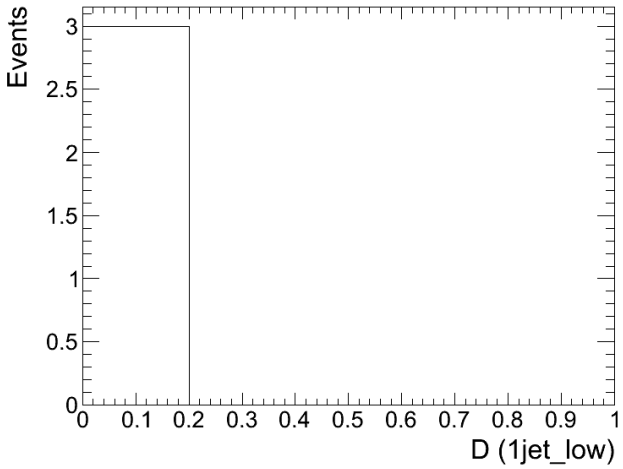


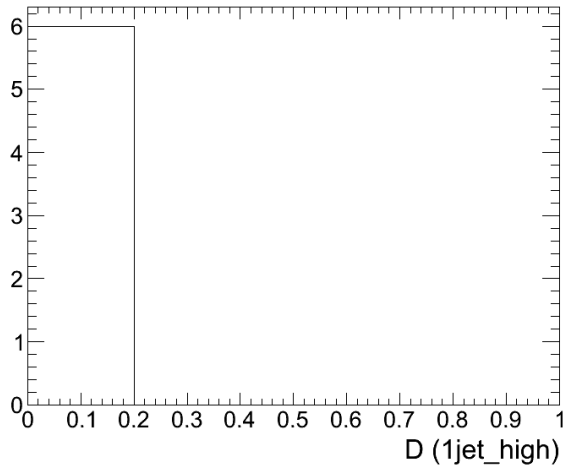
MuMu : Overlap in gg → H(125) → WW MC sample

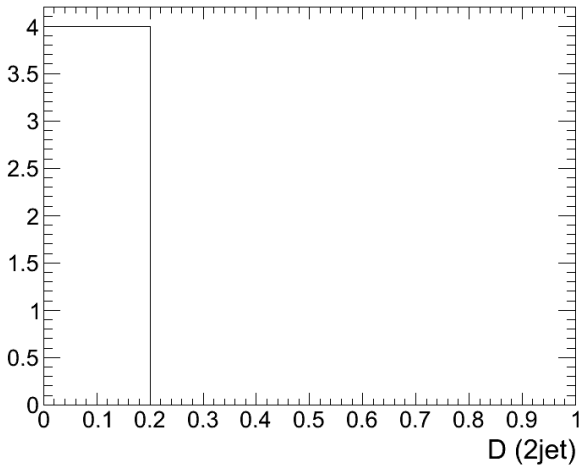
Final discriminant distributions for overlapping events









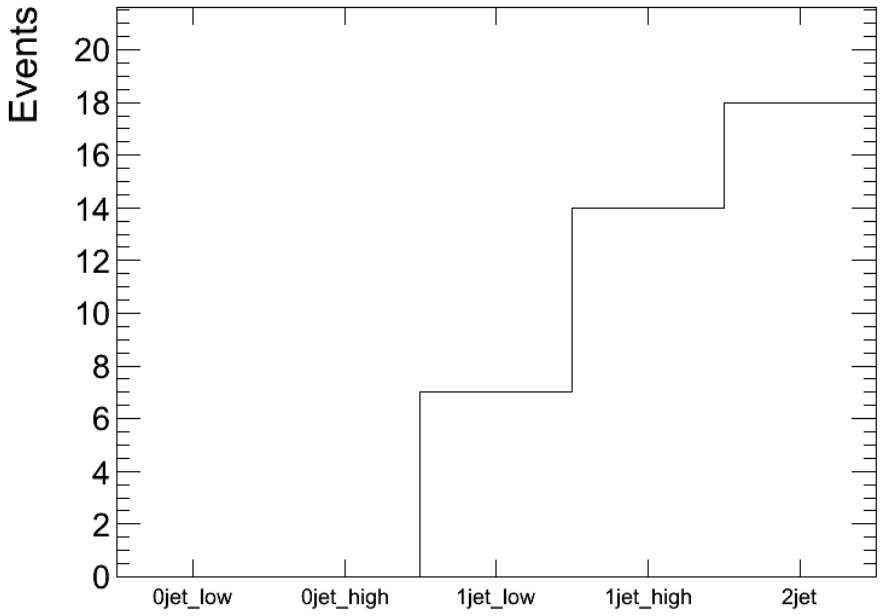


MuMu : Overlap in qqH(125) → WW MC sample

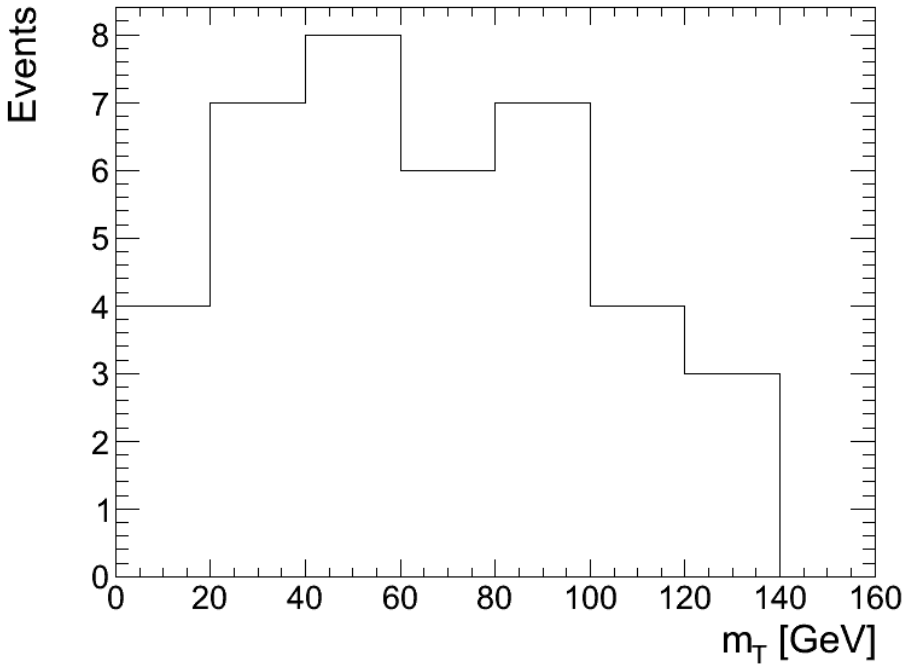
qqH events selected in H → WW → (μν)(μν)	Overlap with H → ττ → μμ	Fraction of overlap
2507	39	1.6%

Overlapping events →

event category

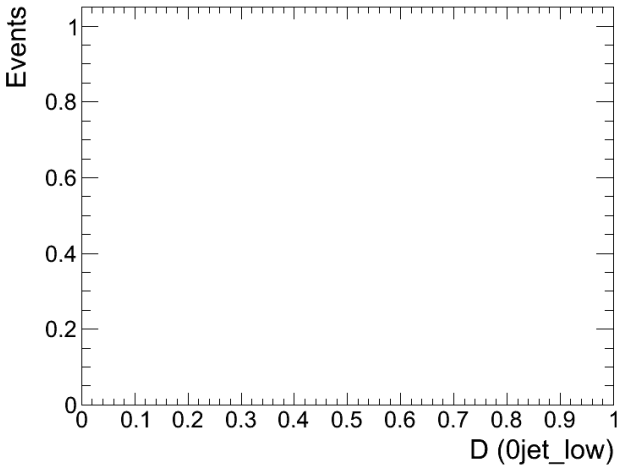


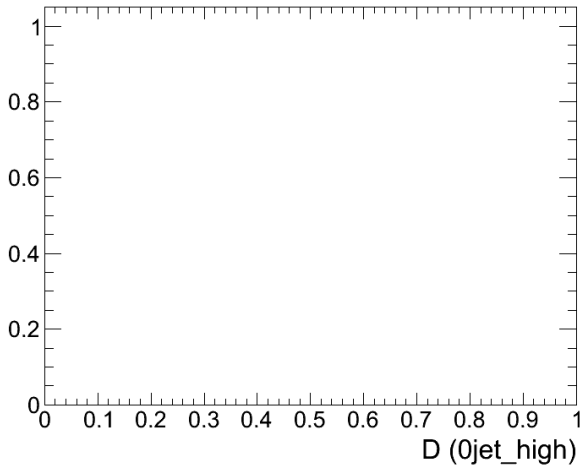
transverse mass

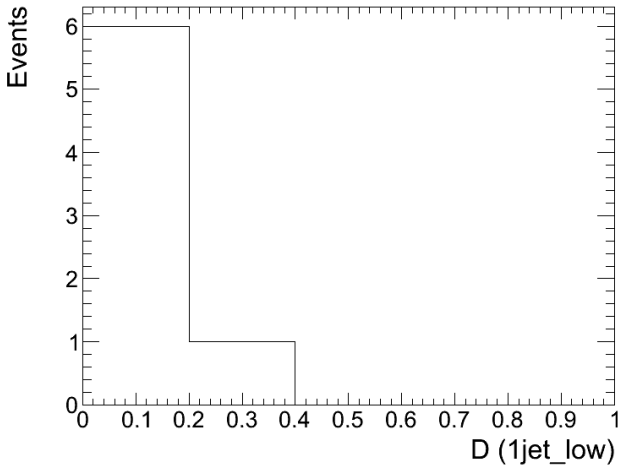


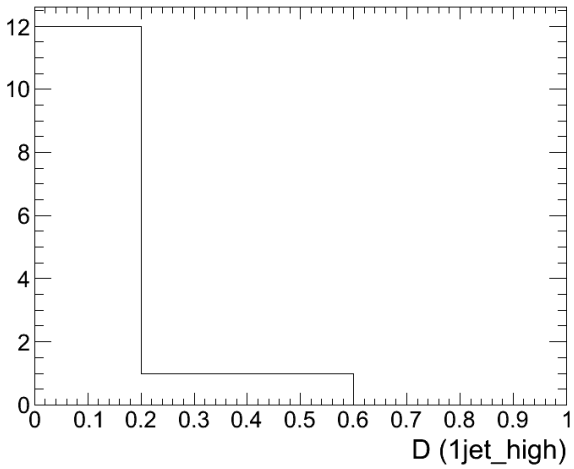
MuMu : Overlap in qqH(125) → WW MC sample

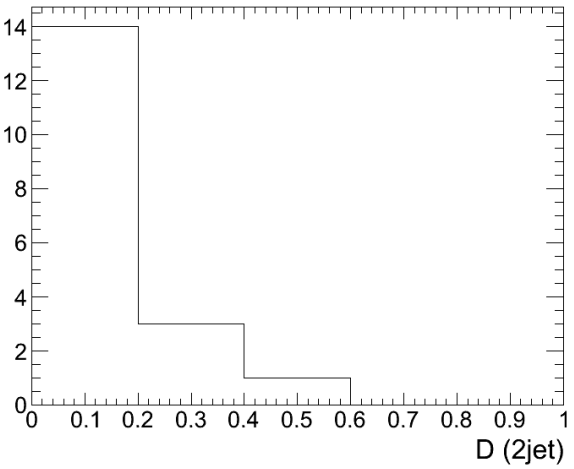
Final discriminant distributions for overlapping events











Summary

Overlap between H → ττ and H → WW selection is checked in the EE/MuMu channels using event lists provided by Guillelmo

Overlap is found to be small

- **% level relative to sample selected in the H → WW → (ℓν)(ℓν) analysis**
- **sub-% level relative to sample selected in the H → ττ → ℓℓ analysis**

Overlapping events have low values of final discriminant → negligible effect on observed / expected significance

Current H → ττ → ee/μμ datacards are safe to be used in CMS-wide Higgs combination