ZH to MET+bb

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Fingerprint

Analisi: ZH -> vvbb

Signature: MET + bb

People Italy: Franco Bedeschi, Marco Rescigno, Michele Giunta, Paolo Mastrandrea

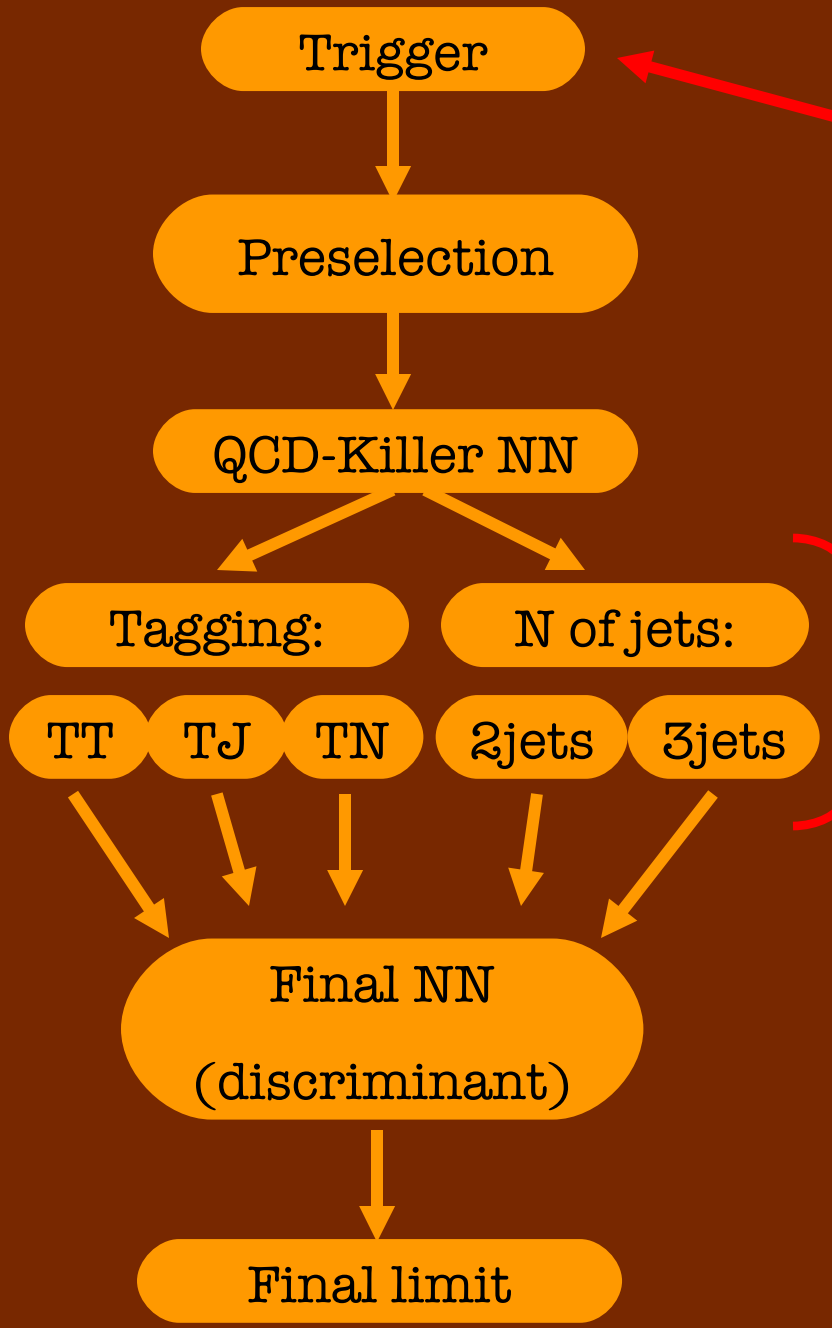
People Purdue: Daniela Bortoletto, Artur Apresyan, Fabrizio Margaroli, Karolos Potamianos + 2 laureandi

More People: Ben Kilminster, Oscar Gonzales, Miguel Vidal

Status: just blessed with 3.6 fb^{-1}

Result: limit 6.1 (exp: 4.2) times SM xsec @115 GeV

Contributi



Proponiamo di usare **MET_DIJET** oltre **MET_35_CJET_JET**

Proponiamo di usare **Roma-Tagger** al posto di SecVtx e JetProb

Studiamo che uso si puo' fare delle informazioni di tagging del **terzo jet** quando presente

Trigger

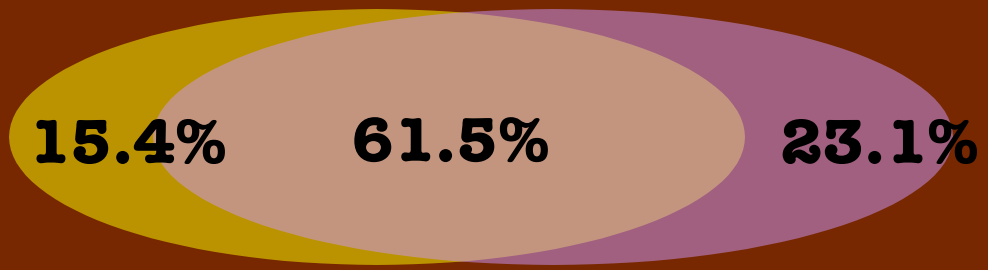
Confronto lo yield dei paths

Per alcuni periodi nei quali entrambi sono presenti (p15,16,17)

MET35 **MET_DIJET**

Trigger Level

After selection



2 leading jets are SecVtx T tagged

Trigger

La mia proposta e' di aggiungere MET_DIJET al path attualmente in uso.

+10-20% di eventi a parita' di tagli utilizzati.
Incremento maggiore abbassando taglio MET

MET45: to be investigated as well

Roma-tagger

Roma-tagger:

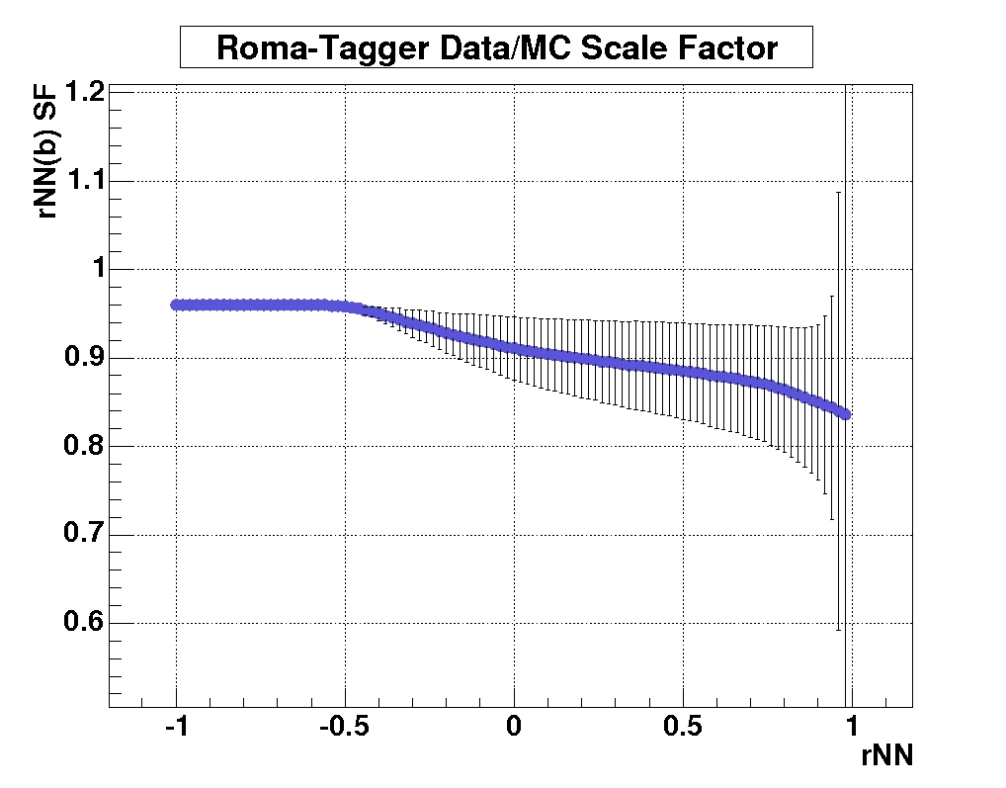
- Funziona solo con top-ntuples
- Puo' essere applicato in due modi: ***cut-based*** e ***shape-based***

Roma-tagger cut-based:

- Studiato e blessato da Justin Keung (cdf9898/9747)
- Workpoints: 0.0, 0.2, 0.4
- Systematics, mistag rates, SFs computed
- SFs depend on energy and number of vertices
- Used for the blessed WH analysis and increased significance by 7%

Roma-tagger

- Shape-based SF based on p0-p12
- Needs work to be extended to more recent periods
- Bless the shape-based rNN tool is a priority (Paolo/Michele)



SF from the cut-based study appears slightly smaller than this one, but roughly compatible within errors

Analisi METbb

Categorie ortogonali SecVtx/JetProb e loro significativita' S/sqrt(B) dopo QCD-Killer NN>0:

- TT: 2 leading jets SecVtx Tight Sig= 0.187
- TJ: un jet SecVtxT, uno JP non ST Sig=0.136
- TN: un jet ST, il secondo untagged Sig=0.122
- **Combined significance: 0.262**

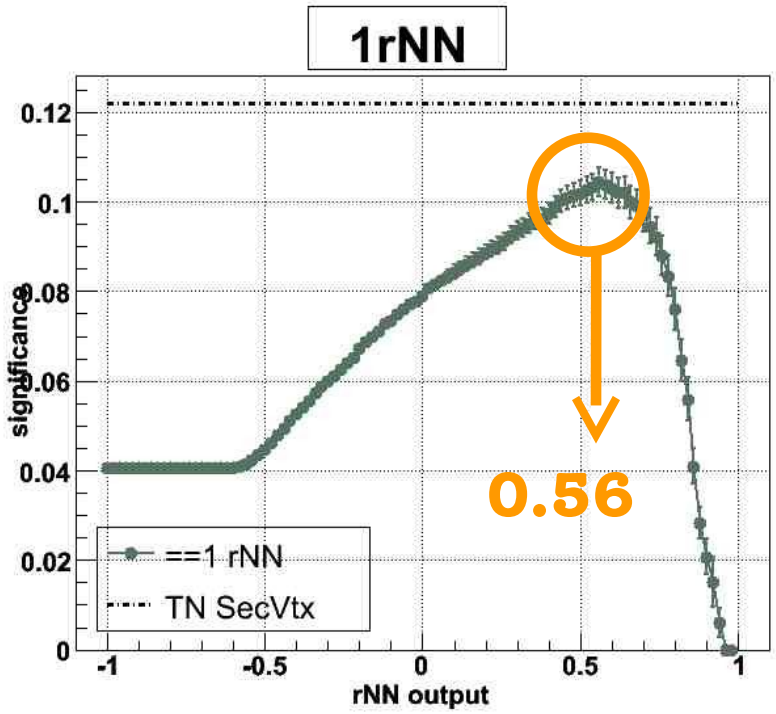
B-tagging: rNN samples

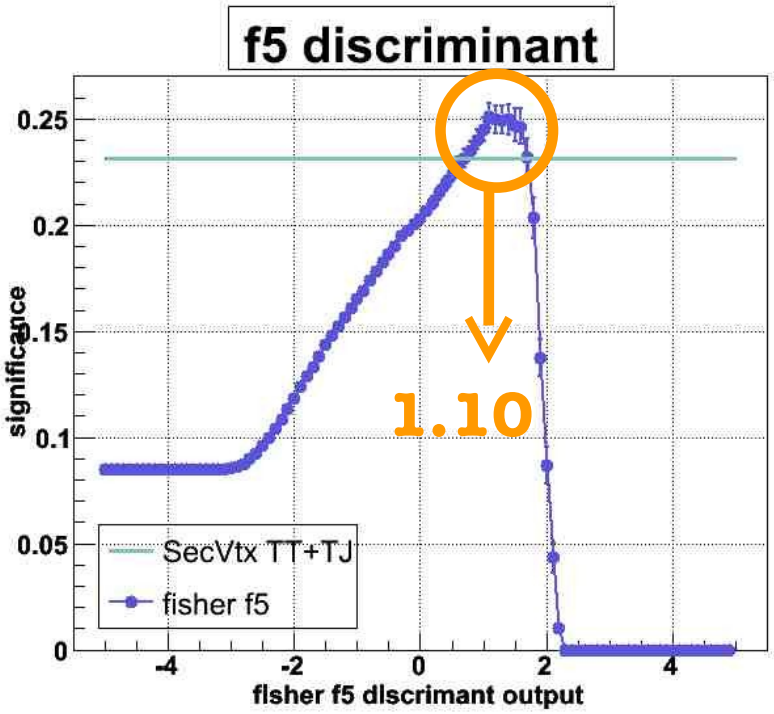
In alternativa a SecVtx+JP, uso rNN per formare 2 categorie

- Se rNN(jet1), rNN(jet2) definiti, calcolo

  f5=f(rNN_min, rNN_max)

- Se rNN definito per un solo jet, categoria 1rNN
- Per entrambe le categorie ottimizzo cut

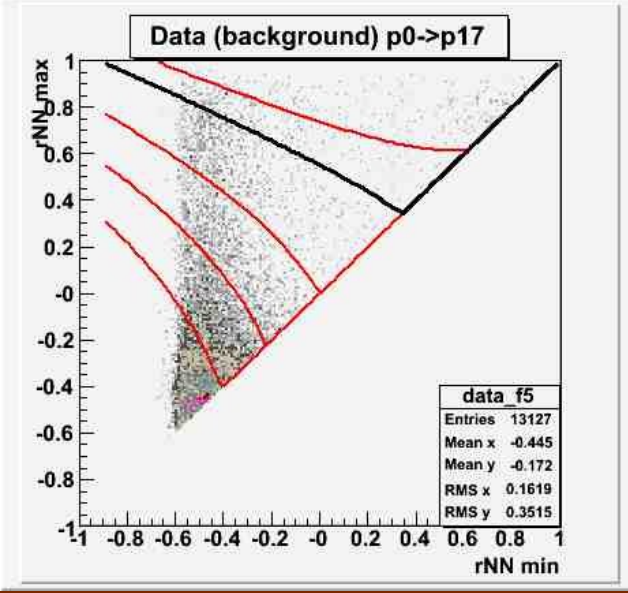


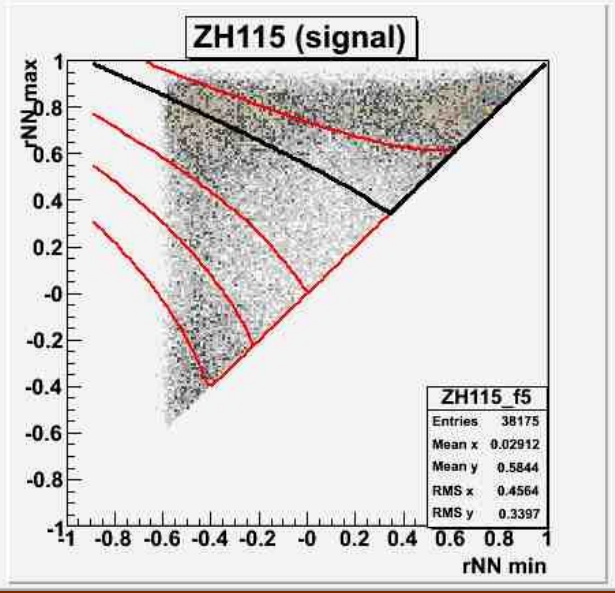


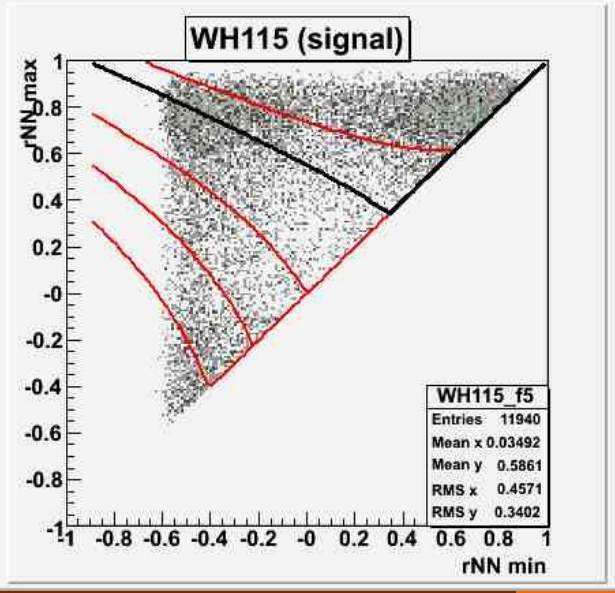
B-tagging: fisher

Separazione del discriminante di Fisher

(La linea nera corrisponde al taglio f5>1.10)







Dati (BKG) **ZH Signal** **WH Signal**

B-tagging: significances

Sfruttando le due categorie definite attraverso rNN in cut-based fashion:

Sig(f5>1.10) = 0.104

Sig(lrNN>0.56) = 0.251

Sig(combined) = 0.272 (+4% wrt TT+TJ+TN)

Cosa succede sfruttando tutto lo spettro?

Somma quadratica su 100 bin degli spettri di lrNN e f5:

Sig(lrNN sqrt) = 0.122

Sig(f5 sqrt) = 0.289

Sig(combined)=0.313 (**+ 19.8%** wrt TT+TJ+TN)

We want this!!

Verify i

stands a

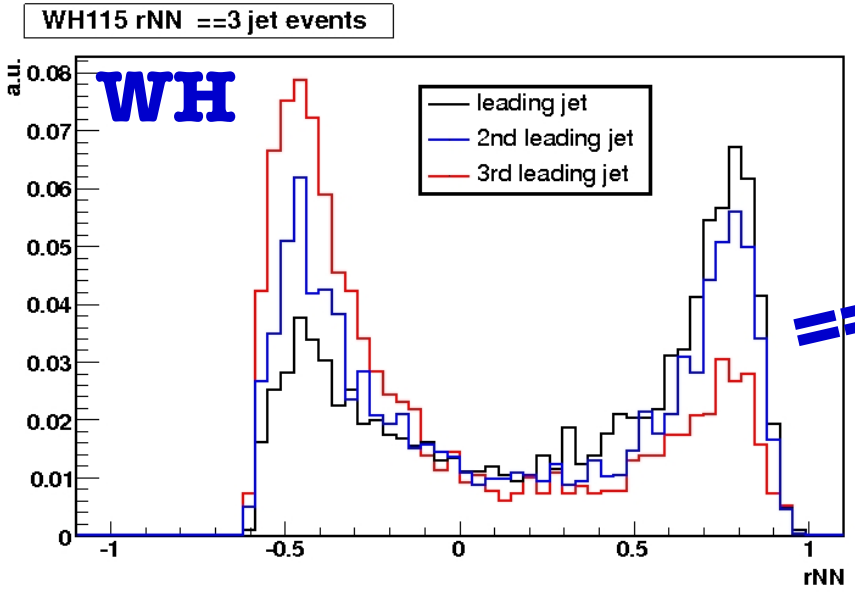
Terzo Jet

Eventi con 3 jets:

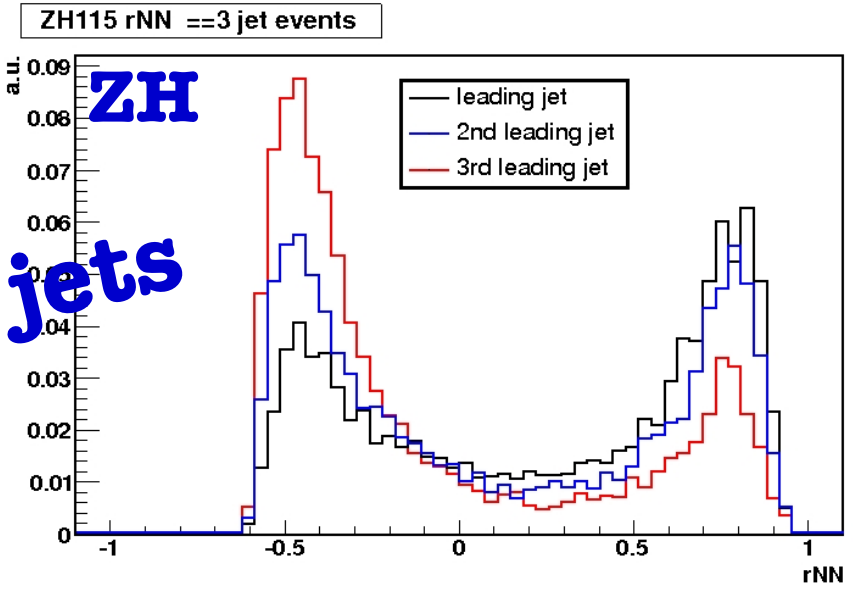
- 13% in ZH (radiated gluons)
- 18% in WH (radiated gluons, taus)

Posso sfruttare l'informazione rNN del terzo jet?

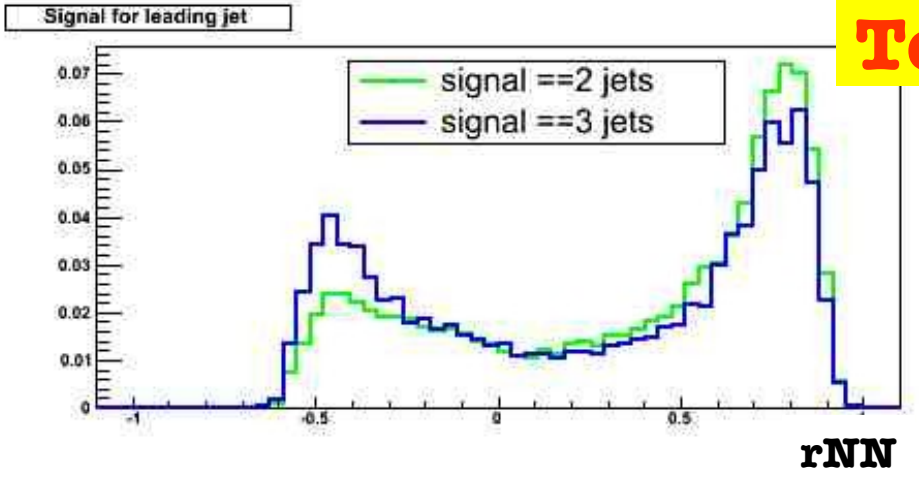
Insieme a **Federico Padua** (programma Summer Student) stiamo studiando le shape di questa variabile.

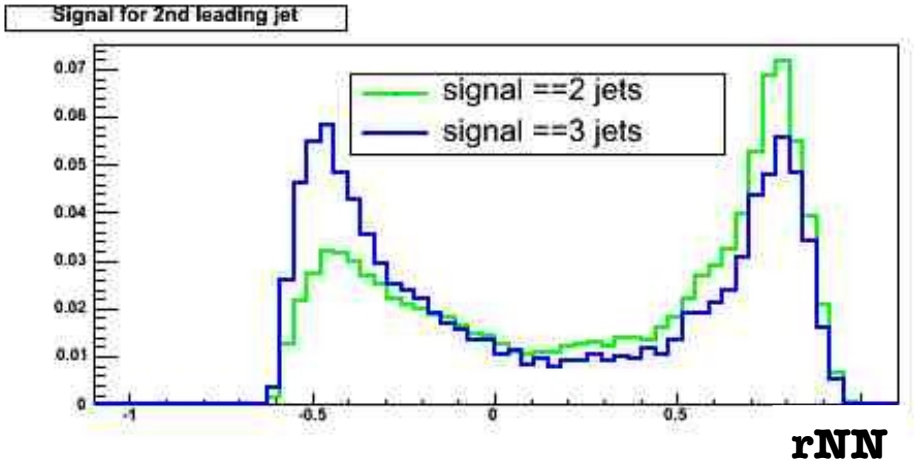


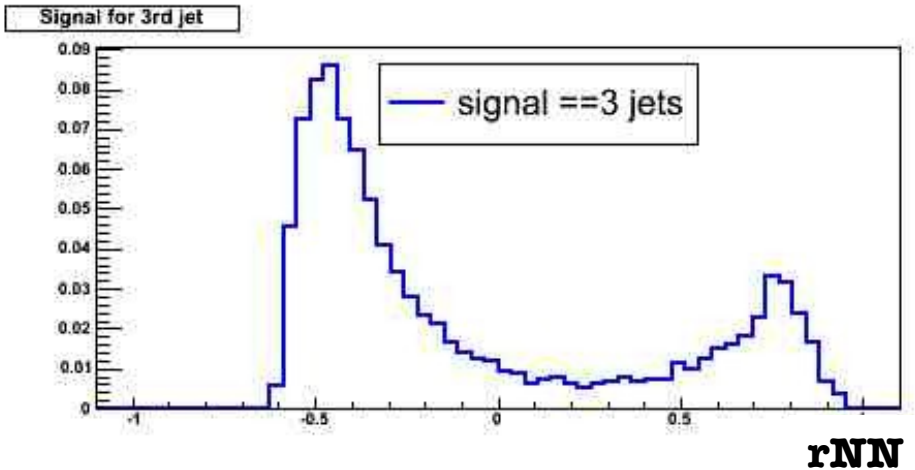
==3 jets



Terzo Jet



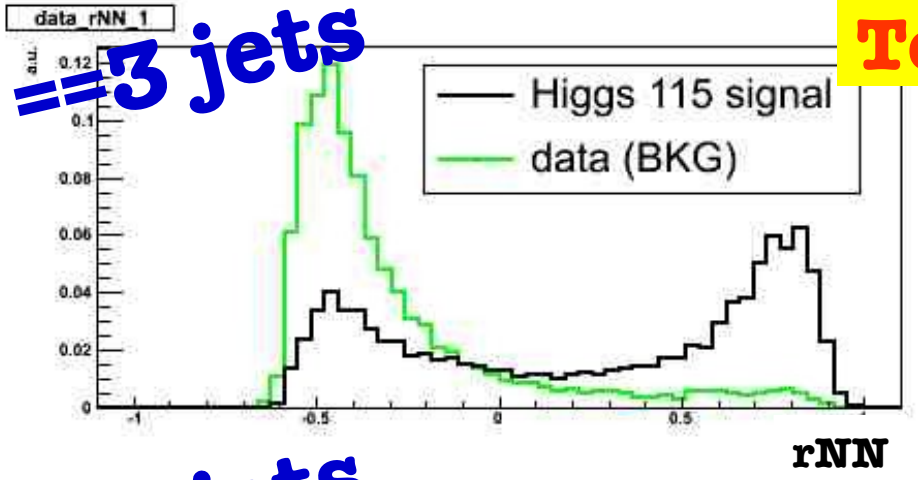


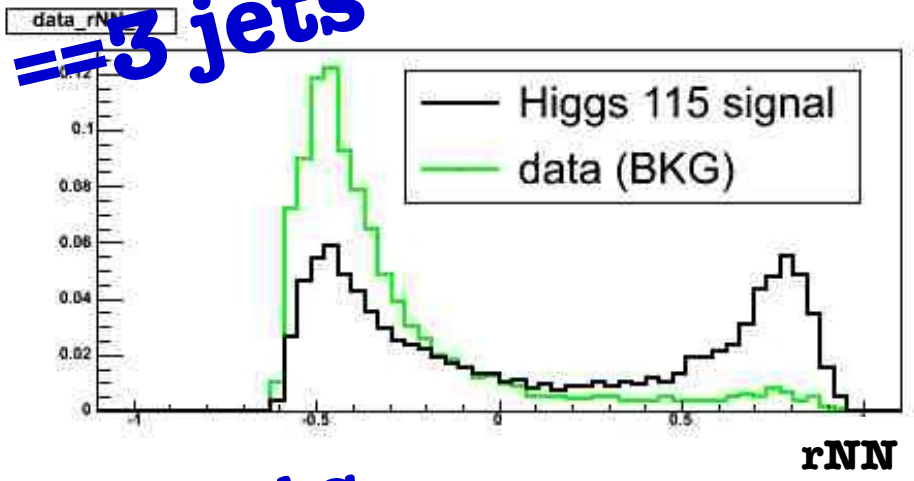


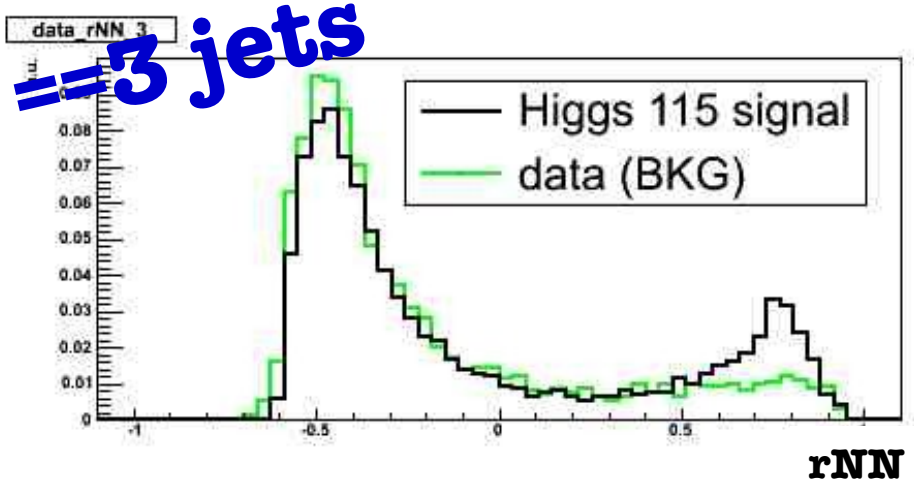
Confronto shapes per eventi con 2 e 3 jets, Signal

- The leading jet is very similar to the second leading negli eventi con ==2 jets.
- Events w 3 jets have 2 leading ones less b-like, because one of the two b is sometimes the third.
- As expected, the third jet is much less b-like than the others.

Terzo Jet







Confronto shapes segnale/BKG(dati)

- Very different S-B shapes in the two leading jets: BKG mostly LF or is mistag
- Third jet rNN spectra are similar in BG and Signal

Terzo Jet

- We could insert the third jets rNN value (third included when present) into the final NN instead of dividing the data in tag Samples.
- M(H) con i due jet piu' b-like?


FINITO!