Search for New Physics in fully hadronic final states with the ATLAS detector at the LHC

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RpV Signature

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RpV Signal diagram



RpV Signal

- Cross section: 0.072 pb.
- stop mass: 603.44 GeV.
- chargino mass: 504.45 GeV.
- neutralino1 mass: 501.89 GeV.
- neutralino2 mass: 508.61 GeV.

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• Higg mass: 125.03 GeV.

ttbb background



• Cross section: 5.1 pb.

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DQC

ttHTobb background



ttHTobb

• Cross section: 0.12398 pb.

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DQC

ttZtojj background



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Selection condition

Kinematic selection

- \bullet at least 5 jets whose PT > 55 GeV.
- $|\eta| < 2.5.$

b-tagging efficiency

• $\epsilon_b = 77\%$ • $\epsilon_c = 5\%$ • $\epsilon_{light} = 0.5\%$

Probabilities to have n b-tag jet (take example n=5,3 b-jet, 1 c-jet, 1 light jet)

$$P_0 = (1 - \epsilon_b)^3 (1 - \epsilon_c) (1 - \epsilon_{light})$$

$$P_{\geq 1} = 1 - P_0;$$

$$P_1 = \sum_{j=1}^5 \epsilon_j \prod_{i \neq j} (1 - \epsilon_i)$$

$$P_5 = \epsilon_b^3 \epsilon_c \epsilon_{light}$$

Number of event



Number of event with 6-jets at final state

b-tag	signal	ttbbar	ttHtobb	ttZtojj
3	145.232	20523	579.973	399.586
4	109.749	2339.52	188.426	125.064
≥ 5	33.4192	78.3773	9.94738	5.90813

DQC

Number of event

Number of event with 7-jets at final state

b-tag	signal	ttbbar	ttHtobb	ttZtojj
3	309.114	20686	501.678	361.49
4	336.971	3736.48	226.528	130.655
\geq 5	190.285	214.956	20.5176	9.95392

Number of event with at least 8-jets at final state

b-tag	signal	ttbbar	ttHtobb	ttZtojj
3	1204.33	23596	781.765	477.51
4	1810.38	6987.48	359.093	210.66
\geq 5	2109.12	742.338	52.3803	25.9217

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Tranverse hadronic energy distribution



Figure : Left: HT with 6 jets and 3 b-tag Middle:HT with 6 jets and 4 b-tag Right: HT with 6 jets and at least 5 b-tag

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Tranverse hadronic energy distribution



Figure : Left: HT with 7 jets and 3 b-tag Middle:HT with 7 jets and 4 b-tag Right: HT with 7 jets and at least 5 b-tag

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Tranverse hadronic energy distribution



Figure : Left: HT with at least 8 jets and 3 b-tag Middle:HT with at least 8 jets and 4 b-tag Right: HT with at least 8 jets and at least 5 b-tag

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Conclusions

- Analyze RpV signal, ttbb background, ttHtobb background and ttZtojj background.
- For each root file select events under kinematic conditions.
- Create tables of number of event with different jet numbers at final state with different numbers of b-tagging.
- Plot histograms of transverse hadronic energy distribution.

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