THE STANDARD MODEL AND VECTOR-LIKE LEPTONS

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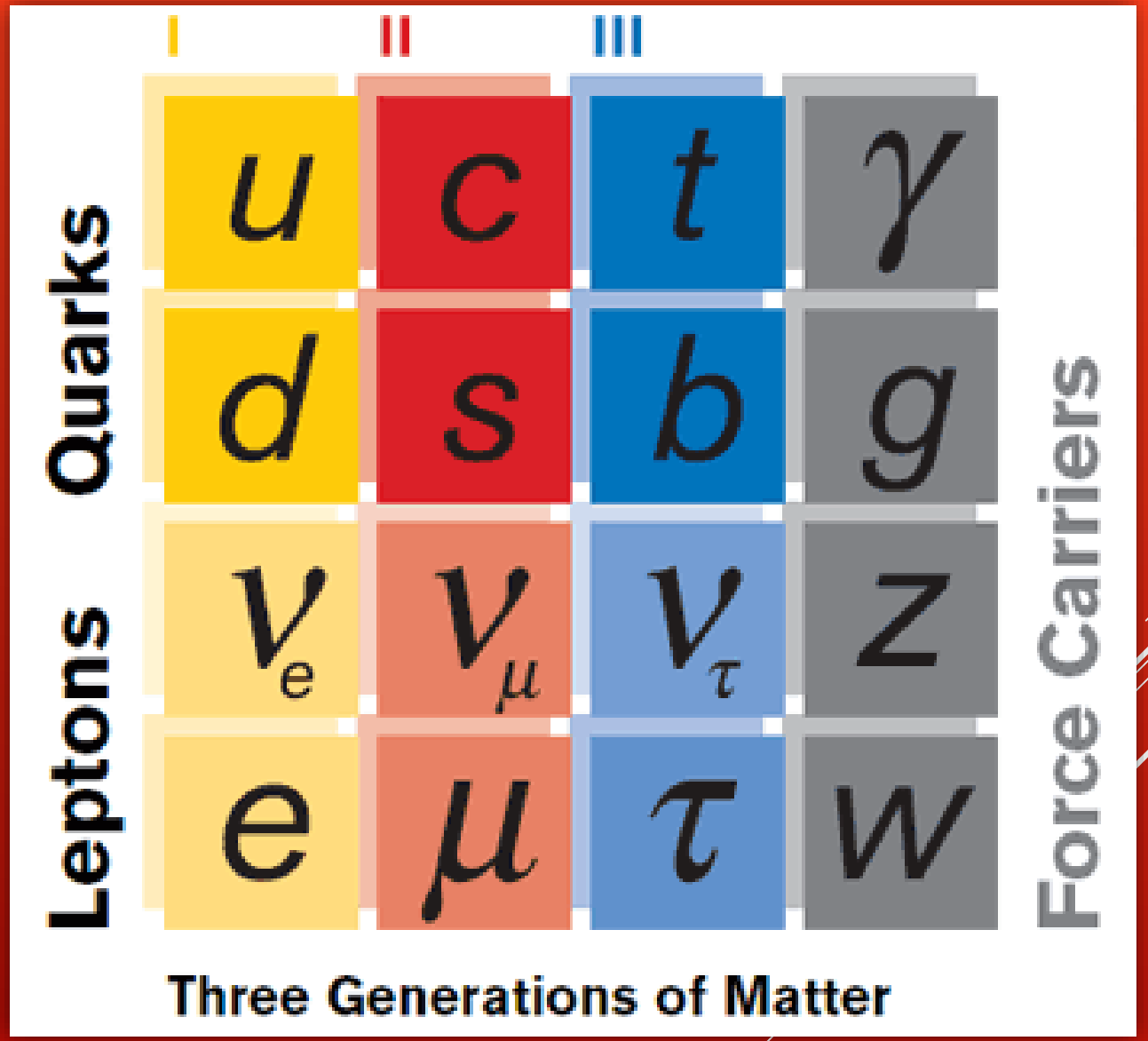
THE STANDARD MODEL

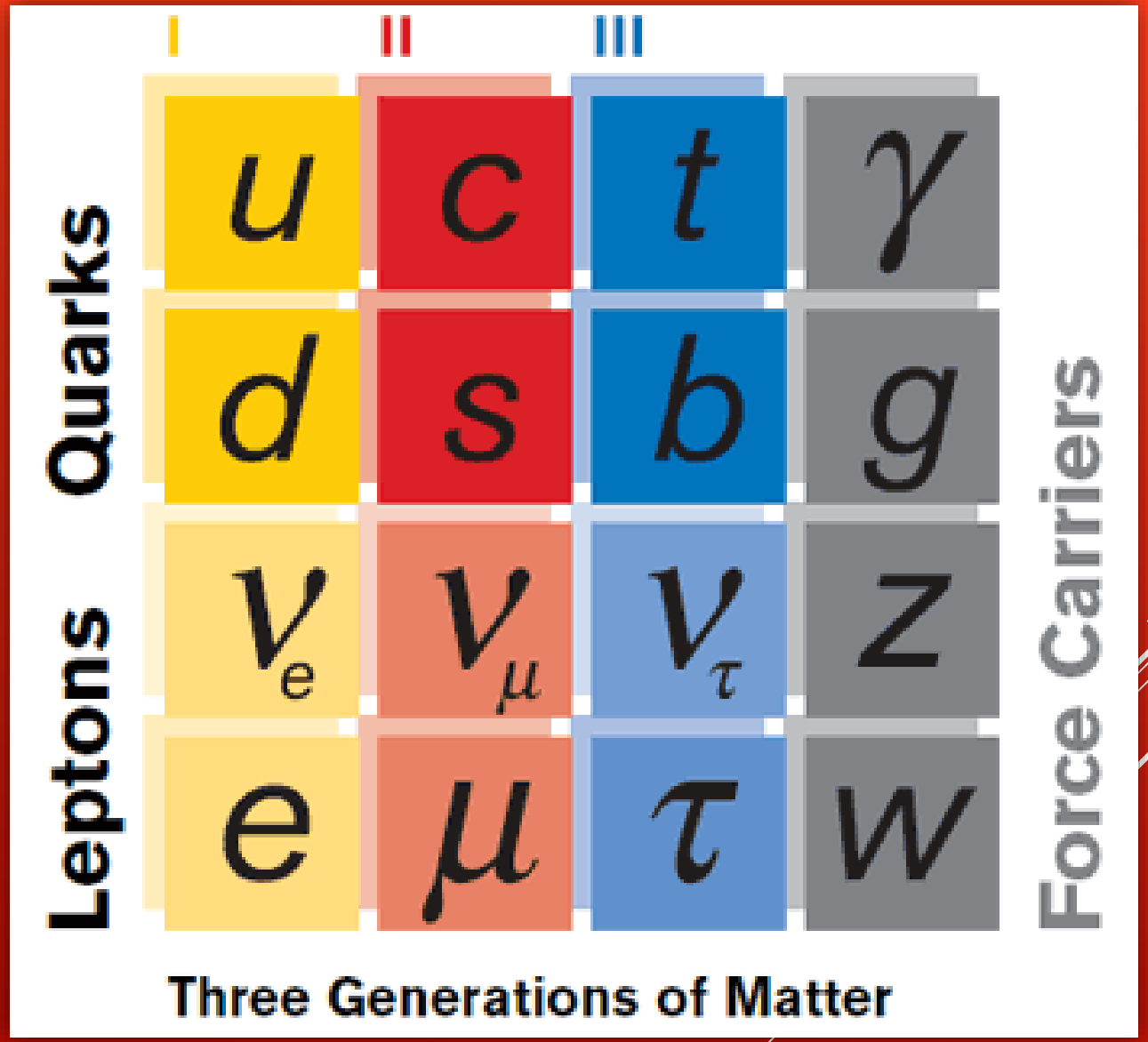
- Elementary particles
- Force carriers
- What makes up everything



http://inspirehep.net/record/853601/plots

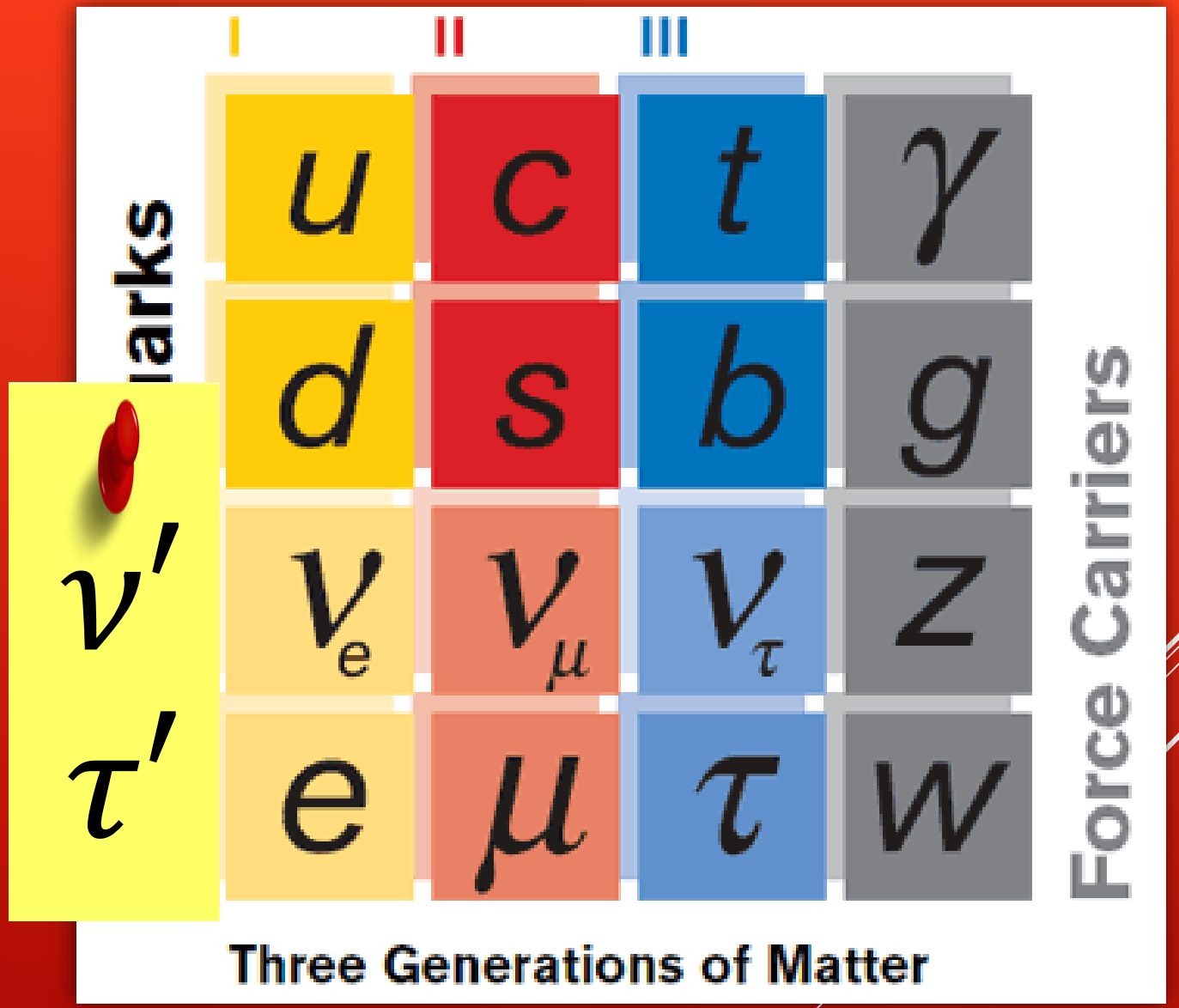
CURRENT RESEARCH

- Expand the standard model
- Measure what is there to greater accuracy/look for deviations from it
- Look for theorized particles



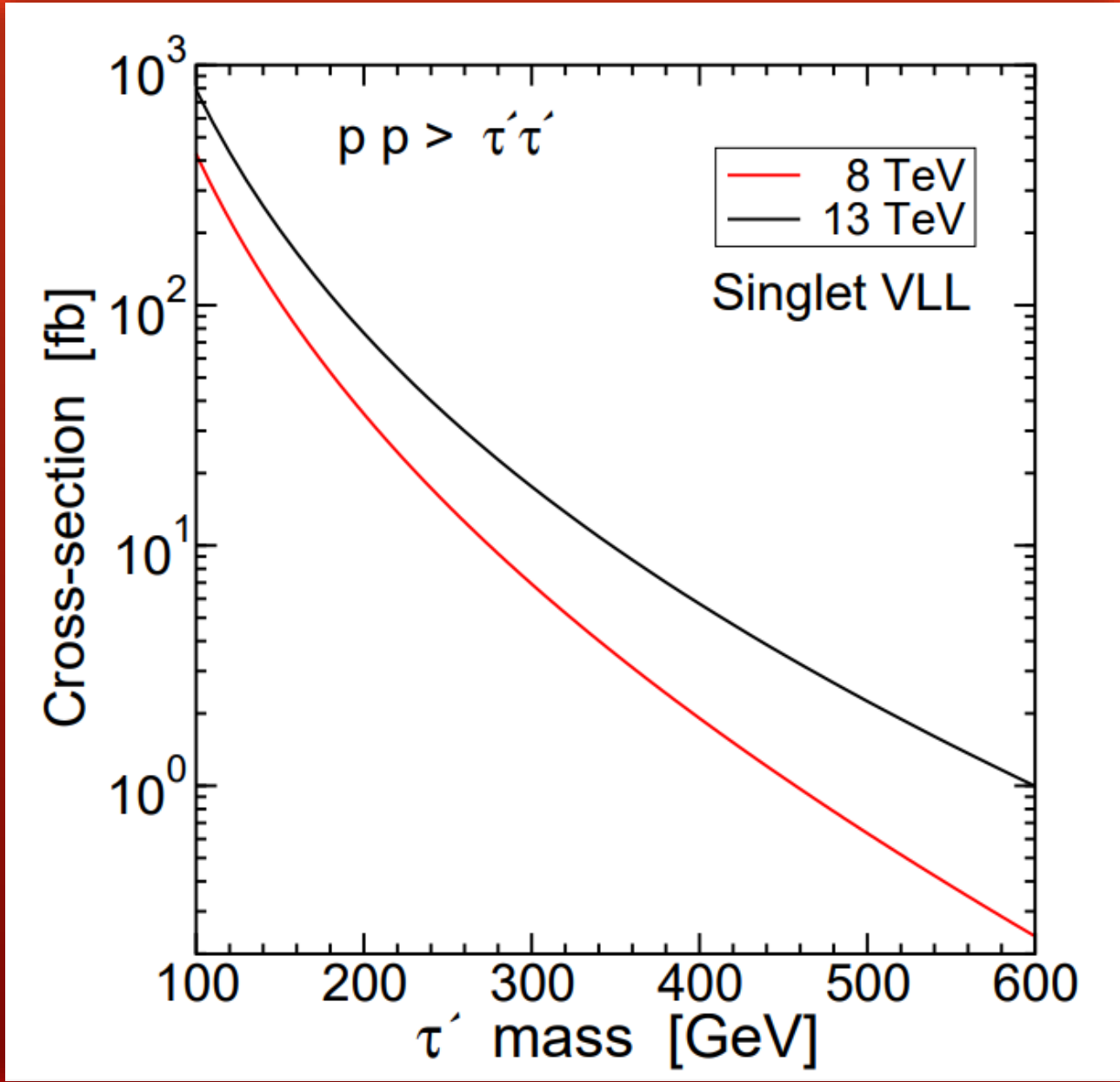
OUR PROJECT

- Investigate the existence of a heavier lepton
- Determine sensitive mass ranges and ways to find it
- "vector-like"
- Data collected from ATLAS Project at the LHC under CERN

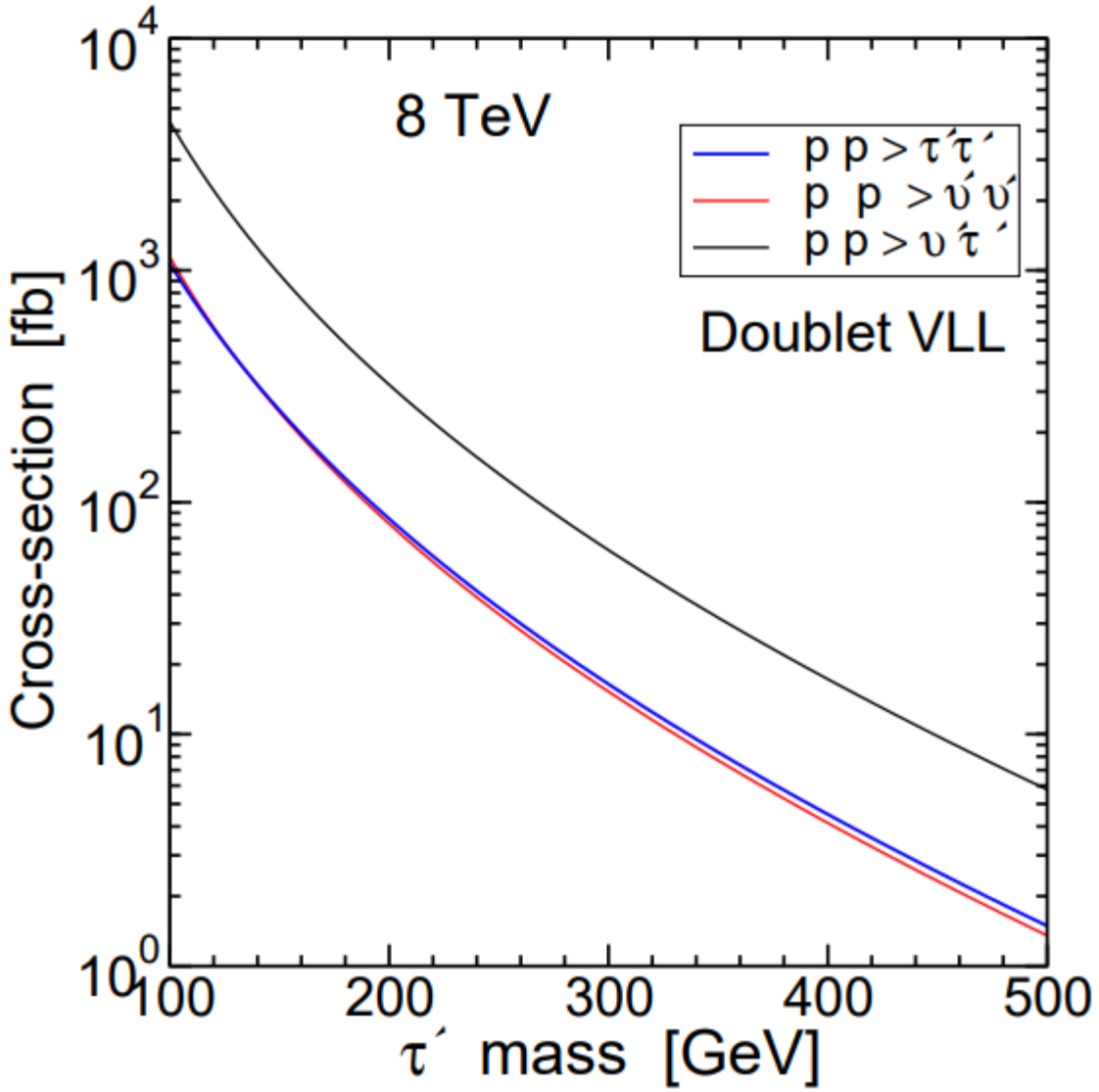


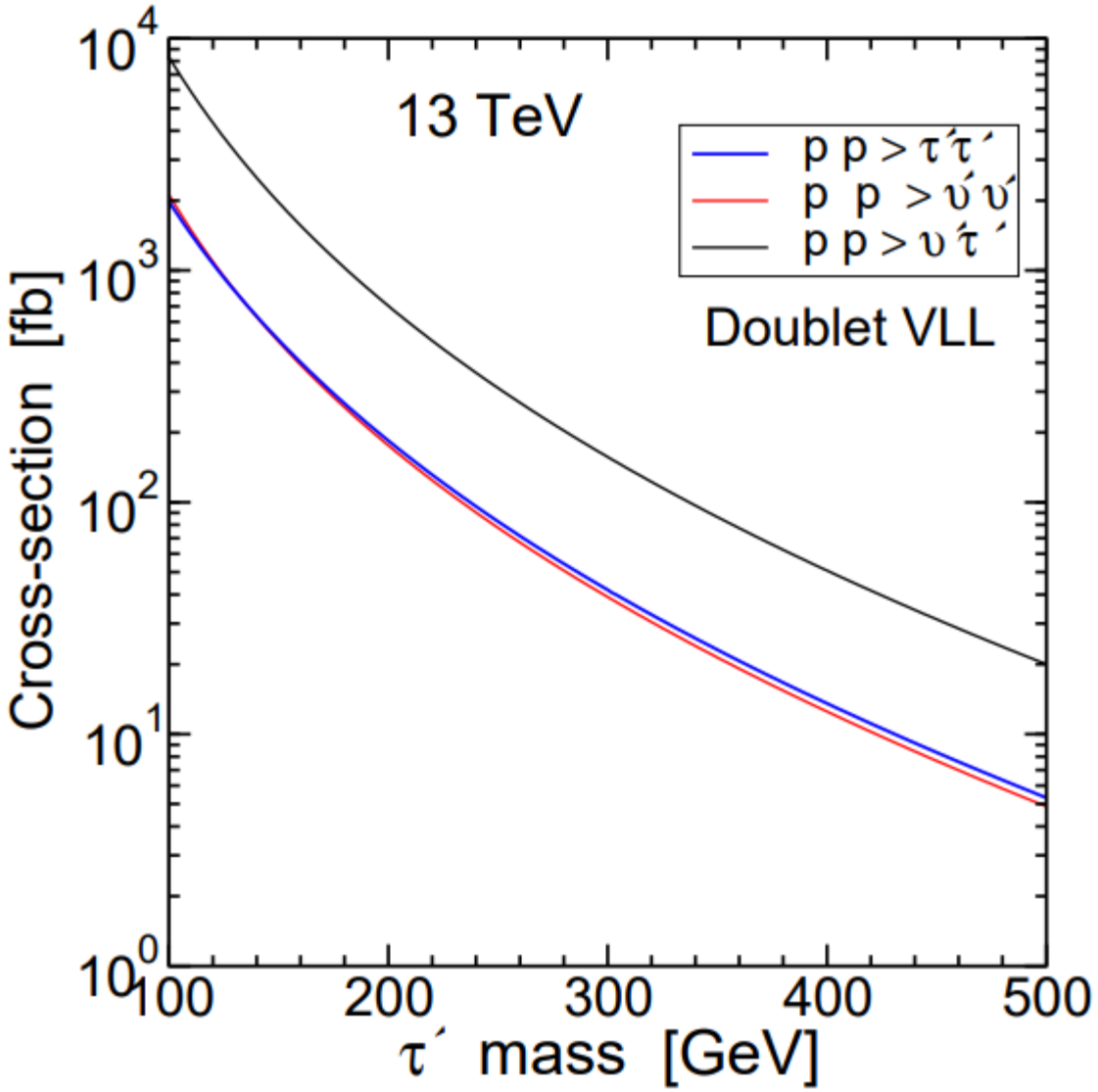
PREVIOUS WORK DONE

- Probability of producing the particle decreases as mass increases
- Singlet- no neutrino for the τ'
- Doublet- neutrino's for both
- Greater than 100 GeV (1990)



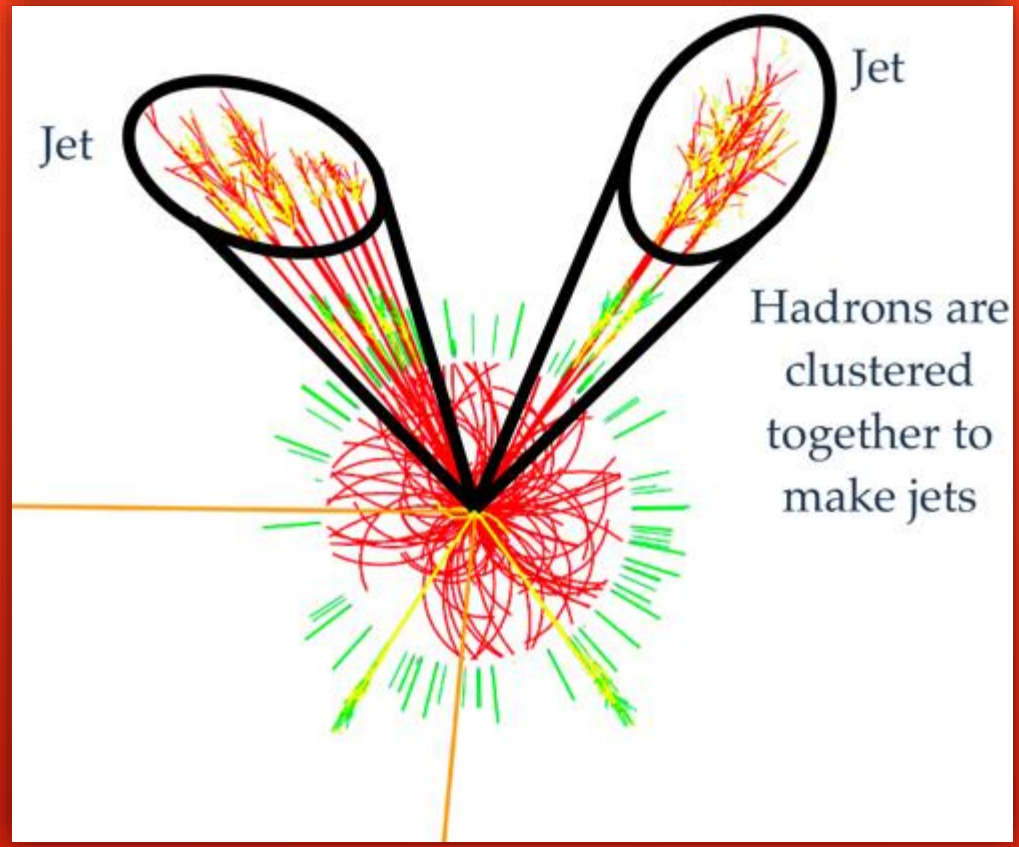
N. Kumar and S. Martin. "Vector-like Leptons at the Large Hadron Collider," *Cornell University Library*.


8 TeV
p p > τ´τ´
p p > υ´υ´
p p > υ´τ´
Doublet VLL
Cross-section [fb]
τ´ mass [GeV]
10^4
10^3
10^2
10^1
10^0
100
200
300
400
500

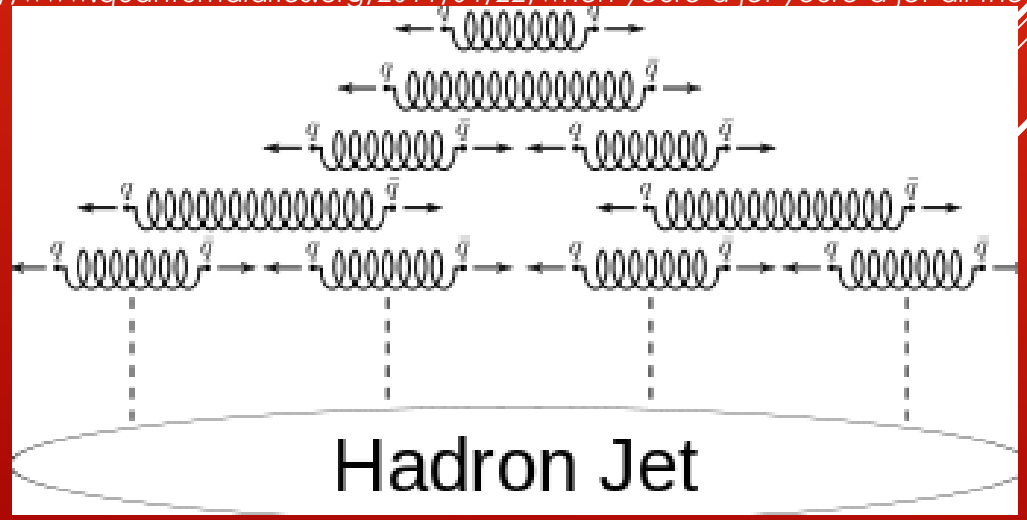

13 TeV
p p > τ´τ´
p p > υ´υ´
p p > υ´τ´
Doublet VLL
Cross-section [fb]
τ´ mass [GeV]
10^4
10^3
10^2
10^1
10^0
100
200
300
400
500

GOALS

- Investigate the possibility of τ' decaying to jets
- Rule out masses below 500 GeV
- Find our expected signal and background as a function of mass



https://www.quantumdiaries.org/2011/04/22/when-youre-a-jet-youre-a-jet-all-the-way/



https://en.wikipedia.org/wiki/Color_confinement