



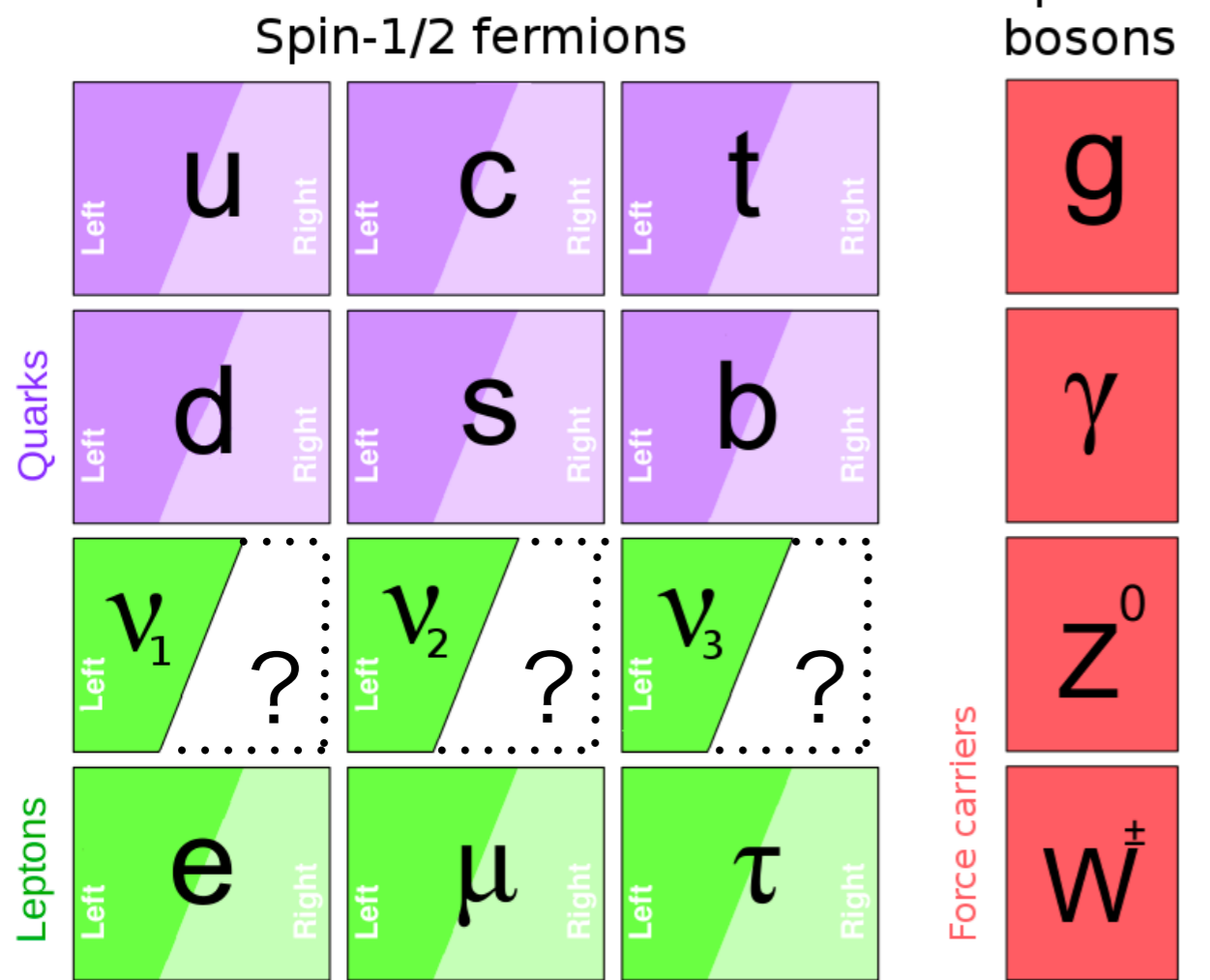
RHN Process

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2,Oct 2020

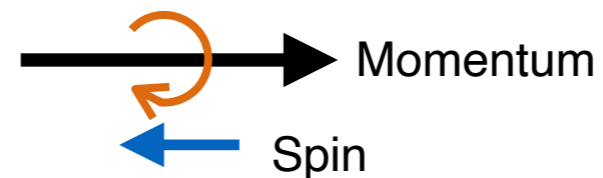
S O K E N D A I

What is RHN?



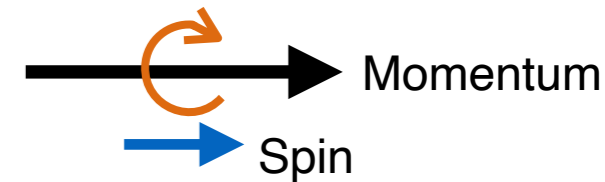
arXiv:1704.08635NuPhys2016-Mermod

ν (Left-handed)



Helicity -

$\bar{\nu}$ (Right-handed)



Helicity +

- Right handed neutrino is Majorana particle.

$$\nu = \bar{\nu}$$

Advantages

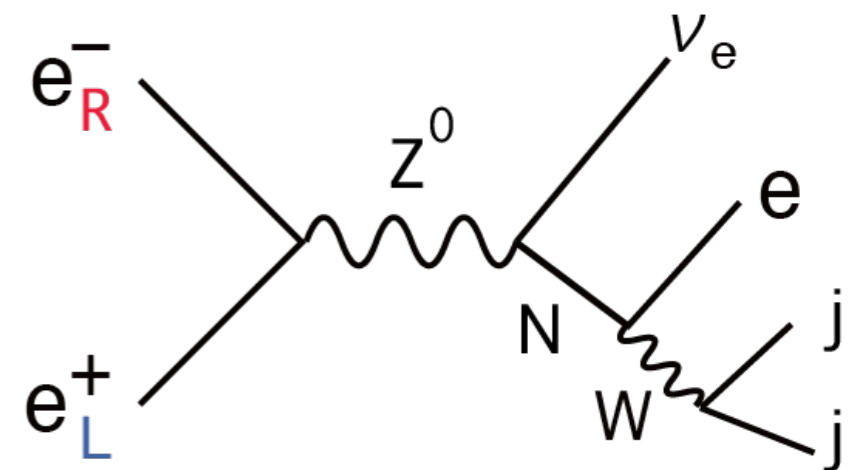
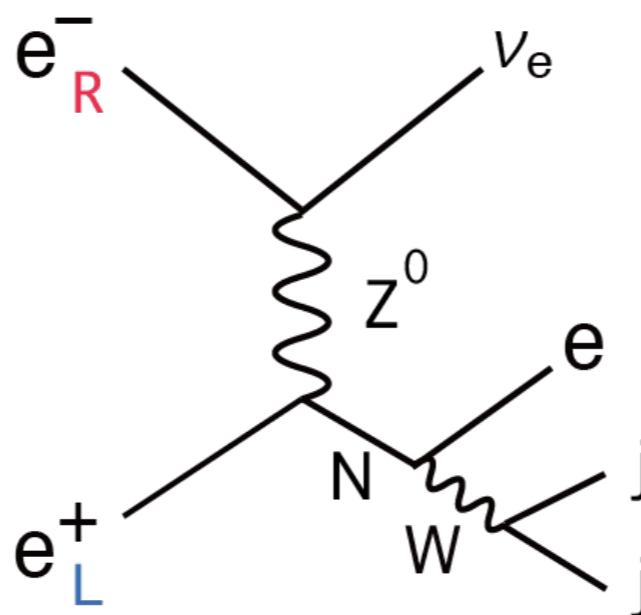
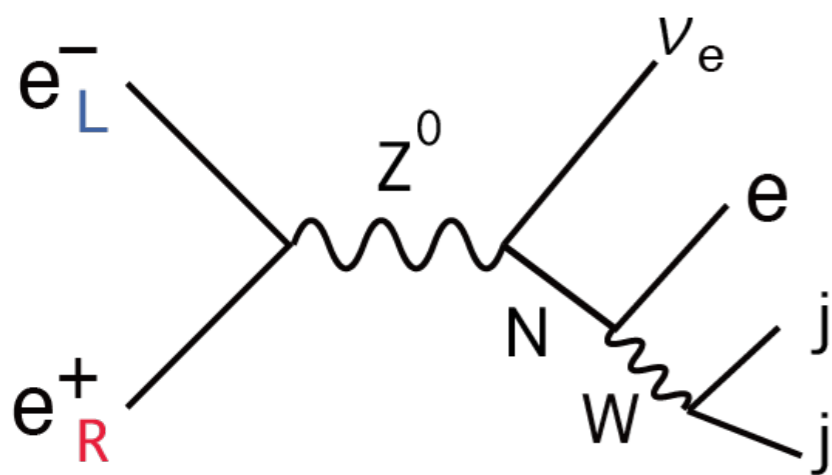
- we can explain “why is neutrino mass small?”
->”see-saw mechanism”
- key to matter > anti-matter
- Unification of quark and lepton

How to produce RHN at ILC

- 4 fermions
- single W
- semileptonic decay
- Ignore hadronic shower

Condition

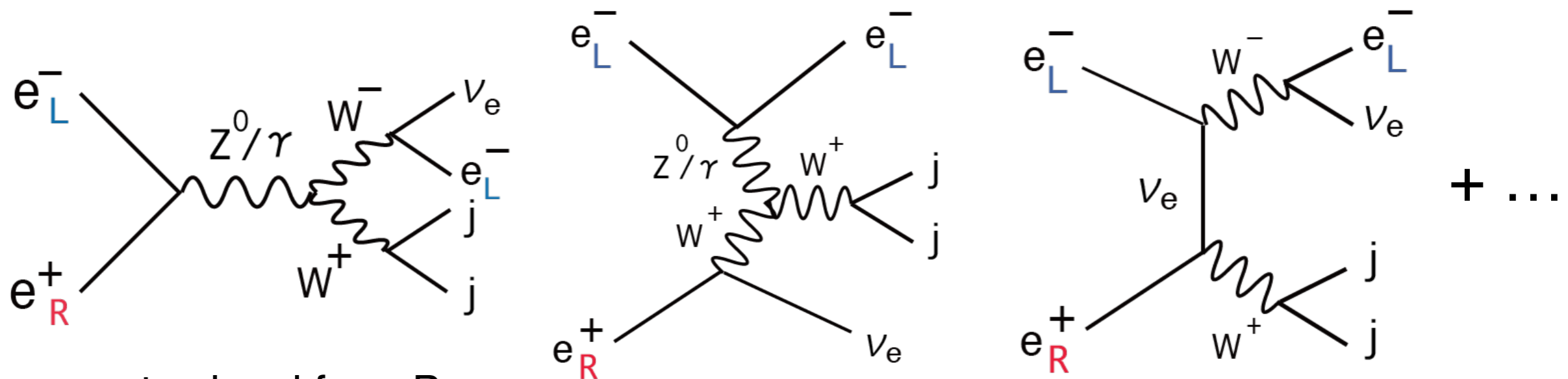
- Whizard generator 2.8.4
- UFO model from Arindam Das
- 100% beam polarization
- $\sqrt{s} = 500$ GeV, ILC beam spectrum + ISR
- $M_{RHN} = 200, 300, 400, 450$ GeV
- MC particles, no hadronization



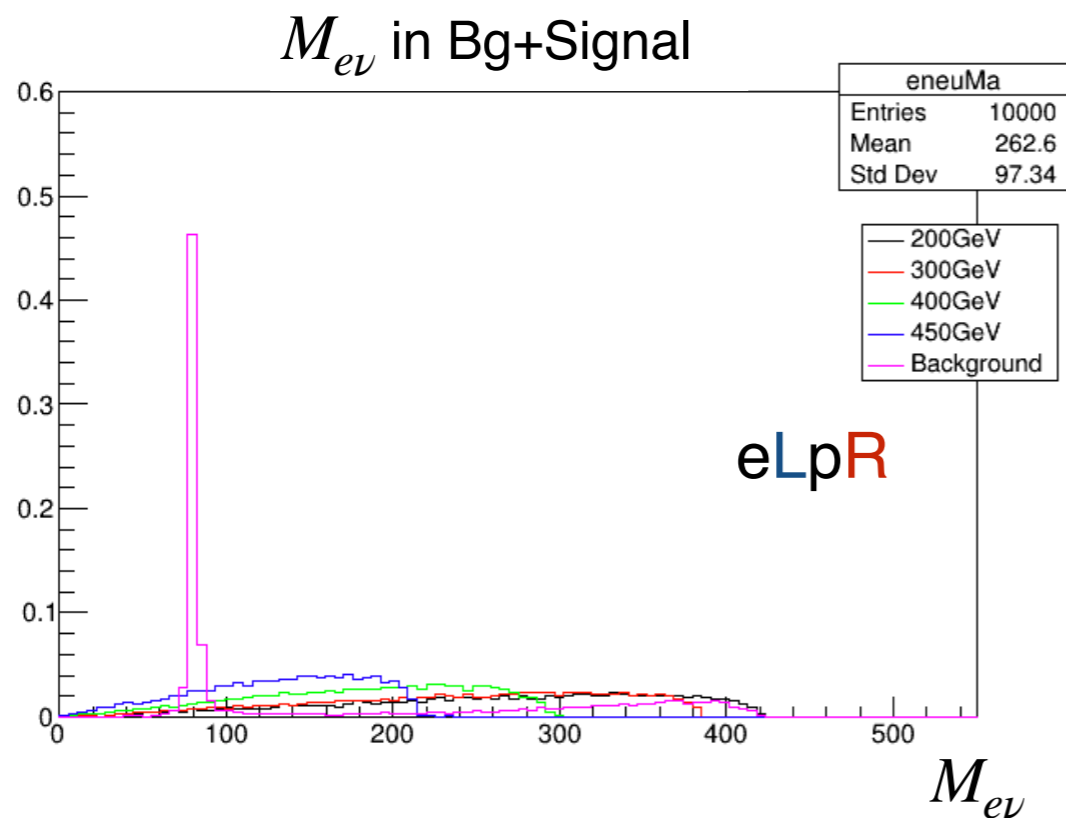
PHYS. REV. D 99, 055030

About Back ground

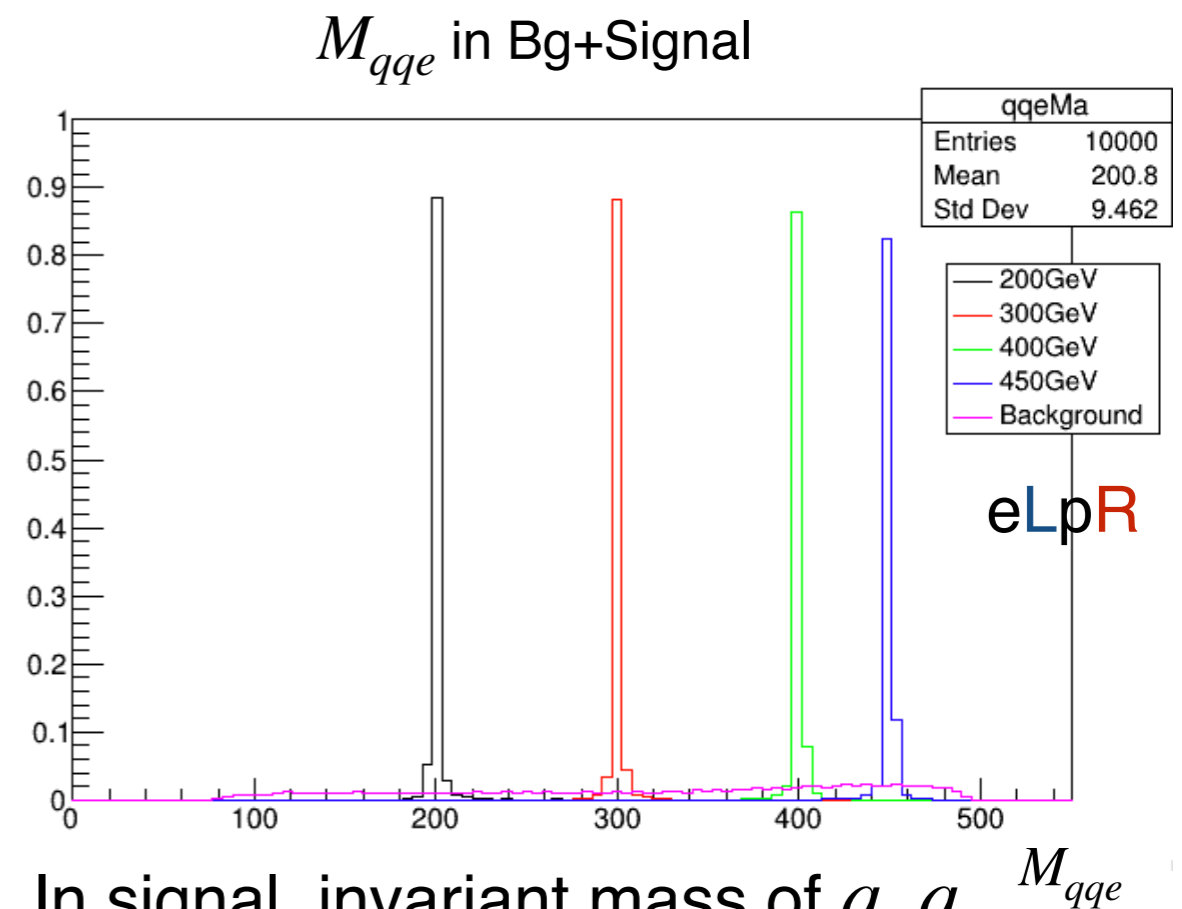
Ex)



How to separate signal from Bg



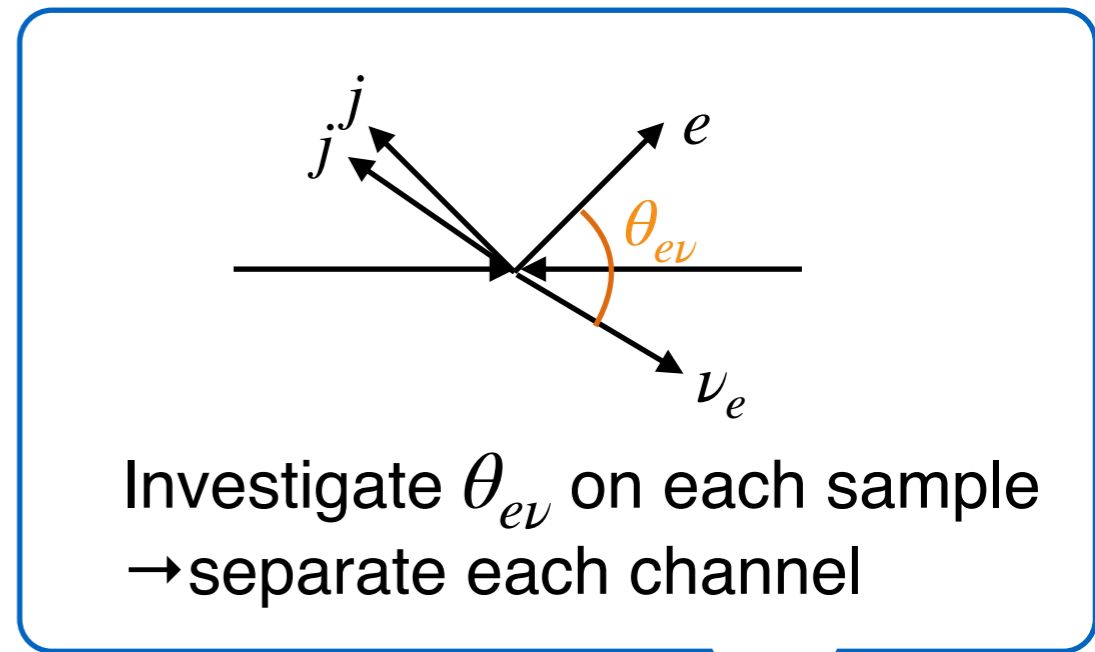
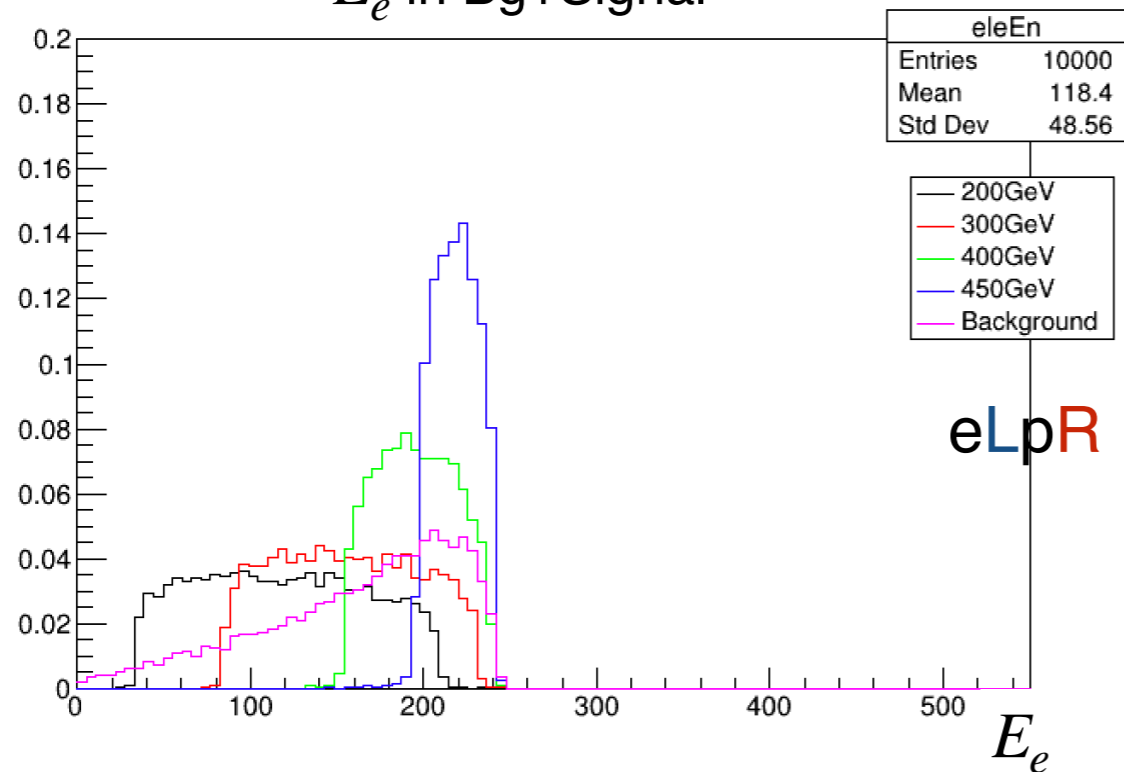
In Bg, invariant mass of e and ν_e often comes from W



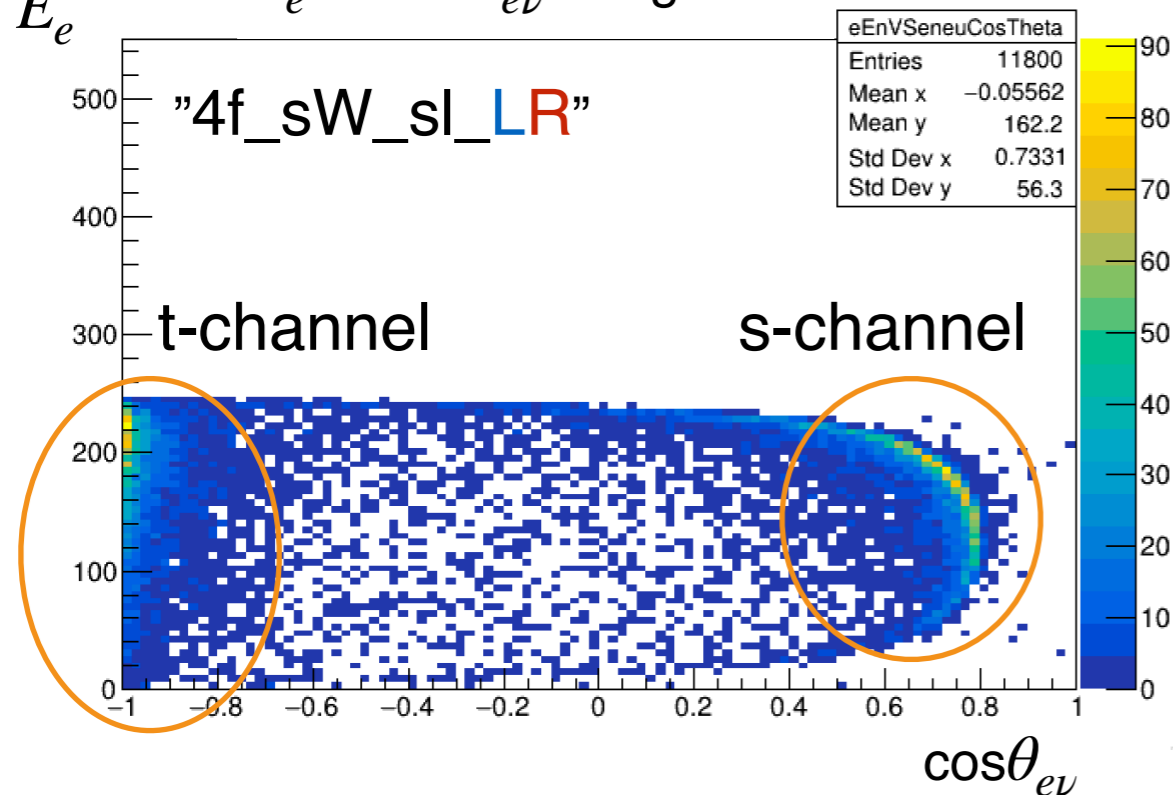
In signal, invariant mass of q, q and e is RHN mass

About Back ground

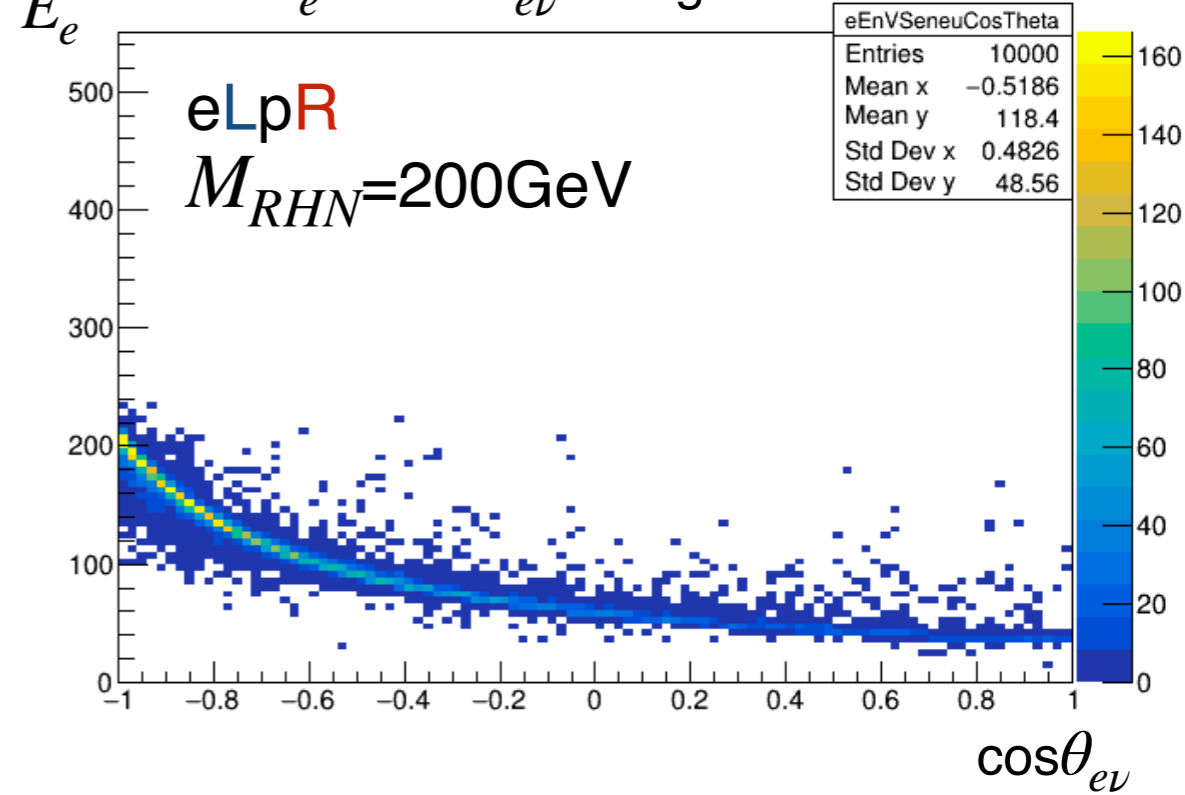
E_e in Bg+Signal



E_e vs $\cos\theta_{ev}$ in Bg



E_e vs $\cos\theta_{ev}$ in Signal



Future work

- Make some selection cut for signal
- Include detector simulation
- Calculate limits on RHN production at ILC