LZ PLR Work

Current update starts on slide 5

How LZ Stats Works in one slide

Input: Tell the code a WIMP mass and type of analysis you would like to run (frequentist/Bayesian)

What the code does:
1. Generates background and signal data sets using our models, includes the LZ detector response,
2. Runs a series of hypothesis tests, with the null hypothesis being data is composed of both signal and background events, and the alternative hypothesis is we only have background events
3. Does this for different fixed parameter of interest (the number of signal events)
4. Keep increasing our parameter of interest until the hypothesis test reveals that the null hypothesis becomes incompatible with observed data (typically giving P value of .1)

Output: give the integrated flux, then use the upper limit on the parameter of interest to solve for the upper limit of cross section

Parameter of interest

$$\sigma^{90\%CL} = \frac{\mu_S^{90\%CL}}{\text{integrated\_flux}}$$
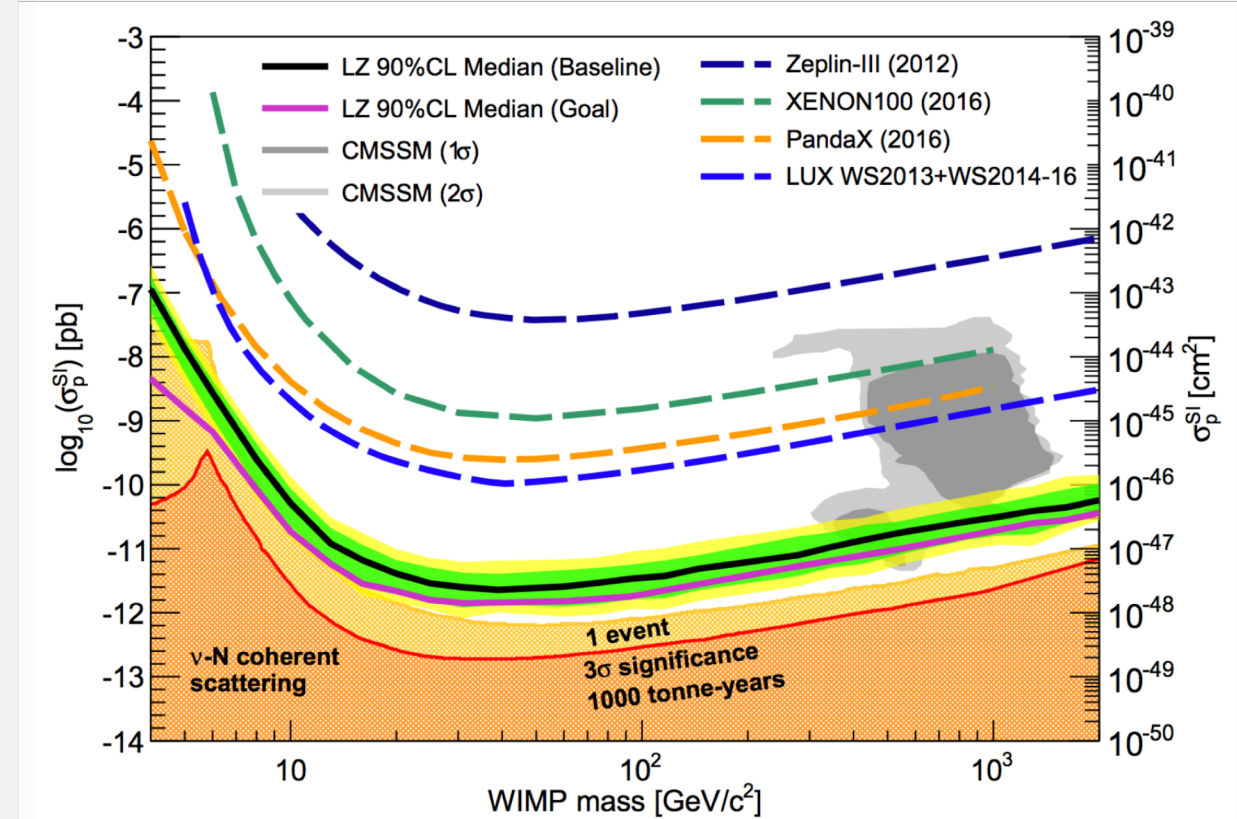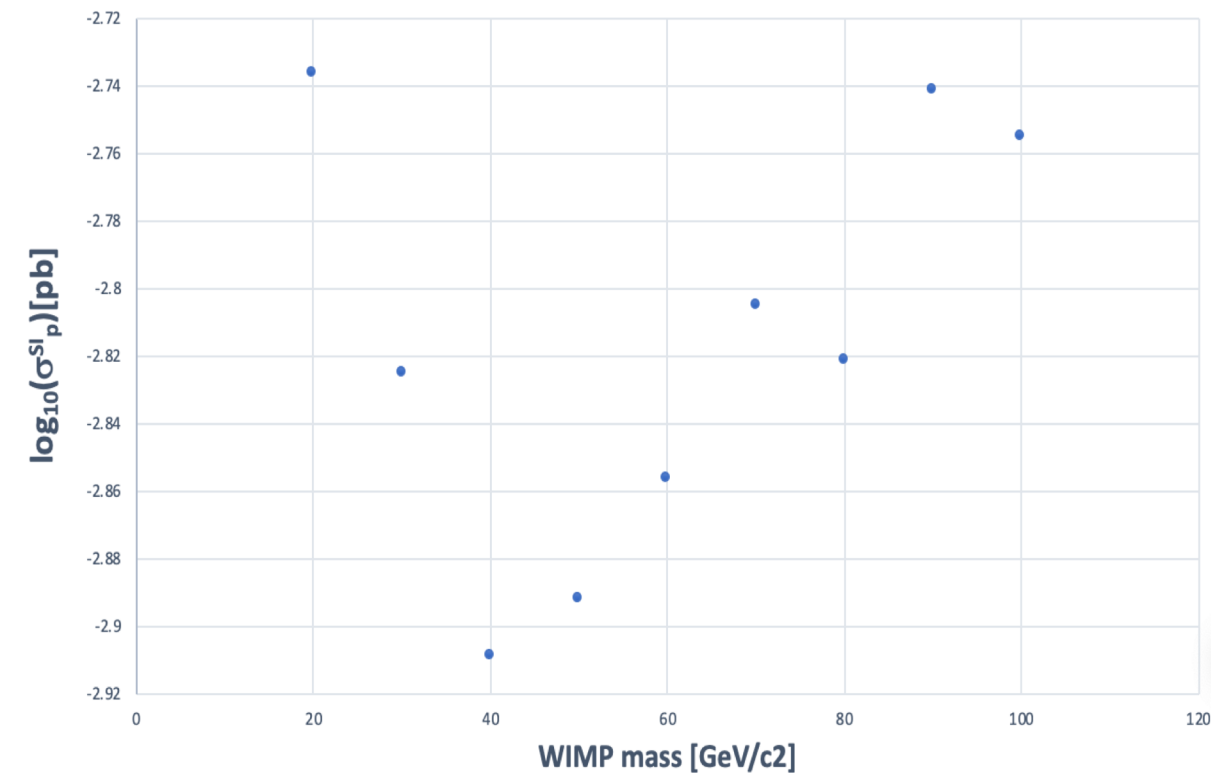
Progress with running the code

- Able to run the code, technically
- Have not been able to get output graphs yet

Goal for next time

- Get enough mass points to make a limit plot
- Possibly need to submit to the cluster?

11/29 Update

- Averaging 8-9 hours per mass
- Shape looks right, numbers are way off
- Going through and checking the parameters used
- Contacted Ibles to see if his numbers are this high

12/6 Update
- Output cross section is in zb not pb, so data looks okay now

Currently Objectives
- Expand to more mass points
- Test sensitivity to different parameter changes