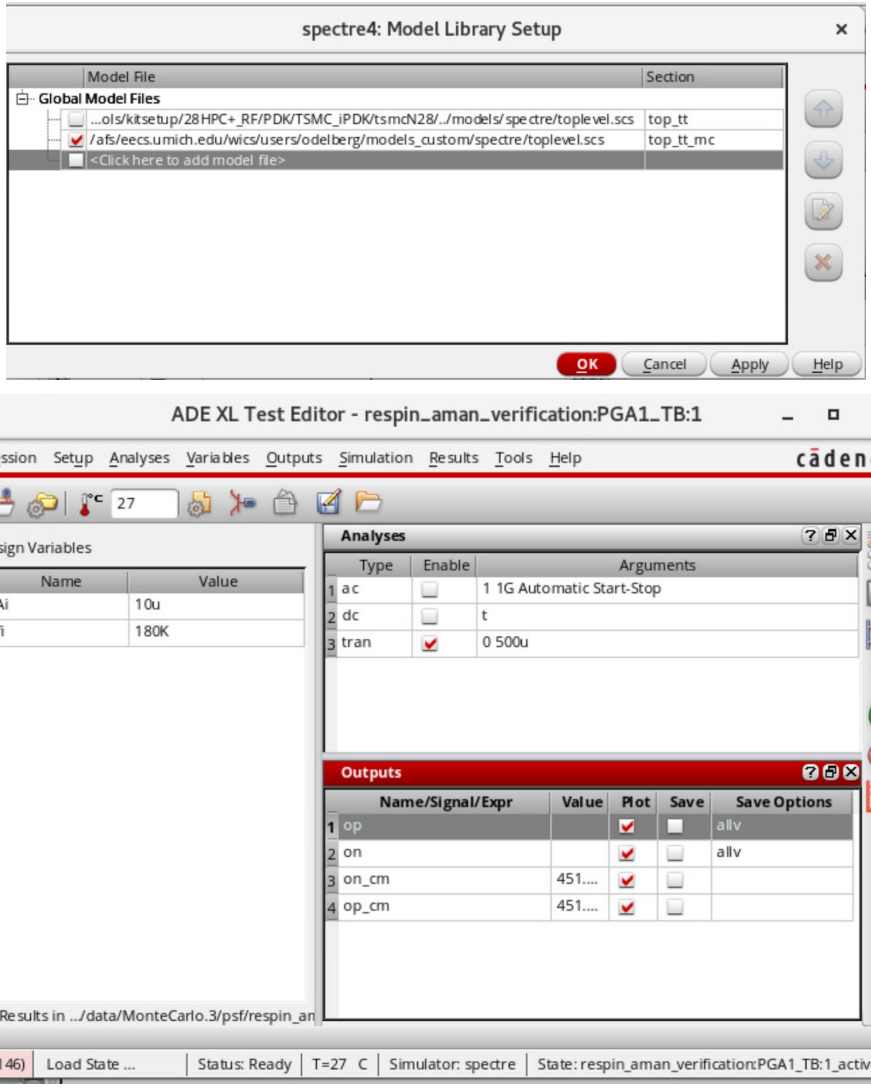
MONTE CARLO SIMULATION STEP (USING ADEXL)

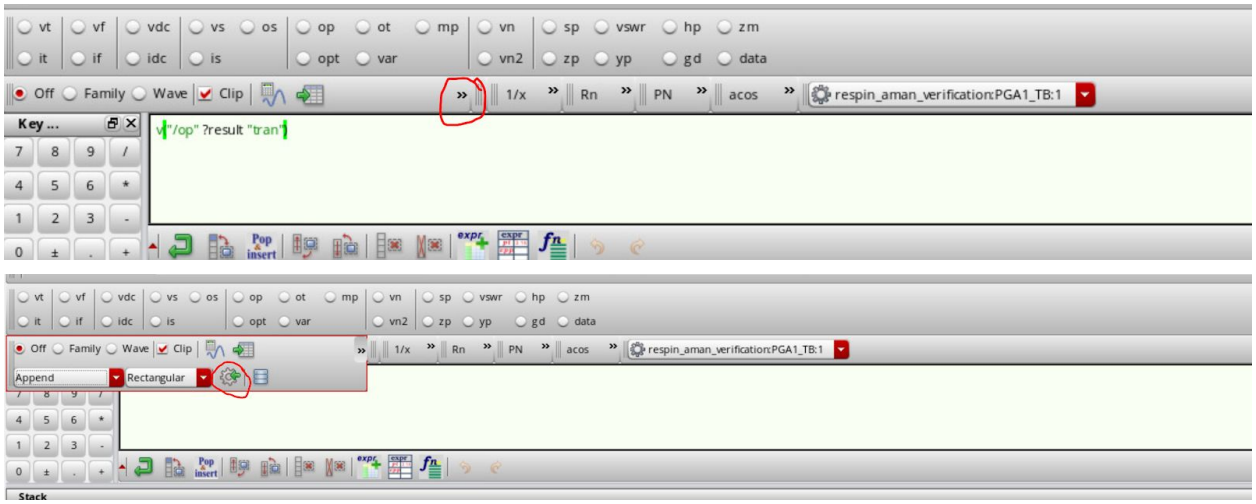
1. Open ADEXL (will open up as a new tab to the schematic)
2. Click “create new view” button on the new small window. Click OK on the subsequent window.
3. Go to Tests (on left palette)
    a. Add test (by clicking the + and double clicking add new test)
    b. In the popup, add your schematic (by selecting the relevant library and cell name)

4. Then, a new tab should open (might be minimized) that looks like the ADEL interface, but is for ADEXL.
5. Can load previous state from ADEL or write your own. (session → load state; typically useful to save state originally in the cellview tab since this will be available for this cell specifically)
    a. This should be the setup for which your monte carlo will be running over (ie: you have the analyses that will be needed to produce the needed outputs). Monte Carlo will run the variation statistics on this. Note, the outputs are functions of the analysis, and Monte Carlo will be varying the input data for the analysis, that results in a variation in the output result (which monte carlo ultimately displays and gathers in a statistical manner).
    b. *PLEASE NOTE:* for the NB-IoT project, Trevor made a separate simulation file for monte carlo. To add this, in the ADEL interface go to setup → model libraries. From here click the first available empty model file entry location (the first one should be the one provided by the PDK). Go to the file/filepath that contains the desired model file, and in our case, set the section of it to top_tt_mc.

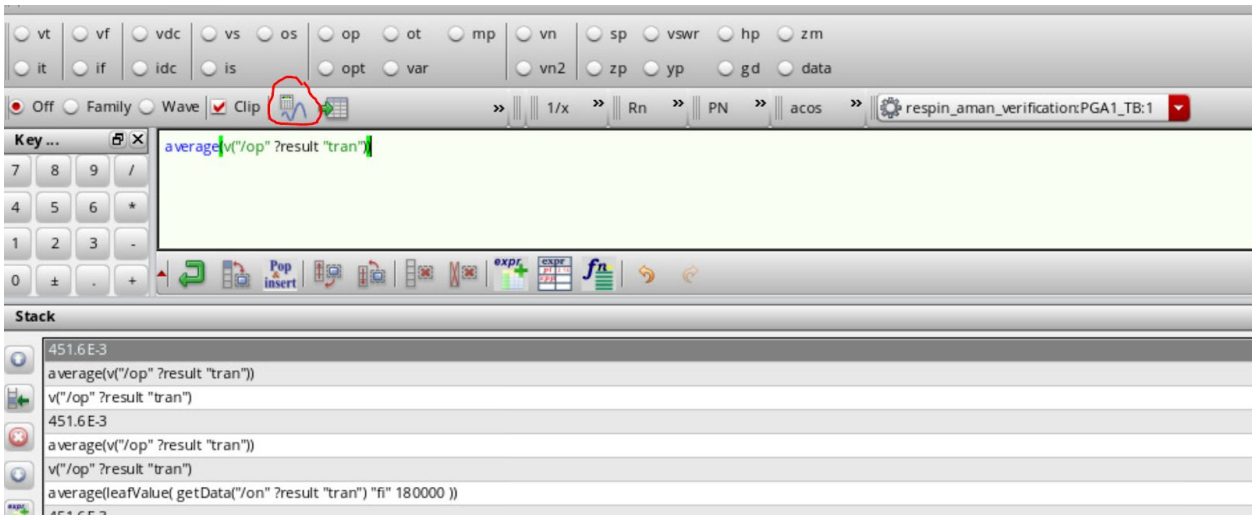


USEFUL ASIDE (FOR OBTAINING DESIRED OUTPUT): Once you have plotted your data/analysis type in ADEL, you can click on the plot name (which should highlight the plot) and then you can go to tools → calculator. Now, the data should be in the calculator (with this long obscure string of commands). This basically is code for all your data. Around this, you can perform any data manipulation commands you want to obtain your desired results. For instance, if you ran a transient and wanted to know the common mode, you can put the average command around the data code and this should provide you with the transient average (which is essentially the common mode). Remember from 4a, this will appear as a number (since this transient data is fixed). But, when you run Monte Carlo, the transient data will change and thus so will the average (since this number is actually governed by a function). To move this function/value to the output of ADEL, click the double arrow next to the evaluate buttons. Then, click the gear with the arrow (which will automatically send that calculator command to the

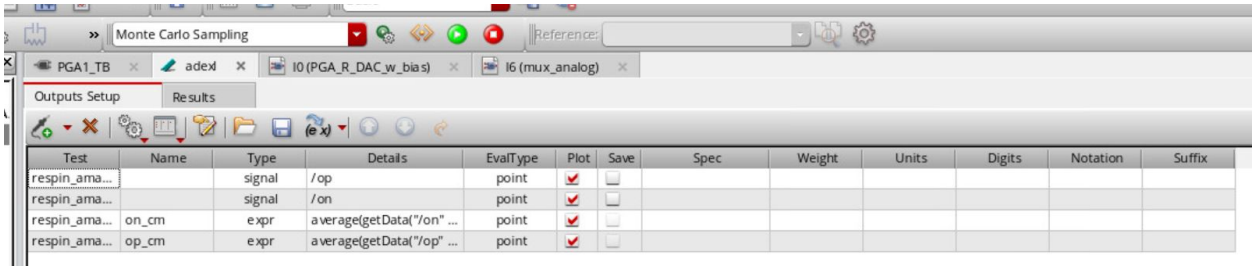
output panel of ADEL. BE SURE TO EVALUATE THE EXPRESSION FIRST, TO MAKE SURE THE RESULT MAKES SENSE USING THE CALCULATOR WITH THE GRAPH OVERLAYED (THIS WILL PLOT THE RESULT IF X-DEPENDANT OR DIRECTLY PRINT SCALAR ON CALCULATOR COMMAND IF A SINGLE VALUE). BE SURE THAT YOU SEND OVER THE EXPRESSION TO THE OUTPUT OF ADEL, NOT THE CALCULATED CONSTANT!!!! CAN REOBTAIN EXPRESSION BY DOUBLE CLICKING ON IT IN THE HISTORY SECTION (CALLED STACK), COMMAND SHOULD APPEAR BACK IN THE YELLOW BOX.



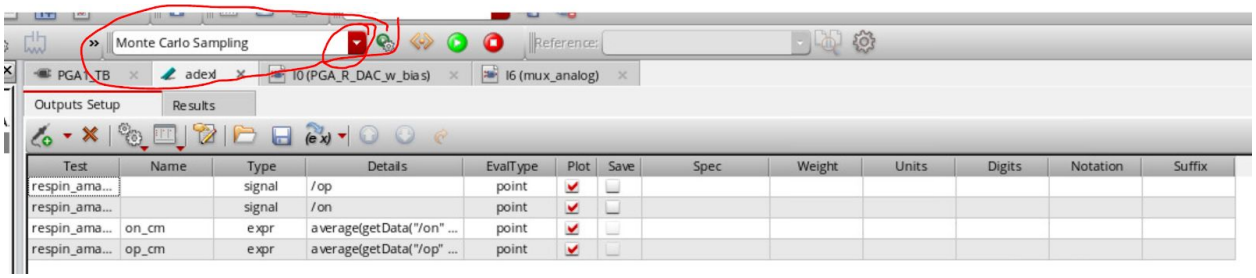
Bottom one for evaluation of calculator command:

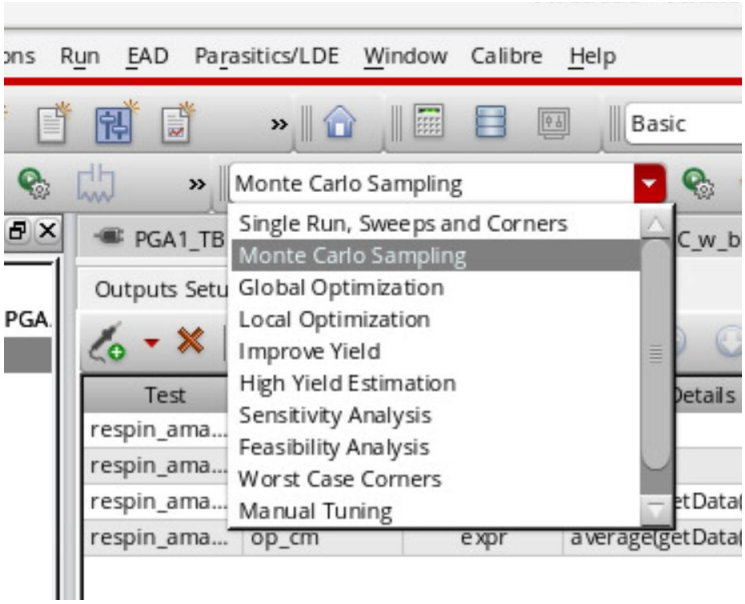


6. Next, you should see your outputs appear on the ADEXL (non-ADEL like interface) to show the outputs checkmarked and present as done in the ADEXL (ADEL like interface), under the outputs setup tab.

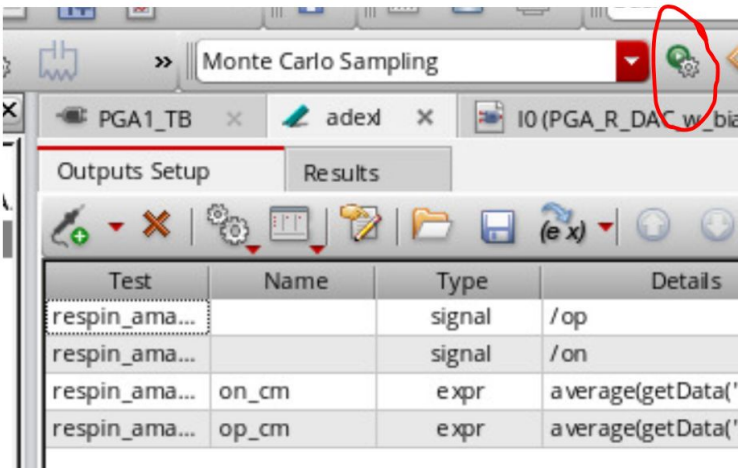


7. From the pull-down menu closely above this tab, select monte carlo sampling (or whatever other thing you want to run if it isn't monte carlo)

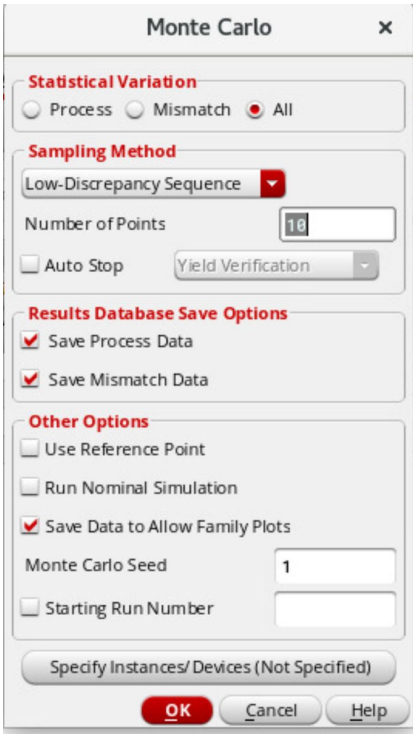




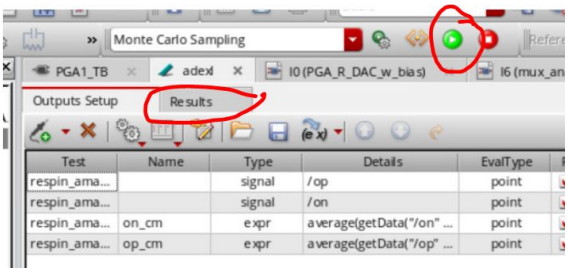
8. Click simulation options (should be the dark green play button with the overlaid gear) immediately adjacent to the pull-down menu

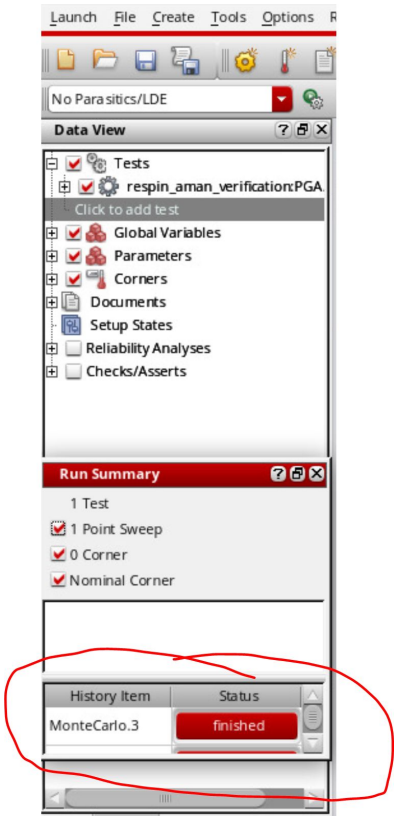


9. A popup should appear. Enter the number of points (how many different times monte carlo will simulate/ how many different variations). Make sure save mismatch data is check marked. Make sure save data to allow family plots is check marked. Enter a seed number (a value used for pseudo-random operation). Then click OK.

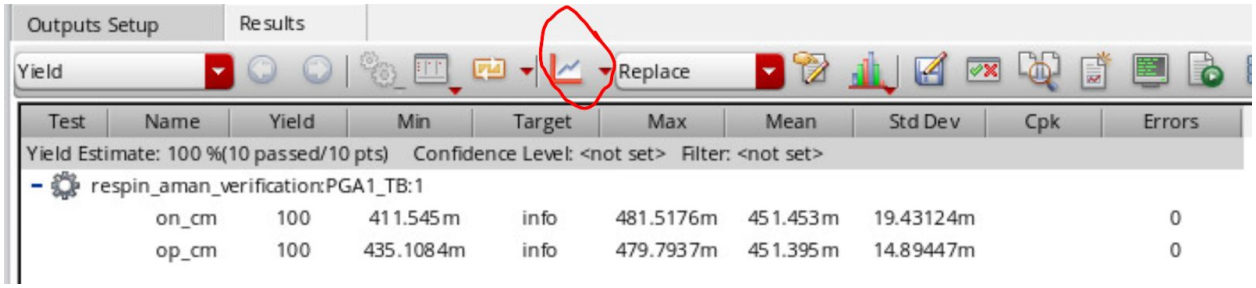


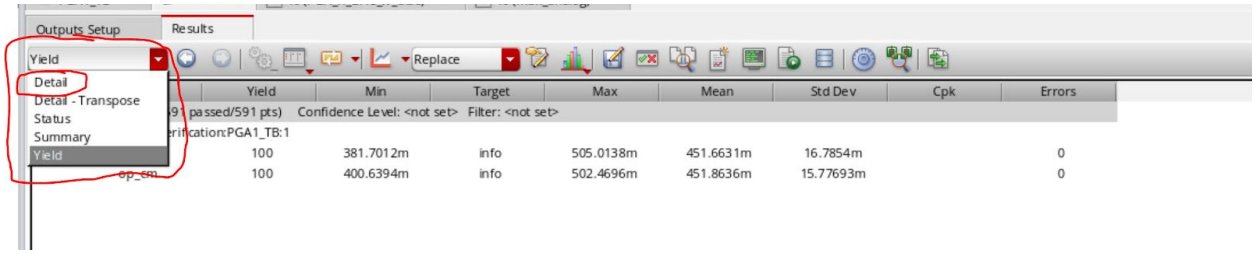
10. Click the light green play button to run the simulation. Can see the bottom left to see the progress of the simulation. This may take you to the results tab (next to the output setup tab). Note, monte carlo will treat scalar data in a table form, not a graph which is for x-dependant data.





11. Finally, you must manually click plot all button (in the results tab), denoted as a line graph. For scalar data, it will plot the data as a histogram. You can also view the data in the results table by clicking the pull-down menu where it is default yield and select detail, to show the data point history of the analysis.

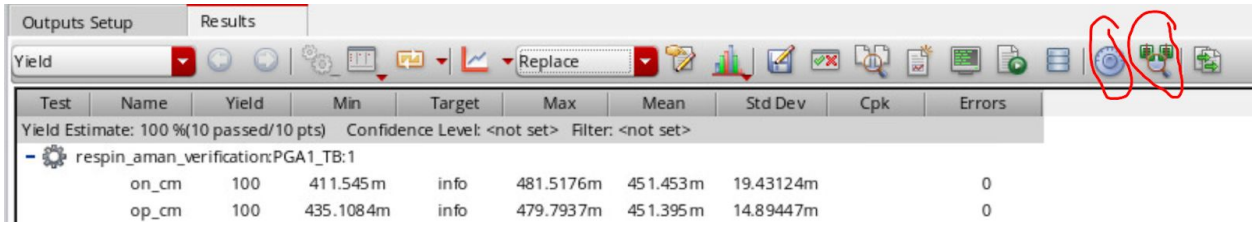




Additional useful information for Monte Carlo Analysis:

1. After finishing running monte carlo, can click on sensitivity result and/or mismatch contribution. This can tell you which components in the design are contributing to the most variation. Sensitivity result tells you what component changes the output the most due to variation in that component. Device mismatch contribution can tell you how if a device is mismatched, how much it will affect the output of interest.

NOTE: The one on the left is sensitivity, one of the right is mismatch.



This analysis can only be done on scalar data, not plots.