Progress Update

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1. Require user to set attenuator if background data is not used
2. Match attenuator setting to background data if used
3. Implement delay between consecutive cycles
4. Log raw data from lock-in amplifier
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6. Provide ability to manually scale y-axis on plots
7. Implement sensor logging into fsNMR
1. Require user to set attenuator if background data is not used

- Motivation:
  - Ensures correct attenuator settings are used for fsNMR measurements

- Added pop-up window for user to enter attenuator setting
  - Only used if background data is not used
    - If background data is used, background's attenuator setting is used
  - Coerces input value to be in range of -63 dB to 0 dB
  - Ensures a value out of RF Attenuation & Distribution Box's capabilities is not used
2. Match attenuator setting to background data if used

• Motivation:
  – To ensure that settings used for background data and that of new run match

• Added logic to get attenuator settings for current run from background data's settings file
  – Only occurs if user selects to use background data

• Completed
3. Implement delay between consecutive cycles

- **Motivation:**
  - Wait time between scans may be up to a few hours
    - User repeats scans judiciously to prevent ruining target

- **Added logic to wait after each cycle**
  - Wait period shown by status message and wait progress bar
  - Program has a "skip wait" control in case user wants to initiate another scan rather than waiting

- **Completed**
4. Log raw data from lock-in amplifier

- **Motivation:**
  - Data can be used for offline analysis

- **Additional data storage arrays implemented into program for raw data**
  - Raw data also logged after completion of each cycle (Feature #5)

- **Completed**

![Directory Structure Diagram]

Example of directory structure of fsNMR results with both raw and scaled data saved for N cycles. Two new directories, raw_data and scaled_data, are created.
5. Log data at completion of each cycle

• Motivation:
  – Previously, program logged all data only at end after successful completion
  – Logging between cycles allows at least some data to be saved if program is stopped for any reason

• Moved data logging logic to immediately after completion of each cycle
  – Average data still logged after completion of all cycles
  – Data logging at this part of program has no significant effects on program execution time

• Completed
6. Provide ability to manually scale y-axis on plots

• Motivation:
  – Allow user to see finer changes in acquired data as it is collected

• Enabled graph palette option on plots to show zoom tools
  – Option allows for different zoom modes
    1. Dual-axis windowed zoom
    2. X-axis windowed zoom
    3. Y-axis windowed zoom
    4. Revert to original view
    5. Zoom in on cursor location
    6. Zoom out on cursor location

• Completed
7. Implement sensor logging into fsNMR

• Motivation
  – fsNMR VI would become standalone and independent from any other VIs

• Work in progress
  – Development performed by Marc McMullen
  – Integrating cryogenic measurement program into fsNMR
7. Implement sensor logging into fsNMR (cont.)

- Sensor readout independent of polarization scan status
  - Values sent to program via global variables at all times
- Added “Sensors” tab to display temperatures and helium levels
  - Plots
  - Alarm thresholds
  - Alarm status

New “Sensors” tab on fsNMR front panel

Plot for target temperature
Plot for temperature sensor resistance
Plot for LHe level
Conclusion

• **Six of seven features completed:**
  1. Require user to set attenuator if background data is not used
  2. Match attenuator setting to background data if used
  3. Implement delay between consecutive cycles
  4. Log raw data from lock-in amplifier
  5. Log data at completion of each cycle
  6. Provide ability to manually scale y-axis on plots

• **Implementing sensor logging into fsNMR is under development**