EPR Operator Procedures
v2.0

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EPRs will be scheduled every 4 hours and it will be the responsibility of the Target Operator to page or call the EPR expert on call (this person will be listed on the white board).

For EPR operator:

Alert your shift leader you intend to take an EPR measurement, however, you don't need to move the target to perform an EPR.

Stop data taking for both arms.

1. **Longitudinal configuration**

   - Be sure that the longitudinal photodiode is connected to the A channel of the EPR Lock-In Amplifier and the longitudinal EPR coil is connected to OUT of the Wavetek80 (RF).
   - Check photodiode signal, should be higher than 80 mV, but lower than 180 mV.
   - If signal is lower than 70 mV, or higher than 200 mV, you will have problem locking into the resonance but you can try. If it doesn't work, call the EPR expert.
   - Open LabView program AFPSweep2000.vi.
   - The EPR circuit should be already set in AFP sweep.
   - Setup parameters:
     - Wavetek80 (RF) amplitude 16.0V, offset 0.0;
     - DS345 (Modulation source) amplitude 1.00Vpp, frequency 200.0Hz, offset 0.0 Vpp, phase 0.0;
     - By changing the Wavetek80 (RF) frequency, try to find resonance around 11.8 MHz manually. D2 signal should be higher than 20 microV. Optimize lock-in amplifier reference channel phase.
       Keep in mind that you need to minimize the time of activating EPR RF coil, so try to do this step as quick as possible.
     - Then move a little bit away from the resonance: about 20kHz away on the Wavetek80 (RF).

  - The system may change, so always check parameters used in the last EPR measurement. Confirm any change with the previous EPR operator, and make sure you transfer the information to the next EPR operator.

- Set EPR PI feedback box 'integration on', try to lock into resonance frequency.
- Check if the counter reading goes back to the resonance quickly (but not too quick!). If the counter reading fluctuates by more than 10KHz, or it takes longer than 2 seconds to lockin back to the resonance, it means the system is not working well and you need to adjust the parameters. Please, never try to change any setting if you are not an EPR expert.
- Once lockin into the resonance, you are ready to run the LabView program for AFP sweep:
  - Click on the arrow at the top-left of the window
  - Click on "download parameters"
  - Switch on "run"
  - If the frequency looks stable ('counter vs. time' window) and time more than 40s then click on "Start Sweep".
  - When the sweep is done, switch back on "pause" then the stop button closed to the arrow at the top-left of the window. Print out AFP spectrum from labview.
  - Put EPR wavetek 80 output in 'standby'.
  - Set EPR PI feedback box 'integration off'.
- Print out cell temperatures from target main controller on EPICS window.
- Fill out EPR checklist.
- Put EPR checklist, EPR AFP spectrum and cell temperatures in EPR binder.
- Set switch on RF capacitor box to be 'NMR'.
- Things to check:
  - EPR wavetek 80 output SHOULD be in 'standby';
- If cannot lockin, or lose lockin when sweeping, do not stop the program, wait until the status window shows 'waiting for sweeping...'. Do not change any instrument setting, call EPR expert on-call. EPR expert should adjust parameters and PI gains to optimize the system.
- Alert your shift leader that you have finished EPR measurement.

2. **Transverse configuration**

   - Make sure that you are on 'Polarized He cell' position to perform EPR measurement and that the three transverse lasers are on.

- Be sure that the transverse photodiode is connected to the A channel of the EPR Lock-In Amplifier and the transverse EPR coil is connected to OUT of the Wavetek80 (RF).
- The resonance frequency and amplitude are in general different and so look at the last EPR checklist parameters for transverse EPR.
- Then the procedure is the same as in longitudinal.