

BT7 3He SET-UP PROCEDURE: POLARIZED BEAM

(Key: Instrument responsible task; 3He scientist task; Instrument responsible or 3He scientist task)

INSTRUMENT/SAMPLE CONFIGURATION

I. SAMPLE GUIDE FIELD

- 1) Put in sample guide field (do 1st so as not to disturb sample alignment)
 - a. May need to adjust sampleGFrot angle to position sample guide field
 - b. **CAREFUL** of sample motors
 - c. **NOTE:** horizontal field power supply has to be powered by separate circuit due to a 10A current
- 2) Connect sample guide field to power supply and test
- 3) Measure ambient vertical field at sample position
- 4) Determine the current necessary to cancel the vert. field for horizontal field measurements (on the order of -1.5A)

II. FLIPPER and POWER SUPPLIES

- 5) Place external flipper at front of sample enclosure; should fit over extrusion and be centered on beam
 - a. Slits upstream (before) of sample have to be removed to place flipper
 - b. Connect flipper power supply and test: power supplies on rack
- 6) **NOTE:** flipper power cable labeled with the letter 'A' is for the analyzer; unlabeled cable is for polarizer
 - a. Top 3 power supplies are Ei (polarizer); Second 3 are for Ef (analyzer)

II. ADD POLARIZED BEAM DEVICES

- 7) To add polarized beam devices in ICE
 - a. device = monoflipper1 alias = Eiflip
 - b. device = monoflipper2 alias = Eicancel
 - c. device = monoguide alias = Eiguide

 - d. device = analyzerflipper1 alias = Efflip
 - e. device = analyzerflipper2 alias = Efcancel
 - f. device = analyzerguide alias = Efguide

 - g. device = samplefield1 alias = Hfield
 - h. device = samplefield2 alias = Vfield
- 8) Prepared sequences are setup in the COMMON sequence menu of the server queue:
 - a. PBsetup.seq → adds polarized beam devices
 - b. PBdestroy.seq → removes polarized beam devices
 - c. **Check for computer/communication problem if devices fail to add**
 - i. **Check that RS232-to-IEEE box on the flipper rack is powered (green light)**
 - ii. **All 8 power supplies should be on (6 for 2 flippers; 2 for sample fields)**
 - iii. **If all else fails, call Nick Maliszewski**
- 9) Test all flipper and sample field settings
- 10) Flippers can be tuned when polarizer and analyzer are in place (cells are on instrument)
- 11) After calibration:
 - a. setFlipper Ei|Ef deviceName energy|CONST current
 - i. ex. setFlipper Ei Eiflip 14.7 2.3 (flip current at 14.7 meV is 2.3A)
 - ii. ex. setFlipper Ei Eicancel CONST 1.5 (cancel current is fixed at 1.5A)
 - b. turn Eiflip ON (flipperON ei) or OFF (flipperOFF Ei)

3He MEASUREMENTS

TRANSMISSION and FLIPPING RATIO

- 12) Insure guides are in place; immediately in front of detector on x-rail
- 13) Insure detector set at sample nuclear peak
- 14) Place analyzer on instrument; place magnet stack in front if using solenoid → magnets should touch solenoid
- 15) Measure transmission of analyzer only; Total counts in detector must exceed 5000
- 16) Remove analyzer and measure empty transmission; Total counts in detector must exceed 5000
- 17) Place polarizer on instrument
- 18) Measure transmission of polarizer only; Total counts in detector must exceed 5000
- 19) Place analyzer back on instrument; place magnet stack in front if using solenoid → magnets should touch solenoid; Leave polarizer on instrument
- 20) Insure detector still set at sample nuclear peak
- 21) Measure flipping ratio (FR) on main beam;
 - a. Count main beam with flipper off and with flipper on; Total detector counts in each spin state should exceed 5000
- 22) Optimize flippers
- 23) Measure NMR signal of 3He cell of both polarizer and analyzer

DURING RUN

- 24) NMR is automatically measured every hour or so by 3He computer.
- 25) Whenever field at sample position is changed or temperature is changed
- 26) Measure NMR signal of cell in new field configuration (setup to run automatically)

SAMPLE CHANGE/END OF RUN

(Repeat at convenient times with sample out for EACH 3He CELL USED. Cells should be re-polarized after use)

- 27) Insure guides are in place; immediately in front of detector on x-rail
- 28) Insure detector set at sample nuclear peak
- 29) Place analyzer on instrument; place magnet stack in front if using solenoid → magnets should touch solenoid
- 30) Measure transmission of analyzer only; Total counts in detector must exceed 5000
- 31) Remove analyzer and measure empty transmission; Total counts in detector must exceed 5000
- 32) Place polarizer on instrument
- 33) Measure transmission of polarizer only; Total counts in detector must exceed 5000
- 34) Place analyzer back on instrument; place magnet stack in front if using solenoid → magnets should touch solenoid; Leave polarizer on instrument
- 35) Insure detector still set at sample nuclear peak
- 36) Measure flipping ratio (FR) on main beam;
 - a. Count main beam with flipper off and with flipper on; Total detector counts in each spin state should exceed 5000