Hall C User Howto

HOW TO SET UP HALL C MOELLER RASTER

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Abstract

Hall C Moeller raster system was restored in September 2003. The system has recently been renovated to meet the requirements of variety of Moeller polarimetry measurements. The major configuration of hardware, operational procedure are introduced in this summary.

1 System Configuration

- The two Moeller raster magnets are made of Litz cable winding with quality factor about 100. Their unit field integral is about 80 Gauss cm per Ampere

- Magnet drivers - the power amplifiers are Bogen audio amplifier. The maximum continuous output rms power is about 250 W. The bandwidth is $\pm$ 1 dB from 20 Hz to 20 kHz.

- Resonance module consists magnet and a resonance capacitor. The resonance frequency is 10.25 kHz.

- Remote control relay module is used to switch on and off bogen amplifiers in Hall C counting house remotely. These four elements are all located on Station 4070 - the first Hall C superharp granite table in BSY.

- Wavetek function generator is used to generate sinusoidal signals with resonance frequency. It is located in CH03B14 rack.
- Adjustable phase shifter converts the y-sinusoidal signal to the one with 90 degree phase shift in order to generate a circle Lissajous raster pattern. It stays together with WAVETEK generator.
- MR remote switch is located in slot # 10 of CH03B14 NIM crate. MRC is marked on its panel. The yellow LED indicates system "on".

2 Operational Procedure

2.1 Switch on the remote control module MRC

The yellow LED indicates the system on. In this case amplifiers are stayed in standby mode and no output at all. No any action occurs on the beam.

2.2 Set Up WAVETEK Generator and Phase Shifter

Set up the sinusoidal waveform output. Set frequency to 10.25 kHz. Adjust amplitude Vpp to 250 mV level. Then adjust phase shifter until a circle pattern appears. The two read back signals comes from current sensor Pearson probe, that has a 0.1 ratio of voltage and current. It means one ampere current through the probe will produce 0.1 V voltage.

2.3 Adjust Shape of MR pattern by Amplitude Controller

The Moeller transportation optics produces an elliptical beam spot on Moeller target. The ratio of horizontal to vertical is about 4. To get better effect by using Moeller raster, one may reduce x-amplitude and increase y-amplitude or reversely. MR amplitude controller is located in the same raster rack. You may use x and y two knobs for adjustment.

2.4 Display MR Current Pattern

The dual x-y display of the Tektronix digital scope can be used to display instant MR current pattern. The scope is shared by target raster system.

The first position of the switch is to display Moeller raster pattern.

3 Calculation of Setting Parameters

The amplitude or the size of raster pattern can be read on scope screen. in the unit of volt. The calculation formula between beam momentum, raster size, and observed raster dimension is:

$$I[A] = 0.947 \times d[mm] \times p[GeV/c]$$

and

$$V[volt] = 0.0947 \times d[mm] \times p[GeV/c]$$

Here, I[A] is the peak-to-peak value of magnet current in the unit of Ampere. d[mm] is raster size in mm. p is beam momentum in GeV/c.