The LabVIEW program of high-k scattering system on NSTX-U

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The LabVIEW program contains the monitor module and control module. The control module is used for Launch, Receiver optical setup and formic acid laser adjustment while the monitor system is used for monitor the power supply, laser output, temperature and humidity of vicinal environment, flow velocity and temperature of cooling liquid, and the acid formic gas pressure in the laser tube.

**The Control Module**

1.1 FIR monitor and control

In the Control Module like figure 1, we have the laser power adjustment and Receiver optical and Launch optical control panel.

A screenshot of a computer

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Figure 1High-k Scattering System Control panel

The laser power adjustment is driven by Thorlabs motor, the stepper motor controls the cavity length via a belt driven micrometer with 0.5um resolution as figure 2, where the cavity length is determined by the position of the coupler. We need to adjust the coupler position from remote control to achieve the maximum output of laser power. The motor can be controlled by the FIRLaserAdjustment as shown in figure 3. During control of the motor, the FIR laser power monitor could simultaneously show the laser power and help us to find where the best position of coupler position is. The move range in our control is from 0mm to 12 mm.

Close-up of a machine

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Figure 2 FIR laser output coupler.

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Figure 3 FIR Power monitor and motor adjustment

1.2 Receiver and Launch optical control

The Receiver and Launch optical control panel is shown in Figure 3. For Receiver optical ,we have four

Axis to control, there are Z axis ,Radial axis ,tilt axis and toroidal axis as shown in figure 4.

A collage of several images of a machine

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Figure 4 Receiver Optical arrangement

The four axis adjustment will determine the focus position of our receiver optical ,the relationship between the focus position and the four optical positions has already been discussed in the ppt (link).

The control panel includes computer mode, manual mode and status check. In the computer mode, we can set receiver antenna position and calculate the focus position, which also called as Interaction Region(IR) .Also we could set the IR and then calculate the corresponding antenna .if all the position is in our arrangement and we satisfied with the results, we can press the button “AutomoveAntenna “,than all the motor will move to the designated position immediately .same as “AutomoveLaunch”, where the launch angle is determined by the IR. (I need illustrate how to install the launch mirror, since the availably angle is only (-6 6) deg. If it not propel installed, it won’t be able to adjust to correct position)

A screenshot of a computer

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Figure 5 Computation Mode panel

A diagram of a region

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