

Bulls-Eye Detector Readout Project

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This is a circuit and enclosure which will house the Bulls Eye Photo-Diode SD7032 for use on the PSL to explore fluctuations in mode quality as a function of time.

1. Bulls-Eye Photo-Diodes (PD) with part number SD7032 will be used in this design. These diodes were used in a prior design [D990249](#) to monitor spatial mode structure of the interferometer beams. These diodes are also described in more detail in [T0900597-v6](#) section 2.4.
2. Each of the four active elements will feed individual trans-impedance amplifiers. The bandwidth will extend into the audio spectrum, from DC to 15kHz.
3. Each output will feed into ADC channels for post processing. We hope to explore fluctuations in the mode quality of the PSL laser beam as a function of time. This will be used as a general diagnostic tool, not likely to be permanently installed.
4. The diodes are Silicon and their maximum bias voltage is 30V. For our application a 0V bias may be sufficient, though we will include provision for biasing.
5. The diode shall be placed 4" above the table to align with other instruments. The original housing placed the diode at 3" above the base, with a 1" standoff, we will use the same arrangement.
6. Use of a DB9 connector to simplify connectivity with existing whitening and anti-aliasing chassis.
7. Use standard power connector +/- 18V and regulate down to +/-15V on board and leave space for a biasing voltage option. Power supplies will include protection diodes to prevent unwanted current flow in the event of power loss or reversal. Power to linear regulators will be filtered to prevent oscillations.
8. Assuming 2mW maximum power, these PD's produce 0.2A/W current. Our maximum current should be 0.4mA.
9. Trans-impedance gain will be 10k ohms to accommodate the low current. At 0.4mA, our output voltage should be +/-4V at 2mW on the center segment. A full 5mW will produce 1mA of current and +/-10V on the output, which is well within the op-amp active region.
10. ADC channels will be allocated as required.
11. To reduce costs and time associated with this project, prototyping will utilize the existing D990249 PCB, modified for low frequency acquisition.
12. The enclosure shall be the same used in the D990249 device WFS, with updated output and power connections.
13. Work is scheduled to be completed by the February 21 commissioning meeting.