Reflectivity measurement of 90% P-polarizing beam splitter for S-polarization

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1. Introduction

This document covers reflectivity measurement performed in the lab with a 90% P-polarizing beam splitter (E040512-B3) and a 1064 nm free space laser at S-polarization.

2. Background

To attenuate the interferometer reflected light we were seeking a beam splitter, whose reflectivity is in a range of 90-95 %, in our stock. One candidate is this 90% beam splitter (E040512-B3) although this is designed for P-polarization. Because the reflected light is S-polarizing we needed to measure the reflectivity of this beam splitter for S-polarization.

3. Set up

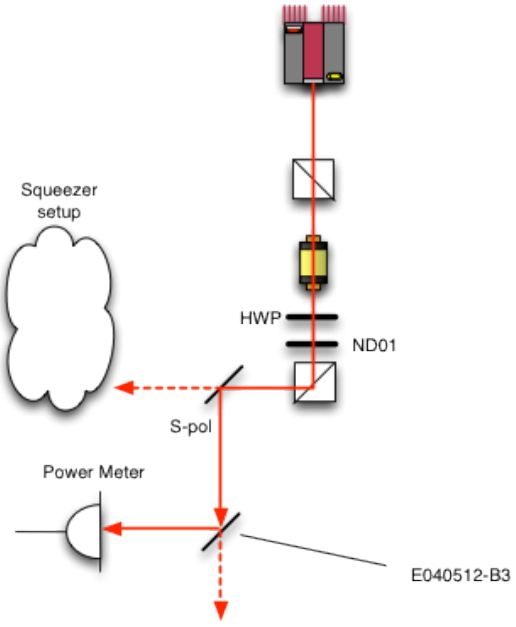

Figure.1 Measurement setup

Reflectivity measurement of 90% P-polarizing beam splitter for S-polarization

As for the laser source we used the existing Lightwave NPRO which had been setup for a reference cavity and SURF squeezer experiment at the Hanford OSB optics lab. A polarizing beam splitter (PBS), which was already setup, was used to generate S-polarizing beams as shown in figure 1.

Items used :

- 1064 nm laser source (which had been already setup)
- Polarizing cube beam splitter, 1064nm (which had been already setup)
- Half wave plate, 1064 nm (which had been already setup)
- ND01 neutral density filter
- Steering mirror, 1064 nm
- Ophir laser power meter, Vega , with filter removed

4. Measurements

Below are the results of the measurements. We flipped the beam splitter so that we obtain the reflectivity for both high reflective and anti-reflective surface.

HR surface R = 92.5 % for S-pol at 1064 nm, 45 deg

AR surface R = 2.8 % for S-pol at 1064 nm, 45 deg

5. Links

- Beam splitter specification : E040512-x0
  https://dcc.ligo.org/DocDB/0023/E040512/000/E040512-01.pdf
- LHO alog 7879
  https://alog.ligo-wa.caltech.edu/aLOG/index.php?callRep=7879