Wavelength metrology with a color sensor integrated chip

JAROM JACKSON, TYLER JONES, NILS OTTERSTROM, JAMES ARCHIBALD, DALLIN DURFEE, Brigham Young University — We have developed a method of wavelength sensing using the TCS3414 from AMS, a color sensor developed for use in cell phones and consumer electronics. The sensor datasheet specifies 16 bits of precision and 200ppm/C temperature dependence, which preliminary calculations showed might be sufficient for picometer level wavelength discrimination of narrow linewidth sources. We have successfully shown that this is possible by using internal etalon effects in addition to the filters wavelength responses, and recently published our findings in OpticsExpress. Our device demonstrates sub picometer precision over short time periods, with about 10pm drift over a one month period. This method requires no moving or delicate optics, and has the potential to produce inexpensive and mechanically robust devices.

\(^1\)Funded by Brigham Young University and NSF Grant number PHY-1205736.