

Crown 85 Report

Adaptive Optics and Cone Identification

The Center for Adaptive Optics, located on the UCSC campus, pioneered the use of adaptive optics in vision and astronomy. In astronomy the adaptive optics technique allows telescopes to correct for atmospheric distortions in the light arriving at the land based telescope. Similar optical techniques are used in vision to correct for optical aberrations and fluctuations in the cornea, lens, etc. allowing for precise images of the retina in (living) observers. This techniques has been used to image the cone mosaic of the human retina and to determine the distribution of L-, M-, and S-cones.

The report will briefly include:

1. What is the adaptive optics technique:

[CfAO \(UCSC Lick\)](#)

[Wikipedia](#)

2. How are the three cone types measured?

from: [Nature-Roorda and Williams](#)

“ Individual cones were classified by comparing images taken when the photopigments were fully bleached with those taken when the photopigments were either dark-adapted or exposed to a light that selectively bleached one photopigment. From these images, we created absorptance images that remove static features to reveal only the distribution of the photolabile pigments that distinguish the cone classes.”

3. Is there variation in the ratios of L:M:S cones in differing observers?

from: [Nature-Roorda and Williams](#)

“The proportion of L to M cones is strikingly different in two male subjects, each of whom has normal colour vision.”

[see figure 3](#)

STUDENT SHOULD MAKE APPOINTMENT WITH PROF. SWITKES TO DISCUSS REPORT