Stray light from the encoder of POpt2 rotator

December 26, 2019

• A light leak from the encoder of instrument rotator causes stray light on HSC images in the wavelength range of $z$ and $Y$ bands.

• The stray light appears a similar pattern at every 45° of the rotator angle (InR) because eight of the encoder heads are arranged at 45° intervals along the outer circumference.

• **Shielding plates were installed in November 2017.** The stray light level was significantly reduced though the effect still appears on $z$- and $Y$-band images.

• $Y$-band images taken with the dome closed before and after the shielding plates were installed:

  ![Apr 2017, Y-band, 60 sec, InR = 0°](image1)
  ![Nov 2019, Y-band, 200 sec, InR = 0°](image2)

• $i$2- and $z$-band images taken with the dome closed after the shielding plates were installed:

  ![Dec 2019, i2-band, 200 sec, InR = 0°](image3)
  ![Nov 2019, z-band, 200 sec, InR = 0°](image4)
- Y-band images with 60 sec exposure in 2017 Apr (before the shielding plates were installed):

   Rotator angle = 0°
   Rotator angle = 5°
   Rotator angle = 10°
   Rotator angle = 15°
   Rotator angle = 20°
   Rotator angle = 25°
   Rotator angle = 30°
   Rotator angle = 35°
   Rotator angle = 40°
• $z$-band images with 200 sec exposure in 2019 Nov (after the shielding plates were installed):

- InR = 0°
- InR = 5°
- InR = 10°
- InR = 15°
- InR = 20°
- InR = 25°
- InR = 30°
- InR = 35°
- InR = 40°