MONDAY(4/22/2019)

MECHANICS OF CCD(CHARGED COUPLED DEVICE)

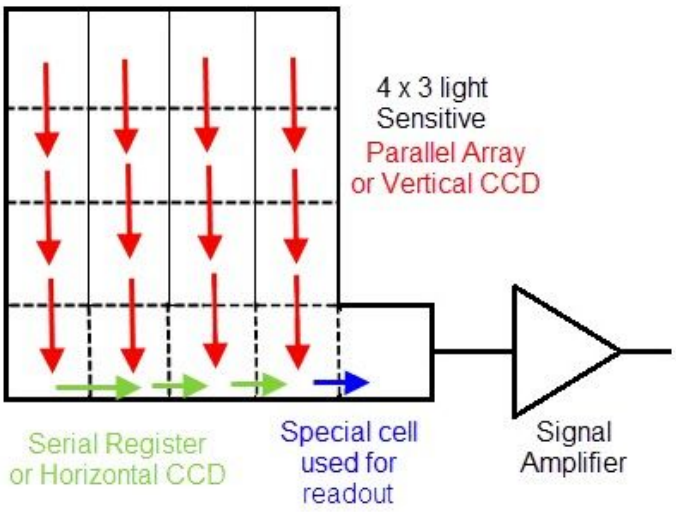
-next week, taking data with CCD

FITS IMAGES

- Scattered light area
- Flat area?
- Investigating the flatness
    - Colourmap
    - Statistic, histogram
    - Number of pixels
- Poisson Distribution
    - How many times does the event occur
        - Exp: How many I will encounter a penny
    - Gaussian distribution ~ Histogram
        - If an average of xxx and STD yyy, what is the probability of man >xxx
- Looking at the data
    - Large area, a large Gaussian distribution
    -
- Photon is governed by Poisson
- Probability of their arrival
- Lots of photons, flats area = approaching gaussian distribution
- Overscan may look like a Gaussian even though is a small area.
- Bias region, can read it out and removed it
    - Zero second image
    - The imaginary region, just reading the readout.

CCD

- Charge transfer => Bucket brigade
- Transfer charge from pixel to pixel on the amplifier.
- Complication
    - Use electricity to confined the electron from pixel to pixel
    - Losing charge as part of transferring
    - You have to know how charge is handled in this process
- Readout
    - Down in a column and out in a row
    - In a special readout cell



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- QE(quantum efficiency)
    - How high or low efficiency is
    - Thinner CCD is more responsive towards the BLUE and RED.
        - Hard aspect:
            - Old or new CCD
            - Mirrors
            - Code
- HEADER
    - QE
    - Gives info on how big image or area in the sky
    - Orientation of ccd
- CCD
    - They are linear
    - Pixel can saturate
        - Due to photons
    - Gain is intrinsic
    - Responsive in optical
    - CCD is commercially viable(CHEAP)
- CMOS technology
    - Photon to electron conversion is happening at the same time as a charge to voltage conversion
- MICROCHANNEL PLAT
    - Can do the time of arrival of photons
    - CCD can only know the length of exposure
- **Signal to Noise (SN)**
    - Shot noise
        - Comes from the Poisson statistic
        - You get variation at every window
        - Underlying photon norse, their arrival

        - Thermal noise/dark current
            - Cool CCD to improve their efficiency
            - But, noise is generated
            - You get more dark current on your image, so we can remove then
            - Dark have to be the same length as your the data that you're working
        - Read noise
            - Variation in the CCD readout electronics
            - Can cause normal distribution around bias level
        - Bias
    - How to remove this bias?

WEDNESDAY (4/24/2019)
- Continuation from Monday
- Submit homework

FRIDAY (4/26/2019)
- ‘Workshop with meredith’
- Python in reading csv or tsv data
- By using panda
    - Df command
    - Astype

NOTE: CODE UPLOADED TO GITHUB