Flat-field Imaging for DIS QA/QC

First, very quick & messy test

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MAGIS-100

Stanford University | U.S. DEPARTMENT OF ENERGY

Lab Set-up

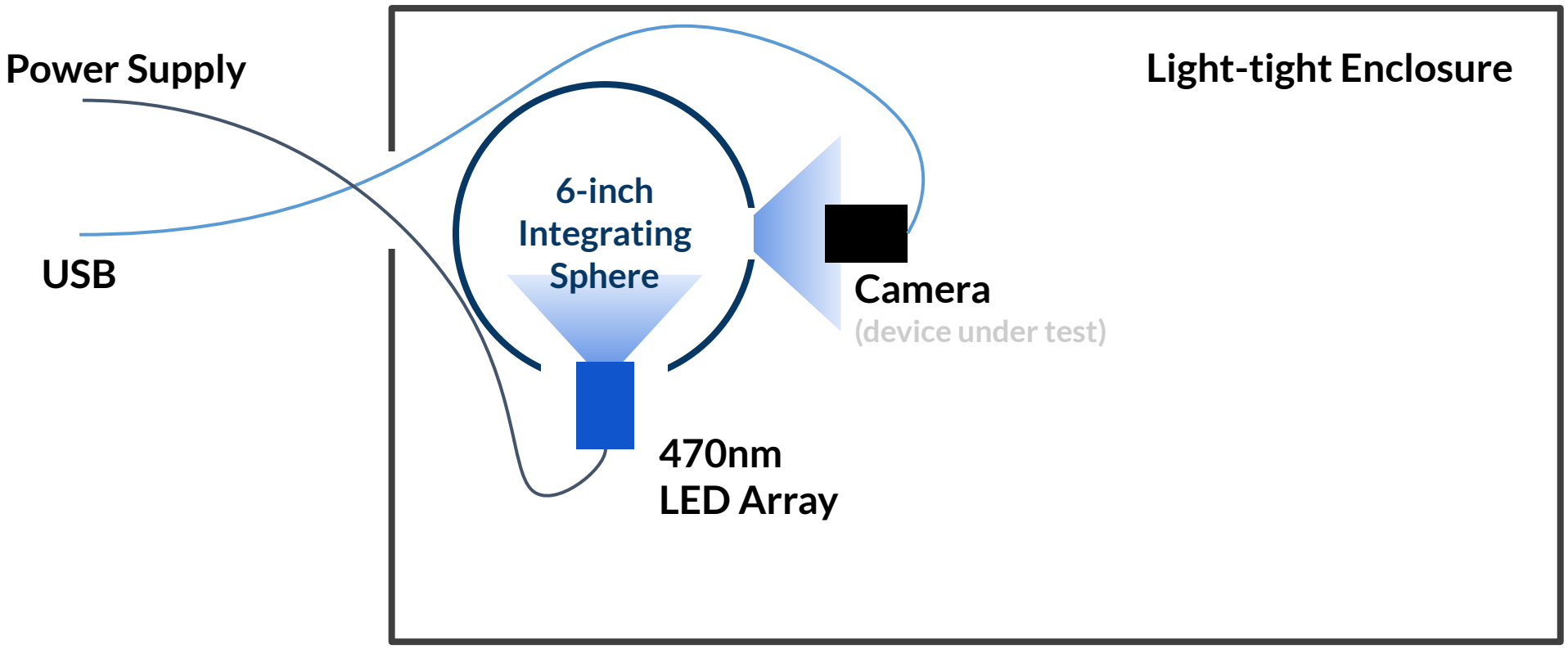
Goal: take images of a “flat field” to understand/calibrate DIS camera performance

Equipments

- 470nm LED array, Thorlabs (link)
  - With a dedicated power supply, 24VDC
  - 1.5” outer diameter
  - 2” OD adapter and then onto a kinematic mount
    (but precise angular alignment of input light source is probably less important)
- 6” integrating sphere (link)
  - 2.5” input port
  - 1” output ports
    - One for camera
    - The other for “monitoring” or simply blocked off
- 2 photodiodes & power meter for monitoring
  - Calibrated by vendor
  - Dual channel power meter

Lab Set-up

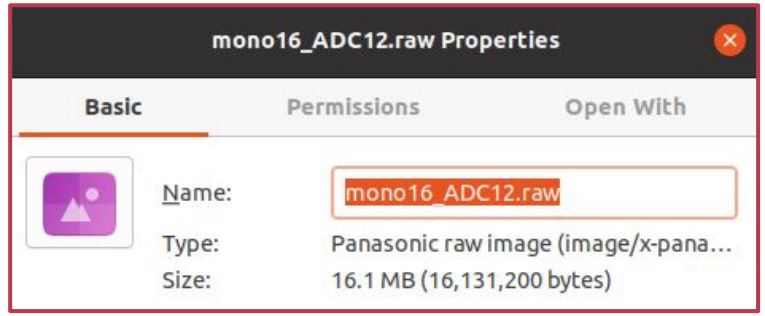
Goal: take images of a "flat field" to understand/calibrate DIS camera performance

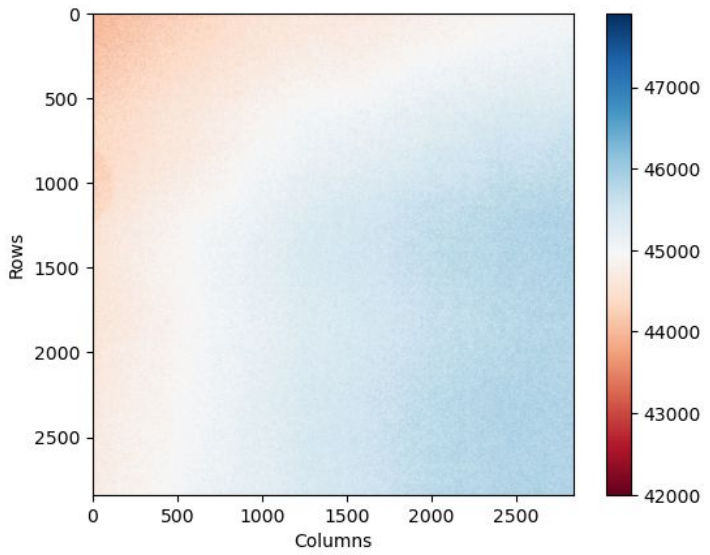


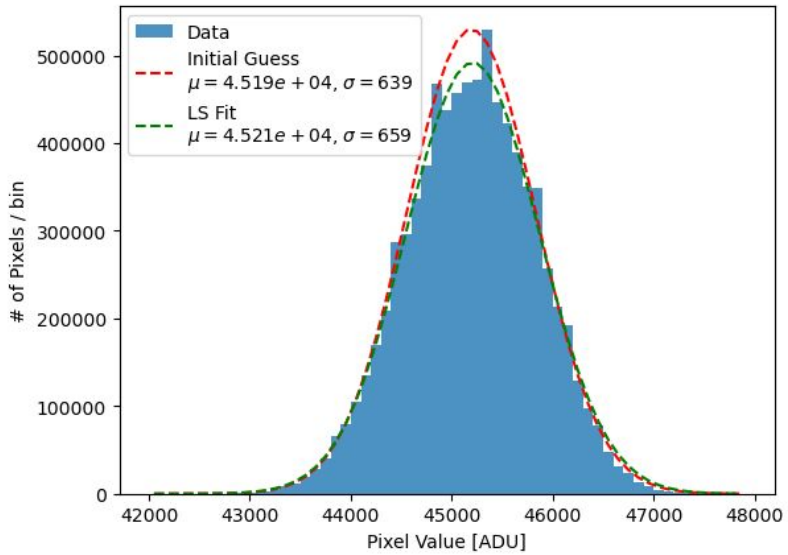
A Very Quick Look at Very Rough First Image

On 2023/09/29, Ariel and Sanha did a very rough initial set-up and **took our first flat-field image!**

- With the set-up mentioned above, but very "messy" and rought alignment / mounting schemes
- Final DIS camera, BFS-U3-80S5M-C
  - Image size: 2840 × 2840
  - ADC bit-depth set to 12
  - Image format MONO16, so pixel values in [0, 65535]
  - **Raw data size: 2840 × 2840 × 16bits = 16.1312MB**
    ⇒ As expected! :)
- Very quick image analysis
  - Image values indeed in [0, 65535]
  - Overall stats: 45207 ± 659 ADU
  - **Values not exactly in increments of $2^{16-12} = 16$**
    - Maybe some "interpolation" setting is turned on?
    - Need to check







A Very Quick Look at Very Rough First Image

- Overall stats: 45207 ± 659 ADU
  - “Roughly” 1% flatness
  - But this is in some processed ADU, not $n_{photons}$ or $n_{electrons}$, so further investigation is needed
  - Needs experimental improvements: alignment, mounting, light-tightness, etc.
- Some clear features, not exactly flat
  - Alignment issues
  - Stray reflections
    e.g. from the optical table