**Call for action: CMOS photometry**

**Fri 24 Jan 2020**

**Adjustable Gain With Binning?**

Hello! Just curious if the CMOS cameras have adjustable gain with binning? Some cameras and companies allow the gain to be adjusted in their cameras while other cameras/companies have fixed gain.

    If the gain does not change, I believe that the same number of electrons in 1x1 would be spread over the total binned pixels. So, for 2x2 binning, each pixel would only be able to handle 1/4 the electrons as it would have with 1x1.

    For example, (for round numbers) with a gain of 2 e-/ADU and 100,000 e- full well, the system would have 50,000 ADUs. With 2x2 binning, with a gain unchanged of 2 e-/ADU, the output would still be 50,000 ADU for the single large binned pixels, so the 100,000 e- are spread over all 4 pixels, essentially decreasing the dynamic range but preventing oversampling so that the image would more closely match the Nyquist theorem.

    If the gain is adjustable, then lowering the gain to 0.5 would allow each pixel to continue to have a full well of 100,000 e-, essentailly inceasing the full well of the 2x2 binning to 400,000 - increasing the dynamic range while more closely matching the Nyquist theorem.

    I may not have gotten the interaction of gain and binning correct, and I would love to hear from others about it. I am far from an expert, and I'm trying to evaluate the benefit of binning/gain vs. larger pixels of cameras to match telescope focal length (taking into account cost, etc.)

    There are other factors besides gain to take into account with binning, too. And Arne has discussed them in some of his post and videos. Thank you and best regards.

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