

Re: CCD to match Celestron 11" SCT?

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On Wed, 10 Jun 2009 06:36:27 -0700 (PDT), Jack <newsgrouppreader1@xxxxxxxxxx> wrote:

I am interested in getting a Celestron 11" SCT for minor planet astrometry but need to decide on a CCD camera to match the telescope.

...
to calculate the pixel scale for their products but what is the actual formula?

$$A = 206265 * d / F$$

where

A is the pixel scale in arcseconds;

d is the pixel pitch;

F is the telescope focal length (in the same units as d)

(206265 is the number of arcseconds per radian)

The 11" Celestron has an aperture of 280 mm and a Focal Length of 2800 mm.

$$\text{Thus, } 2 \text{ arcsec} = 206265 * d / 2800.$$

$$d = 27 \text{ um.}$$

In other words, this telescope requires a large pixel camera to get your desired scale of 2"/pixel. With typical science cameras having pixels that are 9 um, you will be rather oversampled. That's actually not a big problem for most astrometry, but you could easily reduce your focal length. I'd look at using a 0.6x reducer (which will also produce a flatter field). That will give you

$$A = 206265 * 0.009\text{mm} / 1680\text{mm} = 1.1 \text{ arcsec/pixel.}$$

That's a very nice imaging scale, and depending on your target you can

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opt to bin 2x2 to get 2.2 arcsec/pixel. Of course, it also means you have a larger FOV than using the native focal length of your scope.

Which CCD cameras would you recommend? Which ones should I avoid? My budget is limited to \$1500 but I could push it to \$2000 if I really have to.

That is a very limiting budget for a good science camera. Avoid any camera with a color sensor, avoid any camera that isn't cooled, avoid any camera that can't take long exposures, avoid any camera without a mechanical shutter. Cameras with full frame sensors will generally give better results than cameras with interline sensors, although you can get good results with either. Sensors with deep pixels (high dynamic range) are often useful for astrometry and photometry, since this allows you to have fewer saturated reference stars to compare with your (usually dim) target.

Take a look at the SBIG ST402, or the ST7 if you need self guiding. These are very good cameras for what you're interested in. The only downside is that the sensors are rather small, which means you will have fewer reference objects in the field than you might want.

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