

Refractors for Imaging Planets?

Question:

Are Refractors a Good Choice for Imaging Planets?

Reply:

You'll probably have gathered from the above that I'm a huge fan of refractors. They have so many advantages and, size for size, simply yield the best visual images. Why then, do expert planetary imagers use SCTs and, to a lesser extent, Newtonians? It's primarily because to get high-res planetary images you require both decent aperture and relatively big image scale.

You need enough aperture to capture with sufficient resolution on the imaging chip the detail that occurs fleetingly in moments of best seeing – because this will be selected out for subsequent processing, the rest being discarded. Sufficient light-grasp is needed to achieve workable brightness of the magnified image. These considerations send expert planetary imagers to scopes of at least 9.25 inch aperture with many using 11, 12 and 14 inch models. This doesn't mean, of course, that you can't have fun with smaller scopes; just expect less detail and edge.

The planets appear small on the sky, so to achieve a sufficient image scale on the camera chip, you need to use very long focal lengths, depending on the planet, typically at least 4 metres. Too short a focal length means the image of the planet will cover too few pixels on the chip and lack resolution. Again, this doesn't mean you can't enjoy experimenting with shorter, smaller instruments.

In practice, the dual requirement of *aperture* to achieve resolution and *light grasp* and *focal length* to achieve image scale excludes many scope designs or at least makes them unaffordable. The scopes that come closest to fitting the bill are SCTs. They are relatively affordable in apertures above, say, 200mm. At f10, they already have a fairly long focal length which can readily be increased to the required, 3, 4, 5 or 6 metres by the use of a Barlow lens or Powermate. Being compact, they are less affected by wind, easier to mount and, in moderate sizes, more manageable than, say, a 250mm f8 Newtonian.

In this application, the shortcomings of SCTs are outweighed by their practical advantages, making them the best tool for the job. The mirror flop to which many models are subject - a problem to which manufacturers have responded with varying degrees of success – can often be dealt with by locking the main mirror and adding a high quality external focuser. The proneness to dewing of the front corrector plate can be mitigated by a shielding extension and by judiciously applying warmth. The intrinsic loss of mid-range frequency resolution caused by the big central obstruction is also a price to pay, but skilled processing nevertheless enables incredible images to be achieved by the best imagers – and none is better than Damian Peach.

Some expert planetary imagers have achieved outstanding results with optimised Newtonians, but it's fair to say that the overwhelming preference among the best practitioners these days is for the large aperture SCT. It's not that Newtonians are optically less capable; the reasons have more to do with practicality. A largish aperture, long focal length Newtonian is, well ... long ... and still requires a lot of amplification to achieve the desired image scale. The length of such scopes makes them susceptible to wind and other

inconveniences and, of course, they are subject to the various factors affecting the performance of Newtonians described in the previous article. SCTs are not without their inconveniences but can offer decent aperture and, thanks to their folded light-path, an initially long focal length that is readily amplified, in a short, relatively functional and more manageable package.

The answer to your question about the minimum size for a refractor to image planets is that even a small, say, 80mm refractor will produce something by way of a planetary image on the chip - but the results will be disappointing. As an aside, such a scope would be perfect for wide-field CCD imaging of nebulae etc as well as being portable and enjoyable for wide-field viewing. A 5 or 6 inch apo refractor would obviously do much better than an 80mm. But, *in this particular application*, it would be an expensive way of achieving indifferent results. Horses for courses ...

If you wanted to have a fairly serious go at planetary and lunar imaging, something like the Celestron 9.25 SCT would be an excellent starting point. These crop up fairly often on the UK Astro Buy Sell website.

Question:

What autoguider should I use?

Reply:

At the time of writing, the standout autoguider remains the Starlight Xpress Lodestar X2. I consulted my friend Ian King of iankingimaging on this enquiry - Ian's imaging expertise and familiarity with the qualities of available equipment are second to none. He agreed that the Lodestar is still the best and suggested the Altair GPCAM as a decent lower cost alternative.

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