Writer and photographer: Shevill Mathers

Images were shot 10 November 2004. High ISO rating (32,000), a fast lens (f/1.4) and very short exposure (1.5 seconds) are essential to capture the fine structural details and colour tints

Blue beam is a 'curtain' viewed edge on

Shooting the aurora australis

Living in the higher latitudes, enjoying some of the clearest air in the world and with relatively low levels of light pollution, Tasmanians are well placed to observe and photograph the splendid aurora australis. This display of moving streamers, bands, curtains and arcs of light, visible in high latitudes, is caused by streams of charged particles from the Sun passing into the Earth's magnetic field. Long winter nights increase the chances of observing auroras. (See Issue 17, 'The Year of the Aurora Australis'.)

The Sun's activity is constantly monitored by dedicated solar observatories that can predict when major activity is likely to cause a significant auroral display. During early November last year conditions in our part of the world were near perfect – a massive class IV flare from a sunspot group sent highly charged particles in our direction. (A class V flare is the maximum.) These charged particles take approximately two days to reach the Earth's atmosphere, allowing an astronomer – amateur or professional – time to ready photographic equipment.

Unlike modern recording devices, the human eye is a rather poor receptor, particularly of colour, in low light levels. Video cameras that use CCDs (charge-coupled devices) instead of film have been available for many years and are 10 to 20 times more sensitive. They can produce good results when used to record astronomical phenomena.

With the advent of single-lens reflex digital cameras (that also use CCDs), amateur astronomers can now, using some simple techniques, obtain excellent colour images of auroras. Wide-angle lenses at full aperture setting (and using very short exposure times) give the best results.

In the past many people have taken auroral photographs with the family

Three arcs with high speed pulses create a flickering effect

The blue tint, barely visible to the naked eye, revealed by digital photography

Below: Both images were taken at the same time of the same view, one with film and the other with digital technology. The lower left image was shot with a Canon AT film camera using Kodak Gold 400 ASA film by Laurie Priest

camera, commercially available film (usually 200 ISO) and a 50-millimetre lens using a time exposure of many seconds. Although this does produce some pleasing images they are often not an accurate record because of the blurring effect of a long exposure coupled with problems caused by rapidly moving light beams, curtains and ripples.

With the latest digital single-lens reflex (DSLR) camera one can see almost immediately if the shot is acceptable, and make adjustments to aperture and shutter-speed settings accordingly. Another advantage of the digital camera is the equivalent film speed rating that can be achieved – from 200 to 64,000 ISO – depending on the make and model. Because of the nature of CCDs, it is necessary to colour-correct images with suitable image-processing software such as Adobe Photoshop. (There are other, more specialised, programs designed for professional astronomers.) Two techniques to reduce the 'grainy' effect of very short exposures are to either electronically 'stack' several images or to use noise reduction software – for example, Noiseware, in the public domain.

The advent of CCD-equipped digital cameras, together with modern image-processing technology, has brought within the reach of modest budgets a quality of photography that could once have only been achieved in large observatories.

Further information:
www.ast.n3.net and www.taao.has.it

Writer Shevill Mathers is immediate past president of the Astronomical Society of Tasmania. His Southern Cross Observatory is located at Cambridge, southern Tasmania.
Email: shevillm@southcom.com.au