

breaks down. The overall result is to reduce the speed of the film, which in the case of colour films may give rise to strange colour casts and effects due to the different emulsion layers having differing colour responses.

There are several ways in which this problem may be overcome by advanced amateurs. The first and simplest is to use the expensive special astronomical emulsions. Because they are so expensive, these tend to be employed only by those few observers who have obtained complete mastery of all aspects of astronomical photography, and who can be confident of wasting little film. Next in order of simplicity in that it requires no modification to the actual camera, is the technique of hypersensitization. In this the film may be baked, chemically treated, or subjected to both processes, sometimes in several stages, with the general aim of increasing the film speed without increasing the grain size, and of delaying the onset of reciprocity failure. The overall process can be quite complicated, even though each individual step may be simple, and usually requires some knowledge of laboratory techniques and safety measures, the latter being very important in those procedures where hydrogen gas is used for hypersensitizing the film. The film is treated before exposure, but there is also a similar technique, known as latensification, which can be applied after the exposure has been made. This latter process, however, is little used by amateurs.

A further technique is that of cooled-emulsion photography, in which the film is maintained at a very low temperature during the exposure. The most frequently used substance for this purpose is carbon

dioxide, either as a solid ('dry ice' or 'snow') or as a gas, and at a temperature of 194.5 K (−78.5°C). Because of this low temperature a number of problems have to be overcome, such as brittleness of the film, and most especially the prevention of condensation, which in some cases has been solved by the use of optical windows and evacuation of the air from the film chamber. As will be obvious, special cameras have to be built for use with this technique, so it is tending to become less frequently employed than hypersensitization. However, it gives excellent results with colour films, with very little alteration of the colour balance.

Another type of approach to obtaining colour photographs is that used by some advanced amateurs who make a set of exposures through different filters, and then combine the images, with appropriate colour filtration, to give a final print in 'natural' colours. There are also various darkroom techniques which may be employed to enhance the visibility of faint nebulosity or detail. These include the superimposition of more than one negative in a technique sometimes used for planetary photography, the 'unsharp masking' method used on many professional photographs, recopying to give higher contrast, or by some combination of all these methods.

Despite all these apparent complexities, however, a lot can be done by a patient observer prepared to spend some time at the eyepiece guiding a telescope which is coupled to a camera in a perfectly straightforward manner.

Certainly there are enough objects in the Galaxy to provide anyone with a lifetime's programme of photography.

*The region of the galactic centre of Sagittarius is very rich in objects to observe, particularly globular and open clusters.*

