PART 9: SHORT GUIDE FOR ADVANCED USERS

Summarized information

Here you will find a summary of all the information concerning the different fields treated in this Handbook. This part may be helpful for advanced readers or to use as a checklist just before you actually start your observations.

FAINT METEORS

Appropriate equipment should include:

(1) A camera allowing long exposures which is easy to handle in the dark and which is not influenced by dew and cold

(2) An appropriate fast lens (for example $f = 50$mm, $f/1.4$)

(3) A warming device for the lens, preferably with a transformer to use a low voltage outside

(4) A rotating shutter with a synchronous motor (about 15 breaks per second; where shower meteors are expected have a high atmospheric entry velocity, about 25 breaks per second are better)

During the observation you should note the following information for each exposure:

(1) Precise time of the start and end of the exposure (use UTC only to avoid confusion)

(2) If possible, the exact time of the meteors which are bright enough to be photographed

(3) Notes about other moving objects in the camera field

(4) Some notes about the sky conditions, especially about clouds at the start or end of the exposure (note at least 10 stars which are not covered by clouds at these times to allow positional measurements)

(5) In case of a meteor storm, the beginning and end of the exposure must be noted with an accuracy of $\pm$1s. Check your watch after the event. Please also follow the hints for the camera field direction given in detail in Part 1 (Faint Meteors).

FIREBALL PATROL

Appropriate equipment:

(1) all sky mirror + camera OR fish eye lens + camera with sufficient film size

OR wide angle lens + camera, ideally with enlarged film format

(2) A suitable mounting of the camera which should resist even strong winds and allow a repeatable orientation of the camera

(3) Warming system for lens and film

(4) Rotating shutter, preferably with synchronous motor (about 15 breaks per second)

(5) Device for fireball timing

(6) Cloud detector, plus twilight dimmer switch

(7) Timer for start and end of exposures

(5), (6), (7) are helpful, but not essential

During the observation you should note the following information for each exposure:

(1) Precise time of start and end (use UTC only to avoid confusion); if you use an electronic timer, check its accuray!

(2) Sky conditions, especially clouds at the start or end of the exposure, because they may affect the measurement of positions (note about 10 stars which are visible at the appropriate time).

METEOR SPECTRA

The **appropriate equipment** should consist of:

(1) A camera with a normal lens or slightly longer focal length (preferably $f = 50$ mm ... 140 mm)

(2) A prism OR a transparent diffraction grating which is well mounted in front of the lens and oriented such that the dispersion of the expected shower meteors is optimal

(3) A heating system for the whole optics

(4) A rotating shutter in front of the prism/grating

The **data to be noted before or during the exposures** are:

(1) Focal length f of the lens

(2) Data for the prism (deflecting angle) or the grating (lines per millimeter), respectively

(3) Start and end of each exposure (use only UTC to avoid confusion)

(4) Region of the sky photographed

(5) Orientation of the prism / grating

(6) Type of film used

(7) Time and magnitude of meteors brighter than 1^{m} if observed visually

METEOR TRAINS

The equipment and practicalities of photographing trains is different for the different types of trains, and ranges from the area of "ordinary" daylight photography to the need for very fast films and fast lenses for the nighttime appearances of transient train phenomena.

REGULAR TRAINS AT NIGHT

(1) Camera with a very fast film (ISO 800/30°or higher) and fast lens ($f/1.8$ or faster)

(2) Shutter already opened, but covered e.g. by a dense piece of cloth

(3) At the moment of the appearance of a bright meteor leaving a persistent train you must immediately remove the cover and expose the film depending on the brightness of the train (at least 20 . . . 40 seconds)

(3) If the train lasts for more than one such exposure, continue with exposures of about the same duration

DUST TRAINS BY DAY

(1) Conditions are comparable to "normal" daylight photography; a slight underexposure is recommended

(2) Try to make a whole series of photographs and note the time(s) of the appearance of the fireball (if seen) as well as the time(s) of the train exposures, or the time lapse between the meteor's appearance and the exposures

DUST TRAINS DURING TWILIGHT

(1) Camera with a fast lens ($f/1.8$ or less) and fast film (ISO 400/27°or higher) recommended

(2) Try to make several exposures of different durations, depending on the film and lens at hand (try at least 10 . . . 20 seconds)

(3) Note the time of the fireball's appearance (if seen) and the time(s) of the exposures taken.