

TAUMOK - a Multi-Object Spectrograph for the Tautenburg Schmidt Telescope

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1. Introduction

TAUMOK is a joint project of the Max Planck Institut für Astronomie Heidelberg and the Thüringer Landessternwarte Tautenburg. It is based on the concept of the "Spaltspinne" (Pitz 1993) now in operation at the Calar Alto Observatory. A first description of the technical concept was given by Pitz et al. (1993). TAUMOK was built at the MPIA Heidelberg in collaboration with astronomers and technicians from Tautenburg. It is now in the test phase and will have its first operation at the Tautenburg telescope in the middle of this year.

2. Technical summary

The use of a Schmidt telescope gives a very wide field for multi-object spectroscopy (TAUMOK will cover a field of 2.3°) but it also requires a series of special considerations. So, some of the details of the original "Spaltspinne" were modified to meet the site specific peculiarities. The size of the ground plate was minimized and yields a central obscuration of only 60 cm in diameter. The curved field of the Schmidt focus (deviation of up to $\pm 400 \mu\text{m}$ from the mean focal plane) is flattened by a field lens - a solution alternative to the guiding of the fiber supporting rods on a sphere.

A processor-controlled positioner points 36 rods in the focal plane. Each of 34 of these rods carries two fibers with diameters of $100 \mu\text{m}$, one fiber for the object and one for the sky background light. The opposite faces of the 8m long fibers form the entrance slit of the spectrograph (modified UAGS from Carl Zeiss Jena) which is placed near the top of the fork mounting. At present four diffraction gratings are available providing reciprocal dispersions of 3.4, 10, 20 and 40 nm/mm. Object and background spectra are imaged on a CCD of 1152×770 pixels (pixel size $22.5 \mu\text{m}$).

There are two new implementations for TAUMOK. First, on two rods two object fibers are replaced by image bundles of 6000 fibers each which feed a CCD detector (ST4 camera) for telescope guiding. Second, TAUMOK will have 36 sky background fibers adjacent to the object fibers and image bundles, respectively, in 40 arcsec distance on the same rod. This important improvement allows simultaneous sky background measurements. It became possible because of the

larger entrance aperture (1:3) and the much smaller size of the fibers (100 μm) compared to the "Spaltspinne".

Table 1. Basic technical data.

telescope	1.34 m Schmidt
f-ratio	1:3
scale factor	20 $\mu\text{m}/\text{arcsec}$
field diameter	160 mm = 2.3°
field flattening	field lens
diameter of ground plate	60 cm
fibers	34 object + 36 sky background (Q+S AS100/140A)
distance object - background fibers	40 arcsec
fiber aperture	100 μm = 5 arcsec
pivot point radius	135 mm
rod length	210 mm
aquisition and guiding	TV guider fed by rods with image bundles
image bundle diameter	500 μm
comparison spectra	36 fibers (Optran UV 300/360) fed by Th-A or He-A lamp
flat field	same fibers fed by quartz lamp

3. Further steps

TAUMOK is now in the final test phase. It includes the determination of optimized parameters for the computer software controlling the positioning of the fiber supporting rods. So, a bending strain model is in hand which considers the deviation of the fiber tips from the calculated places in different telescope positions. Another problem is the handling of the 8m long fibers. A laboratory arrangement had been made at Tautenburg for the measurement of the fiber degradation.

TAUMOK should be available for observations in the middle of 1994. First astronomical projects will be the measurement of the redshifts of galaxies, the spectroscopical check of quasar candidates and the search for faint B stars in the galactic plane as indicators for a possible spiral structure behind the Perseus arm.

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