been obtained with the ESO 3.6-m telescope instead of the 1-m.

The high-quality results obtained in the visible at La Silla will now be combined with the results obtained from other observatories. This will lead to new position ephemerides for the Galilean satellites. There is no doubt that ESO will have played a major role in this realization.

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Splitting the Zodiacal Light

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1. Introduction

In view of the progress in the field of astronomy, in particular the ever-increasing accuracy of measurement and the development of high-resolution optics, it is an amazing fact that some of the largest phenomena in the sky have not yet been correctly described. This realization came as a surprise to us, a group of German amateur astronomers.

Some time ago, scientists of the Astronomical Institute of the University of Bochum, Germany, drew our attention to various unsettled problems concerning the inclination of the zodiacal light against the ecliptic plane. Already the first person who described this phenomenon, the well-known French-Italian astronomer Giovanni Domenico Cassini, noted an inclination of 3° against the orbit of the Earth (1). Visual, photographical and photometric observations in our century gave other results and were quite inconsistent (2). In the meantime, the Infrared Astronomical Satellite (IRAS) has shown that the zodiacal light bridge consists of individual bands within 10° of the Ecliptic. These substructures can be connected to the large number of asteroids with similar orbital parameters, leading to frequent collisions and thus to inhomogeneous concentrations of the dust (3).

2. New Observations

To obtain new and better observational results, we installed our cameras at places with low light pollution and made deep photographs of the Ecliptic. This work started in 1984 at the observatory at Jungfraujoch in Switzerland in the High Alps and ended in March 1989 at the ESO La Silla observatory.

We employed a fisheye lens (2.8/16 mm) which has a field of view of 180° over 43 mm image diagonal and which is very useful to render large- and low-contrast phenomena. As film served the T-MAX 400 emulsion from Kodak, which was forced to 1600 ISO while preserving its gradation. In this way we kept the exposure times short enough to avoid any smearing-out of the regions near the horizon, which would otherwise have exposed themselves on delicate structures in the zodiacal light. The camera was pointed to the antisolar direction and the lens was stopped down one step to have a more homogeneous illumination on the negative. Since one of our aims was to examine the position and structure of the gegenschein, the pictures were taken at times when the

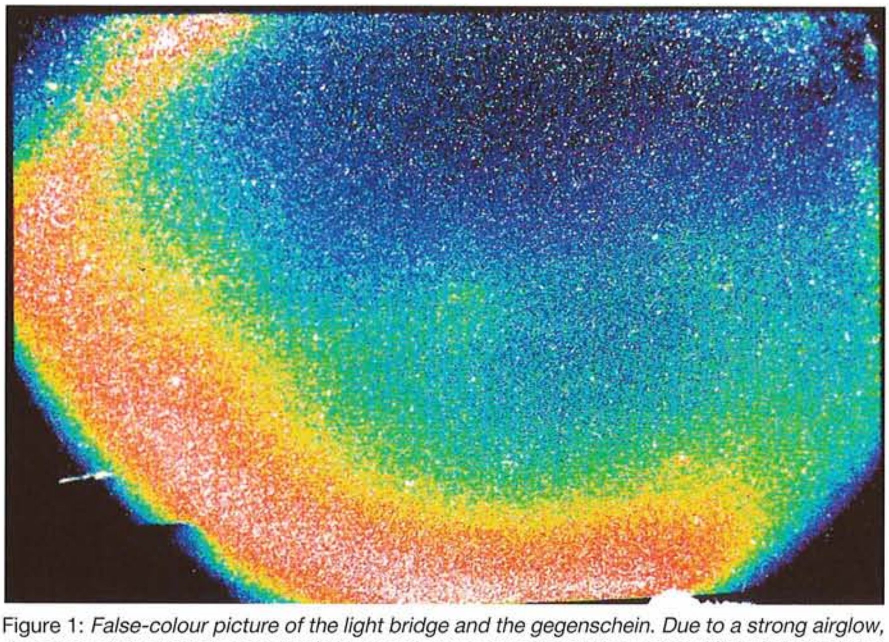

Figure 1: *False-colour picture of the light bridge and the gegenschein. Due to a strong airglow, the areas of the Ecliptic near the horizon are overexposed and the zodiacal light bridge shows a low contrast. Exposure: 60 min on March 14, 1989, 6:03 UT; objective: 4.0/16 mm.*

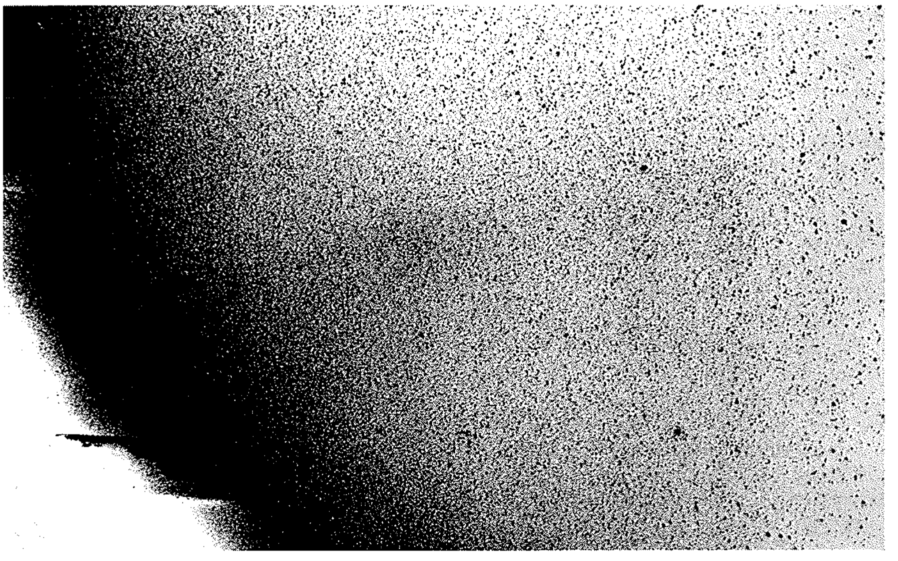

Figure 2: *Contrast-enhanced picture of the same photograph as Figure 1. Two bright stars have been marked to facilitate the orientation. Especially west of the gegenschein a separation of the light bridge is noticeable.*

antisolar point was at high galactic latitudes and the Milky Way did not interfere too much. Because of this, the zodiacal light bridge could be observed over a large extension along the ecliptic. Unfortunately, at the time of our observations (March 14, 1989) there was a strong airglow due to high solar activity close to its maximum, and the areas of the Ecliptic near the horizon were overexposed and the zodiacal light bridge had a low contrast.

The negatives obtained were either digitized and processed to false-colour images (Fig. 1) or contact-copied to increase the contrast (Fig. 2). Further techniques, like the correction of inhomogeneous illumination by the optics or subtraction of the stars, has not yet been performed. Especially the subtraction of stars would have been a good means to avoid any deceiving of the eye by star chains. In another step the scale of the picture was determined and the positions of the two bands appearing within the light bridge were marked, taking care that they did not influence the judgement of the pictures themselves. This procedure was repeated with three different pictures with various scales to improve the accuracy of measurement. Furthermore, the degree of error could be determined.

3. Results

All measurements over an ecliptical length of 70° in the region $140° \leq \lambda \leq 210°$ showed a separation of $6° \pm 1°$ of the bands within the zodiacal light bridge; this could also be established for the field of the gegenschein. Within the accuracy the bands are parallel to each other although one has the impression that they might diverge in the direction of increasing λ. The Southern band coincides with the Ecliptic and is more prominent, probably because it contains more dust. The deviation of the inclination will be studied with another set of exposures.

How far these bands agree with those observed by IRAS at different times and wavelengths remains to be seen, but it is at least possible by earthbound observations to see structures within the zodiacal light and to measure them. In particular, it will also be possible to make long-term observations which will throw more light on the constancy of this phenomenon. Other, still open questions are the inclination of the bands to the ecliptic, their intensity and how far they correlate with the distribution of the asteroids.

Here we only demonstrated that with a quite modest equipment new results can be obtained in this field of astronomy. Surely, the excellent conditions on La Silla contributed to this.

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Fundamental Stellar Quantities of Early-type Stars

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1. Background and Motivation

Absolute dimensions (masses, radii, luminosities) of massive stars are well known only for a few early-type stars, which comprise about 30 OB binaries of spectral types earlier than B5 and less than 10 O-type systems, while no reliable data at all are available for stars with $M > 40\ M_{\odot}$. However, especially for massive stars improvements in the theoretical treatment of the internal structure and stellar evolution have been reported during the last few years. Such new findings include convective core overshooting and continuous stellar wind mass loss with important implications for the stellar structure and temporal evolution of single and double stars.

There is an urgent need for an increase in the amount of high-precision