The principal of “Primary Image Guide” (PIG) at IRSOL /Locarno

Professional solar telescopes are mostly equipped with a guiding system, which can guide the telescope to a set position on the solar disc. Many of these guiding systems work with an image of the sun created by a smaller lens tube whose axis lies parallel to the axis of the main tube and recorded by photo diodes. Each variation of the guided position will be registered and then an impulse will be given to the telescope's driving motors.
But such a guiding system is not exact enough for an exact pointing. A deviation of some 10 arcseconds may occur. In comparison with the imaginary sun's diameter of 2000 arcseconds this may be more than 1%. The main reason of this error is the differential deflection of the tubes during an observation period.
Due to this the idea of a better guiding system came up: At the Gregory-Coude´-telescope of IRSOL we use a laminary position sensor to record an image of the sun, which is not created by an extra smaller tube, but by the main mirror (primary image). From 99% of the light beam which is directed outwards to transport the unused part of the solar image out of the tube a reduced image of the sun (6 mm) is created. The light beam is directed outside through a diaphragm, which is made of copper and is cooled down by water. A glass wedge lying behind the diaphragm will create two new image of the sun: one will be reflected outwards to protect the system from heat; the other is focused on the plane of the photoelectrical position sensor and is used to guide the main tube.
This image is equivalent to a miniaturized image created by the main mirror. “Primary Image Guide” with the abbreviation PIG. is the name of the guiding system Because the system works with an original image of the sun seen by the main telescope , the accuracy of the system is much higher than guiding system, which work with image from an extra lens tube. Additional to guiding errors of the mounting, change of declination and refraction small deviations of the guided position caused by tube deflection or main mirror's incline are regarded by the new system.
While the optical parts of PIG keep unchanged, the computer system was completely changed. The new system is a standalone, multi-client server. Herewith “standalone” means not only that the server can run alone but it runs also on its own hardware. The components of the new guiding system, which we still call “Primary Image Guide”, are described in detail in “*Primary Image Guider (PIG) – Hardware and Software*.”
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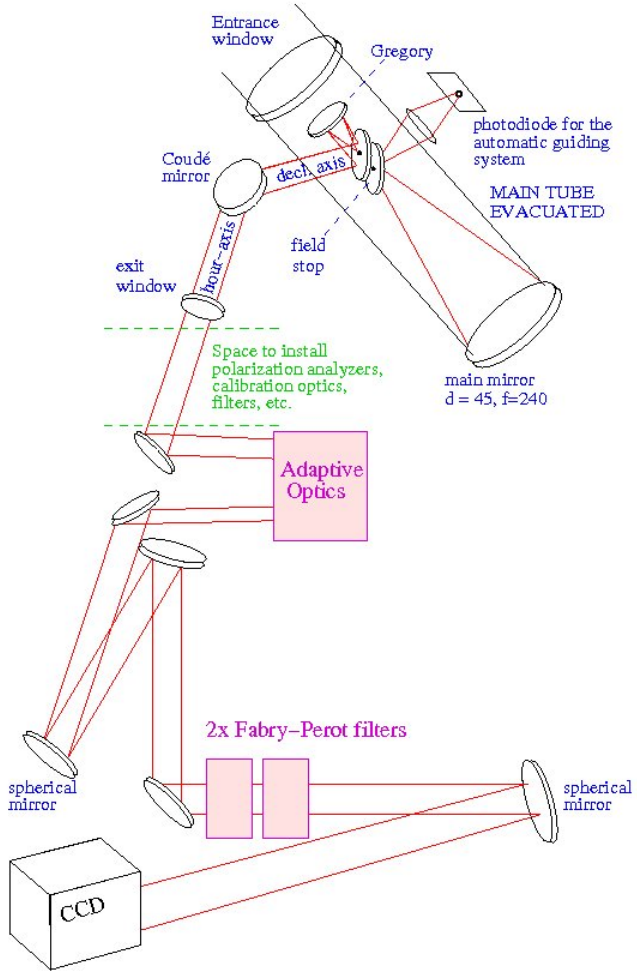

Construction of the Gregory-Coude´-telescope