CONSIDERATIONS IN PHOTOGRAPHIC DETECTION FOR VERY LARGE TELESCOPES

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ABSTRACT

Current practice with four-meter reflectors is reviewed and the good match with fine-grained photographic plates of high DQE is examined. The present designs of 15-meter-class telescopes appear to point to instruments with a large flat focal plane and an image scale in the 5 arc sec/mm range. This requires an emulsion of considerably larger microcrystal size than currently used. Extension of the present emulsion type to the required grain size is not likely to be efficient; however, the use of new emulsion technologies should offer the opportunity to devise appropriate photographic detectors for use with an f/6, 5 arc sec/mm telescope. A gain in detective quantum efficiency appears possible.

It is suggested that the use of modern polyester film base in place of the traditional glass plates be considered for telescopes with very large image fields with areas of 2500 to 5500 sq. cm. Manufacture, shipping, handling, exposing, processing, digitization, and storage could be far more convenient and cost effective for an appropriate film than for a 60 × 60 cm glass plate of suitable thickness.

DISCUSSION

F. Diego: Kodak emulsion 2415, when hypersensitised in forming gas, seems to be very attractive for very high resolution spectroscopy. Is there any project by Kodak to make it available on glass? Or, on the other hand, will plastic based substrates be dimensionally stable enough for spectroscopic work?

A. Millikan: Experimental samples have been made of 2415 on glass at some expense in speed compared to the film-based material. I believe that the Estar^{R}-based film (at 7-mil thickness) will be adequately dimensionally stable for most conventional spectroscopic work.

R. Racine: I would have expected that, since LIRF can now be made negligeable, oversampling the seeing disk would have no effect on the resulting signal-to-noise ratio. Why is this not the case?

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A. Millikan: To form a twenty micron diameter spot with developed A_g° to a density of, say, 1.0 requires that a certain number of silver molecules/unit area be developed. With a gated detector, with detector pixels matched to image size, it will require fewer absorbed photons to give the result than one that is much too small in pixels (highly oversampled). The oversampled system will probably have higher output S/N but will require longer exposure.

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