SOME RESULTS ON A.G.K. 2 - A.G.K. 3

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Thanks to W. Dieckvoss's great obligingness who communicated to us all his results, we could apply the overlap method to the A.G.K. 2 -A.G.K. 3.

Some studies are given in (1) and (2) on the use of overlapping in A.G.K. 2 - A.G.K. 3; here only qualities of the results are studied from the pole to +40° of declination. Moreover some results will be improved by new measures. The details of the method will be published later.

WEIGHT OF THE PLATES

By comparison of the results on different plates, it is possible to assign to each plate a characteristic value ε of the standard error of measures. These values are very different for different plates.

A graph of the values ε is given in Figure 1. The results of A.G.K. 3 are not as good as those of A.G.K. 2.

MEAN RESULTS

For computing means of the positions for each star, we had to take into account the weight of the plates deduced from the values ε. After that, we gave the standard errors about the means which had to be expected. Then we computed the proper motions and their standard errors.

In Figure 2, the statistics of the standard random errors $\varepsilon(\mathrm{ph})$ for the means, and for the proper motions are given.

For studying whether evaluations are available, the photographic positions were compared to those of the reference catalogues. That is valid, for the solutions of the plates are found, for more than 9/10 of the weight, not on the reference stars but on the other stars.

In Figure 3, we give statistics of the differences Δ according to the calculated errors $\varepsilon(\Delta)$. We used:

$$\varepsilon^2(\Delta) = \varepsilon^2(\mathrm{ph}) + \varepsilon_1^2$$

ε_1^2 is the random standard error of the reference catalogues.

It is seen that $\Delta^2 > \varepsilon^2(\Delta)$. That is natural because in addition to the random errors we have a systematic local difference E' between the reference catalogues and the photographic catalogue.

$$\overline{\Delta^2} = \varepsilon^2(\Delta) + E'^2.$$

It is seen that the dispersion of the values of $\varepsilon^2(\Delta)$ is very big.

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But the correlations between Δ^2 and $\varepsilon^2(\Delta)$ show that the values of $\varepsilon^2(\Delta)$, therefore of $\varepsilon^2(\text{ph})$ are statistically wholly valid.

LOCAL SYSTEMATIC ERRORS

Theoretically these errors E' are smoother and smaller with the overlap method; about a decrease by a factor of three in E'^2 in the case of A.G.K. 2 - A.G.K. 3.

We have tried to determine the mean quadratic values E'^2 with the numbers in Figure 3 and with other statistics on 3° x 3° and 5° x 5° areas.

Provisionally, we adopt:

$\alpha \cos\delta$ and δ 1958	$E'^2 = 40\ (0''.01)^2$
$\alpha \cos\delta$ 1930	65
δ 1930	100

The values of E' are about independant at a distance of 2°.5. Except for comparison of results between very near stars, it is necessary to add the contribution of E'^2 to the pure random error ε^2 (ph), to obtain the total random error.

Also it is necessary to take in account E' and its correlations, to study the qualities of the photographic catalogue.

For example, for the study of systematic errors, if we consider an area of 2° x 2°, with about 36 stars, the standard error of the mean is reduced by the number of stars for the random part, but not for the systematic part.

For the secular proper motions the contributions of the local systematic errors to the standard errors are 0".37 in $\alpha \cos\delta$ and 0".43 in δ, while the contributions of the random errors decrease to 0".14 for an area of four square degrees.

PRESENT STATE OF THE WORK (1 May 1970)

1) The present results are on magnetic tape from the pole to +40° of declination, for the dates 1930.0 - 1958.0 and for the exact dates. These results are available at the United States Naval Observatory.

2) The results will be improved and extended to the low declinations.

3) As soon as the newly measured plates will be available, the new results for the zones concerned will be given.

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(1) P. Lacroute. Highlights of Astronomy I. A. U. 1967 p. 319 - 337
(2) P. Lacroute. Tampa Conference, March 1968 (in press).

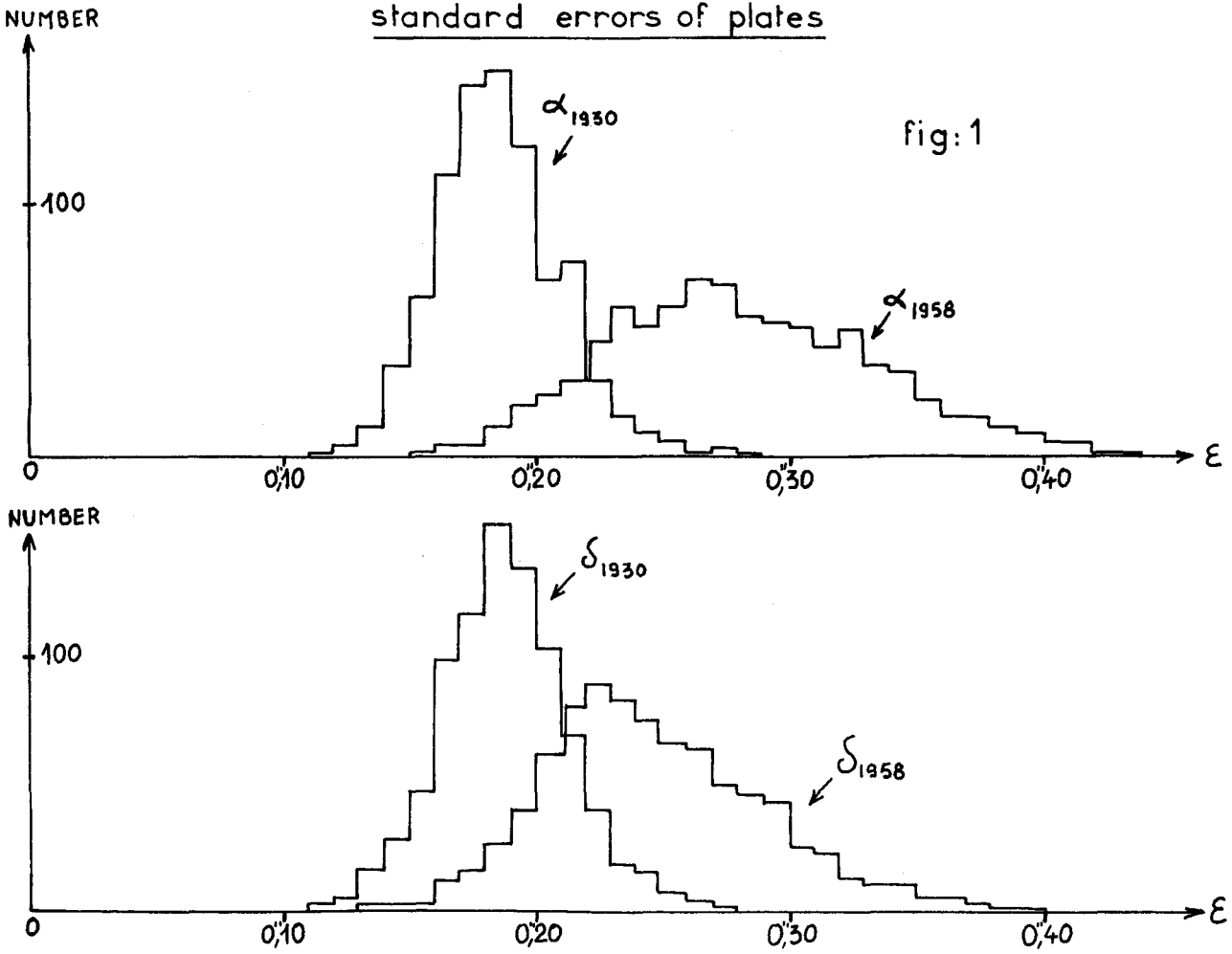
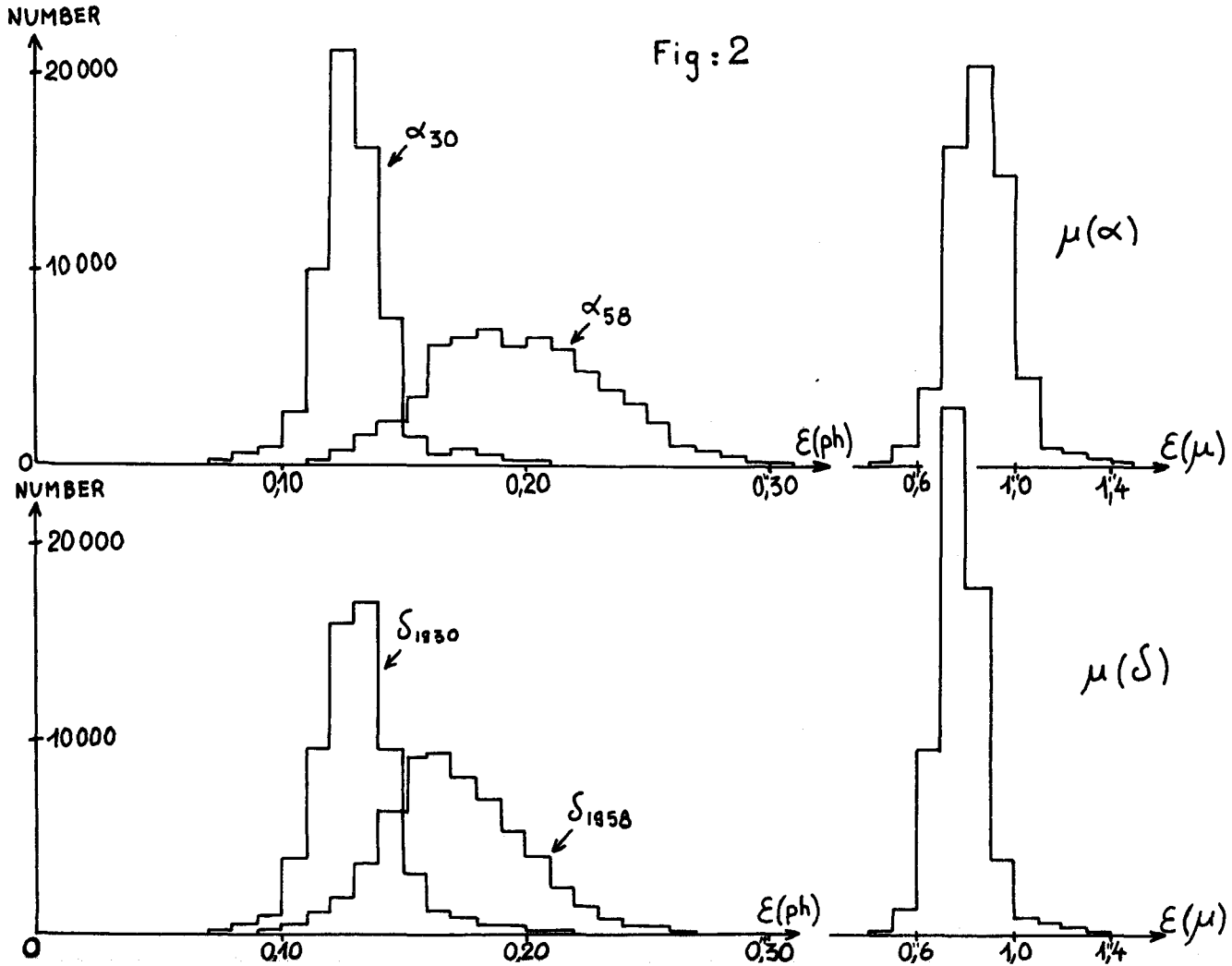


fig: 1



DISCUSSION

Vasilevskis: First, I would like to thank Dr. Lacroute for taking an interest in the Lick program and we certainly hope to cover the polar galactic region for some special reason, and the blue stars will be involved, and then we will cooperate with Dr. Lacroute in seeing what can be done. There is no question that reaching the zone for white dwarfs and for galaxies is the most important thing. So this is the main reason why we are interested in good relationships between the Fundamental Catalogue and ours. I am sorry to say that we do not care very much about what the ecliptic does. Since I have the privilege of having Dr. Lacroute's paper and reading, I would like to argue with him regarding a couple of things. Here, for example, rightfully Dr. Lacroute's paper determines the systematic difference between positions measured in System 1 and System 2 because of different types of images, different qualitities of imaging. We agree. This is the reason why we are reluctant to publish positions. Because they would enter into positions directly. But since we are extremely careful to repeat everything in exactly the same manner, we hope that any error due to systematic shape of the star image will also appear in the second epoch. Therefore, while we will not be able to guarantee positions, we will publish them and make them available, but in the difference I would doubt that things are as dangerous as Dr. Lacroute's points out. There is no question that we realize this. If there is an accidental error in reference frame this enters a systematic error into the proper motions of all the stars on the plate. There is no question about this.

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