

Positional stability of the EEBA floor and of a long shielding block

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Positional Stability of the EEBA Floor and of a Long Shielding Block

High resolution detectors need very stable positioning supports. We were interested in the accuracy which could be obtained using the experimental floor, or alternatively by mounting devices on a shielding block standing on the floor.

We know from survey measurements that the whole floor undergoes considerable movements, but in our measurements we are only interested in the relative motions in a local area. In first order, these can be summarized by the sagitta of three points along a nominally straight line in the vertical and horizontal plane along with a dilation which is not of much interest here.

The measurements were made with the set up shown in Fig. 1. A laser beam was focused by a 25mm lens to form a point source. The position of the lens was then our first point. The second was the position of a long focal length lens 17 feet from the first. This was formed by two 100mm Goerz Artar lenses of f/8 aperture mounted as a 1:1 telescope on a common rigid base. The third was a translucent screen with cross hairs mounted another 17 feet away, viewed by a telescope at some 6 inches. These mountings were only a few inches high to minimize thermal effects. They were placed on the floor, or the blocks with brass shims placed tightly underneath, and lead bricks on top.

The results are given in Fig. 2. The dates refer to 1972. The 34 foot stretch of EEBA floor shown here was out in the middle of the building on line perpendicular to the crane bridge. Similar results were obtained for a line near and parallel to the crane rails. No distortions could be seen due to motions of the crane, though when a 20T block was set down with a thump, motions of ~ 0.010 inches were seen. The displacements shown

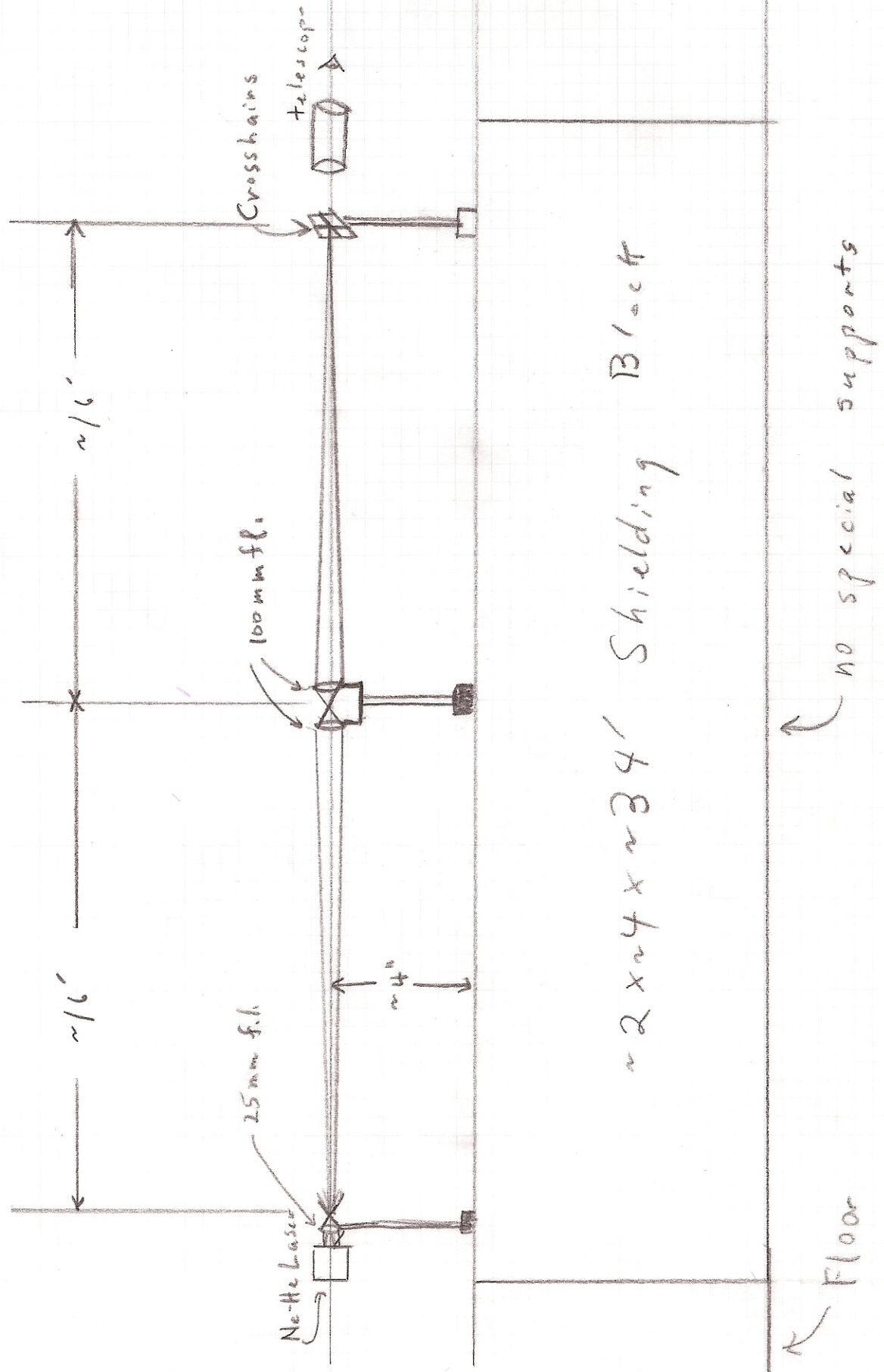
here may be upper limits since we made no independent studies of the stability of the mountings or the effects due to index of refraction fluctuations.

The conclusion is that the EEBA may not be sufficiently stable to support separate high resolution detectors, but a shielding block resting on the floor is stable to a few mils over considerable time spans.

The experiment was terminated when the telescope and its supporting Vee blocks were stolen. I wish to thank the Survey Group and the AGS Shop for the loan (now permanent) of these items. I would also like to thank Gerry Tanguay.

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Fig. 1



~ 2 x 2 x 4 x ~ 24' Shielding Block

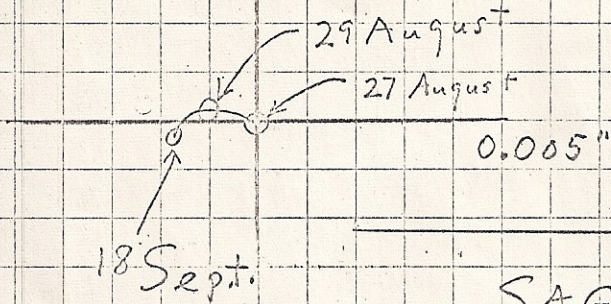
↖ Floor

↖ no special supports

Fig. 2

0.005"

SAGITTA: 34' Block



SAGITTA: EEBA FLOOR, 34'

