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List of 3/1/89

COMMENTS ON THE DOCUMENT TITLED
"Elementary geometric considerations of light baffles in a tube"
DATED July 5, 1988 WRITTEN BY Rainer Weiss

Reviewer: Yekta Gürsel **July 21, 1988**

The reviewer finds this geometric calculation rather informative. However the calculation is not complete since it does not supply an estimate for the residual scattered light which is not stopped by this arrangement of the baffles. It also contains two statements which need clarification. These issues are addressed below:

1) Note that when the author performs the calculation for the specular beam hitting the mid point of the tube, he makes the approximation $d_e = d_t$ which means that the clear aperture of the tube is about the same as the tube diameter. A much better value for the clear aperture is the projected diameter of the baffled tube which the author calls d_b. Putting this value in gives the result $h\,(N+1) = d_t$ instead of $hN = d_t$ which alters his values for low N a bit, but this is not so significant.

2) This arrangement of the baffles will stop all one bounce specular reflections. All the beams drawn in figure 1 except the one that is hitting the mid point of the pipe are Lambert scattered. For those beams the method of computing the relationship between h, N, d_t is only a little bit more complicated but it gives exactly the same result. Hence, all one bounce Lambert scattered beams are also stopped with 100% efficiency. This neglects diffraction effects and the beams that are scattered off the edges of the baffles.

3) The problem with the calculation is that although it is very hard to travel from the mirror to the exit aperture by a few specular reflections, it is almost always possible to complete the trip by just *two* Lambert scatterings! This is the major source of the residual scattered light and no estimate on its magnitude is given. It would be nice to have the magnitude of the residual flux of incoherent light impinging on the mirror. This is not so easy to calculate analytically, but it is quite easy to do it numerically. The result of this calculation may give rise to a significant noise in the interferometer. If this is the case then one might try to treat the inner surface of the pipe in such a way to reduce the Lambert scattering. This is probably much easier than trying to reduce specular reflections from the tube walls at small glancing angles.

The reviewer will try to do some of these calculations and will compare the results with the predictions of Andrej Cadez's paper. One might also try to measure the amount of scattered light in a small pipe with baffles directly by

shining an intense beam from one end at various angles and compare the results with the predictions.

Yehuda Eisel

Pasadena, July 21, 1988