



40m Mode Cleaner curved mirror

The original design of the 40m mode cleaner, driven by unimportant (in retrospect) considerations (available beam pipes, etc), had a half-length of

$$L_{MC} = 12.68 \text{ m}$$

Based on this, I spec'ed the ROC of the MCCM to be

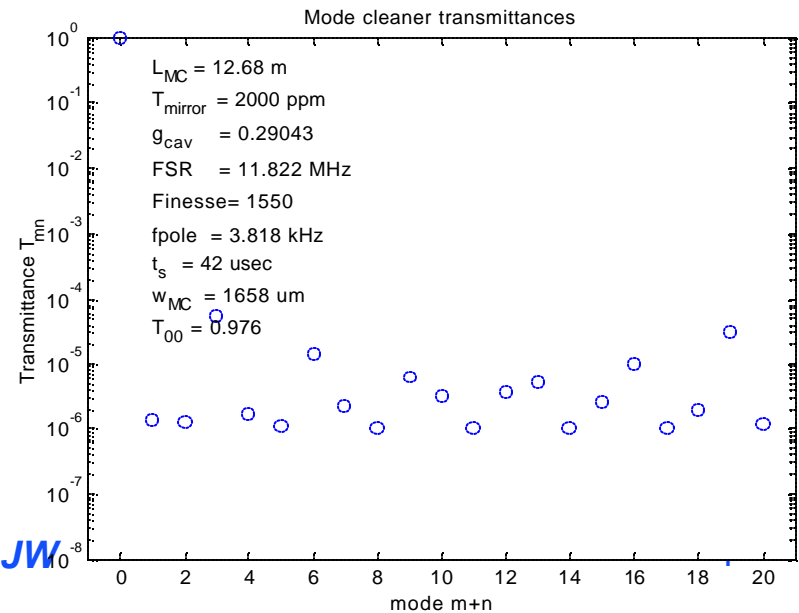
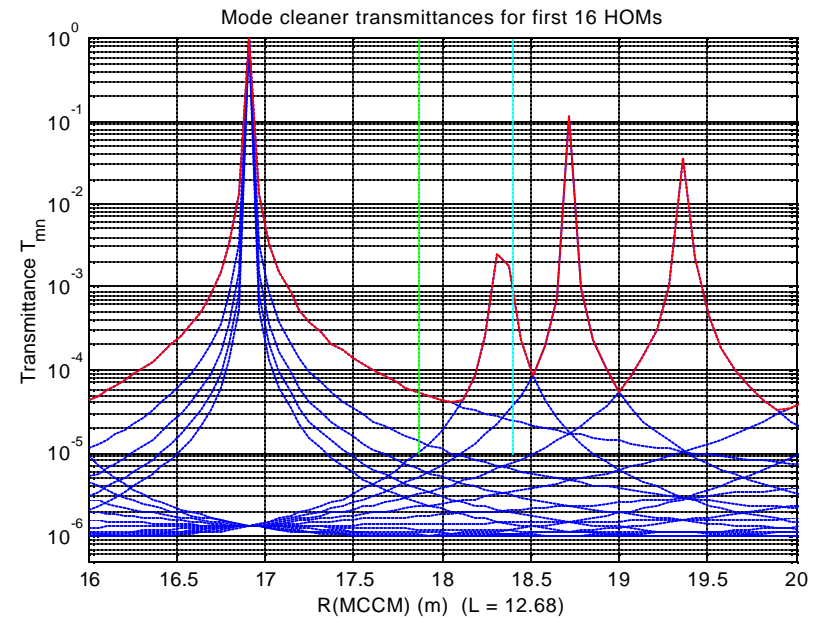
$$17.868 \text{ m (well, } 17.87 +0.25 - 0.35)$$

in order to get the same g-factor

$$g \approx 1 - L_{MC}/ROC(MCCM) = 0.2904$$

as the LIGO 4K mode cleaner,

allowing no more than $5e-5$ of the non-TEM₀₀ power to transmit through the mode cleaner.



3/15/02, AJW



But I made a boo-boo

In October 31, 2001, we switched to $L_{MC} = 13.542$ in order to improve the diagonality of the interferometer length control matrix. I did not update the spec on the ROC of the MCCM (it was too late by then, anyway; but I forgot to check this!)

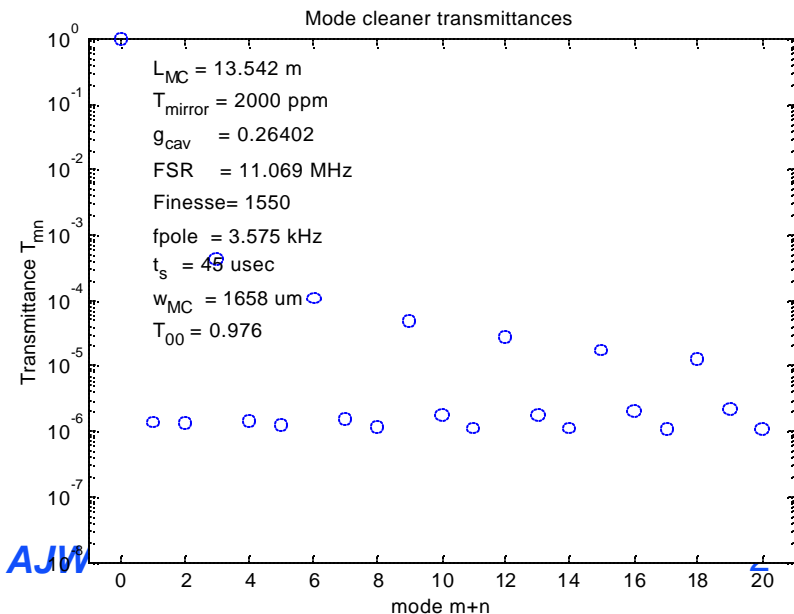
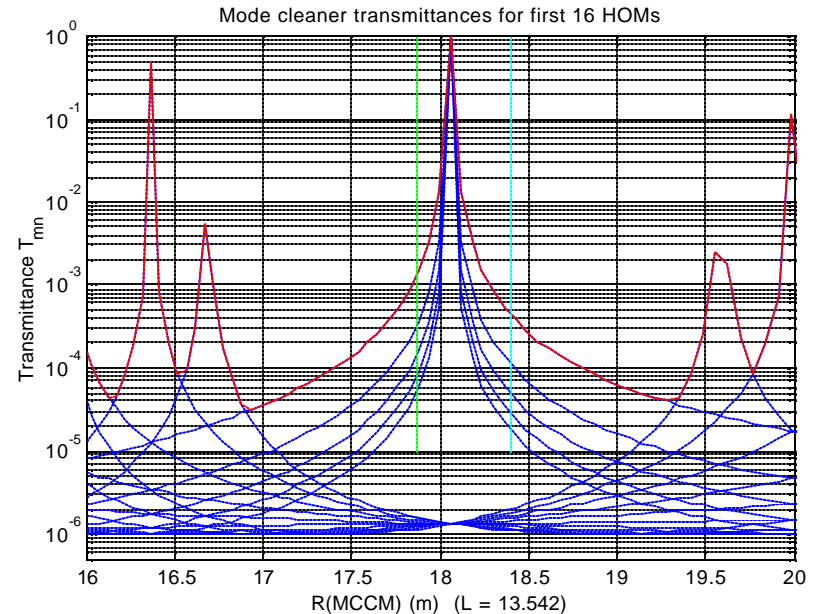
With this new length, if $ROC = 17.87$, $g = 0.246$, the transmission of the non-TEM₀₀ power would be as high as $1.3e-3$.

HOWEVER, the mirror came in with a ROC (measured by Garilynn) of 18.4 (with what error?).

If the ROC is exactly 18.4, $g = 0.264$, the transmission of the non-TEM₀₀ power would be as high as $5e-4$ (for modes with $m+n = 3,6,9\dots$).

As far as I can guess, this is acceptable.

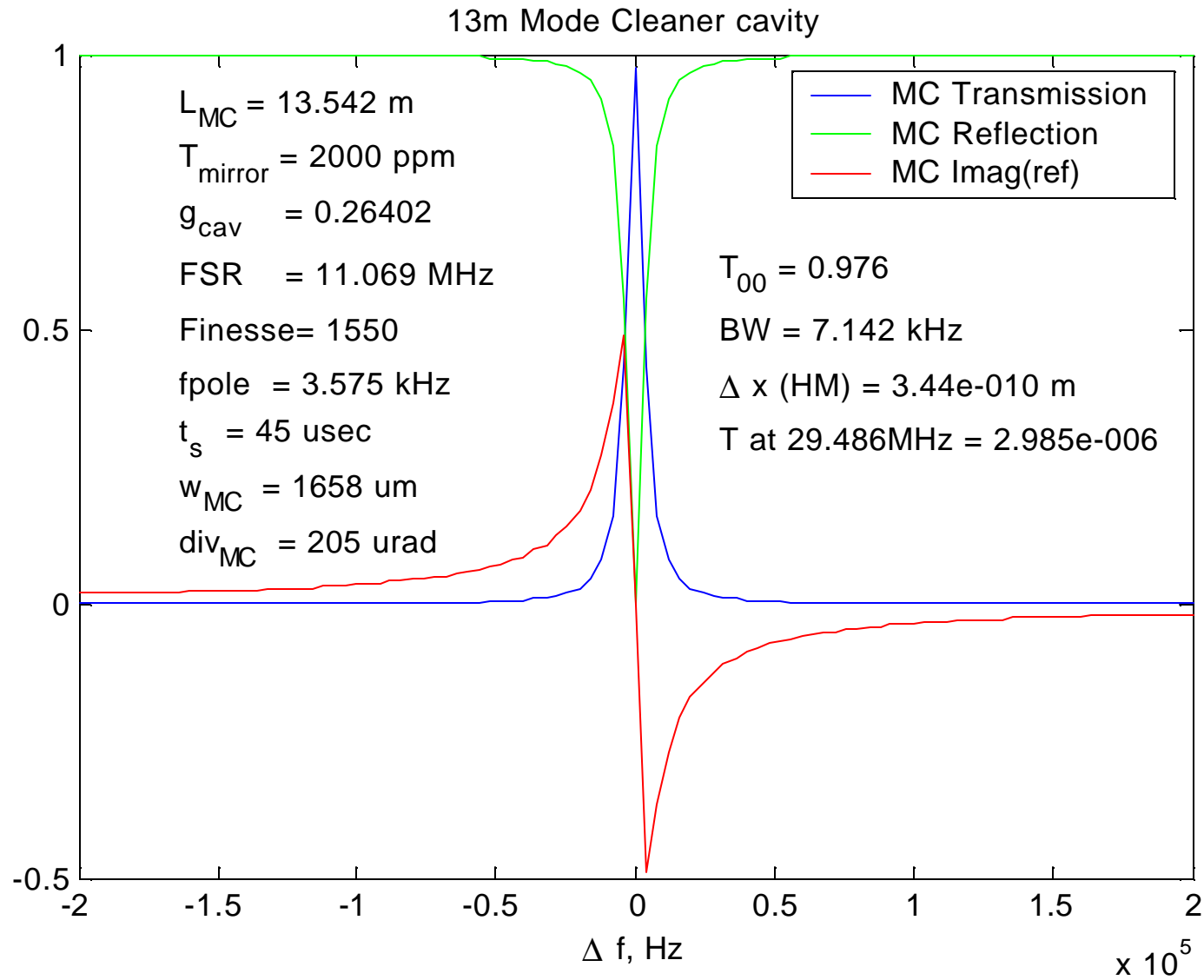
I sure hope that it's NOT 18.1 meters; if so, we're **SCREWED!!**



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Here are some important parameters of our MC



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