



OMC Layout Modification Plan

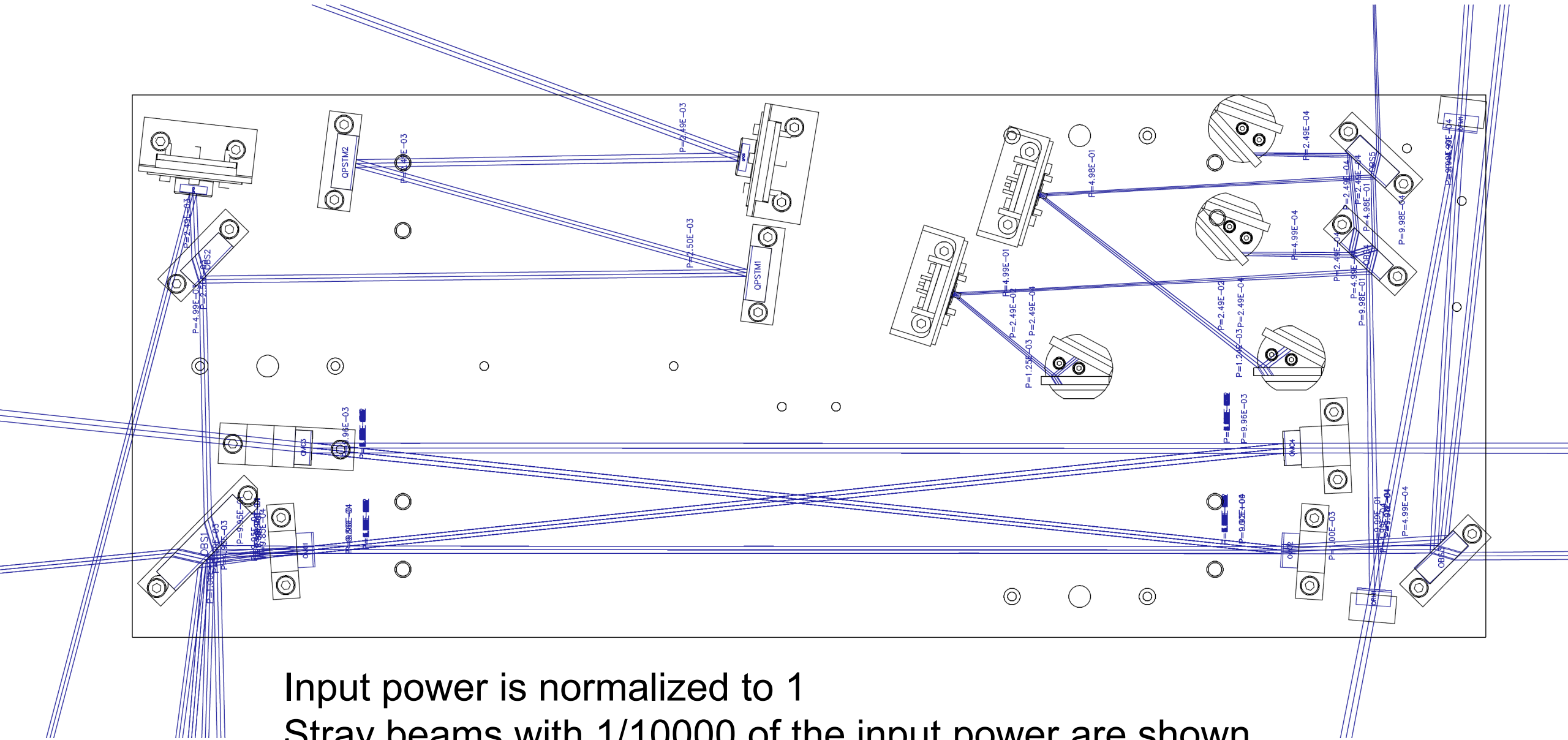
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There are several problems with the current component layout of the OMC

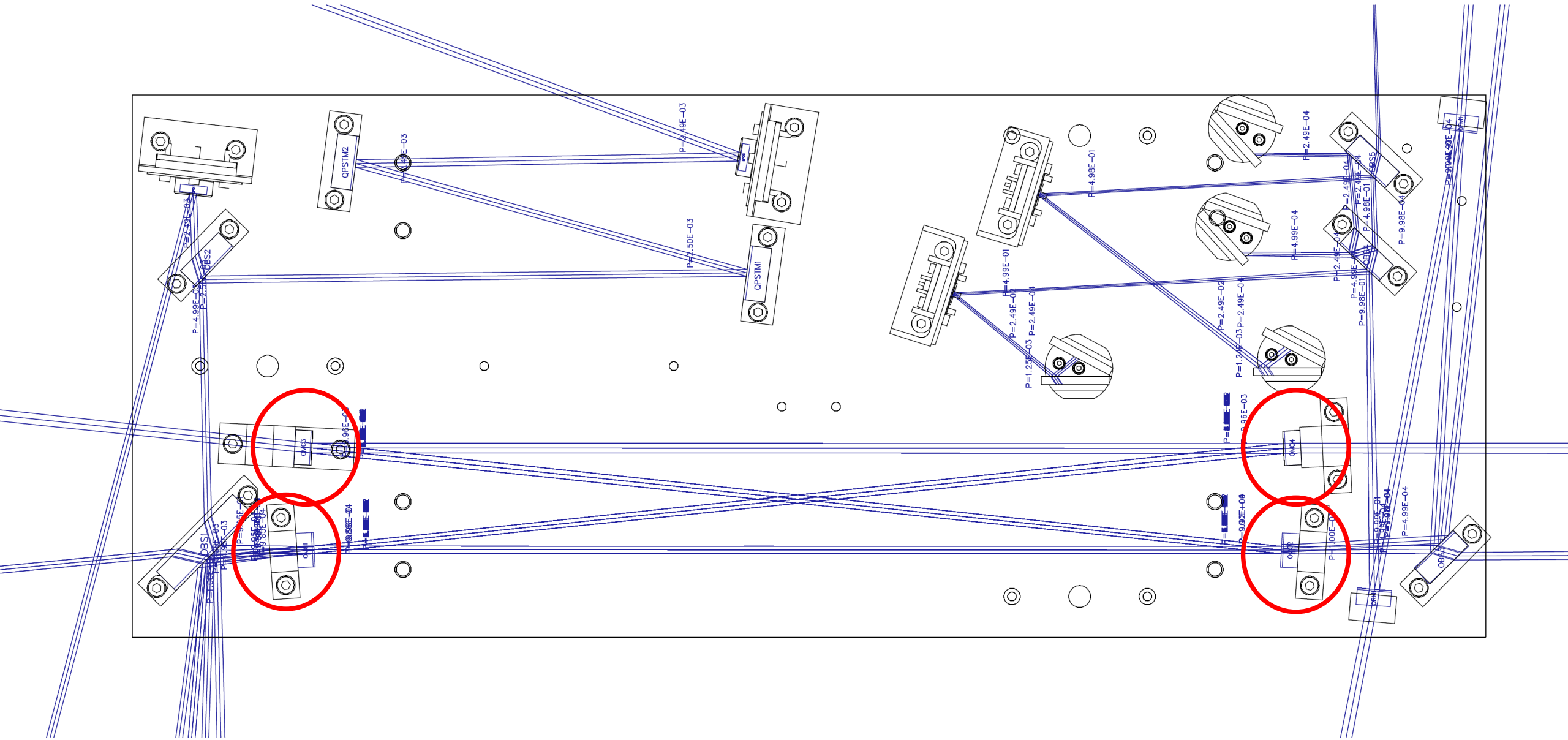
- OMC cavity axis does not go through the center of the mirrors
- The beam spot size on the DC PDs is too large
 - The aperture size is about the same as the 2.7σ diameter of the beam
- Ghost beams need to be dumped.

In order to cope with the above issues, I propose to modify the layout of the OMC as shown in the following pages.

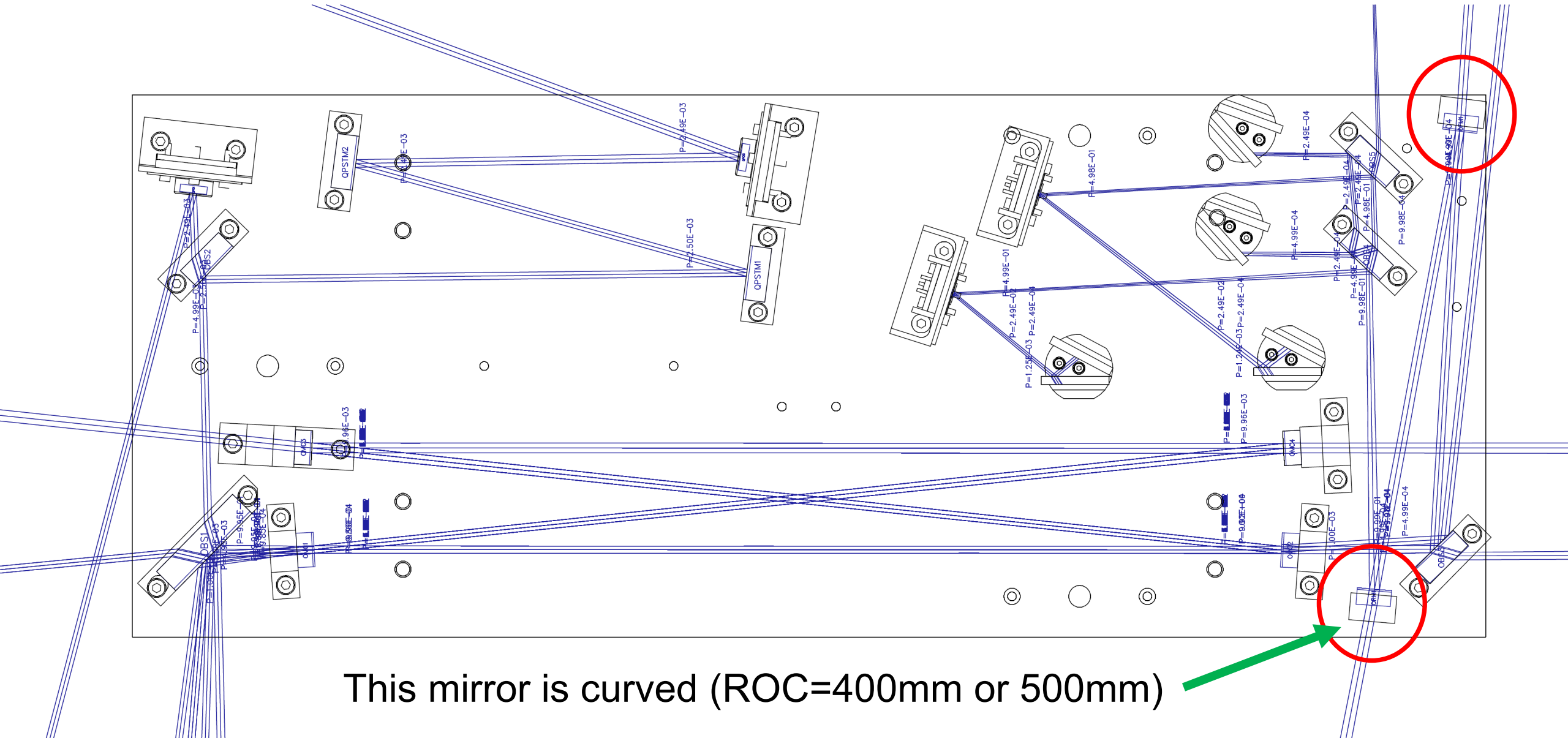
Modified OMC layout with stray beam tracing



Modification point 1: Slightly tweak the OMC mirror orientations



Modification point 2: Add folding mirrors in the output path



Explanation of the modification point 2

Adding a curved mirror will make the beam spot size smaller at the DC PDs.
⇒ 3 sigma diameter will be less than 1mm

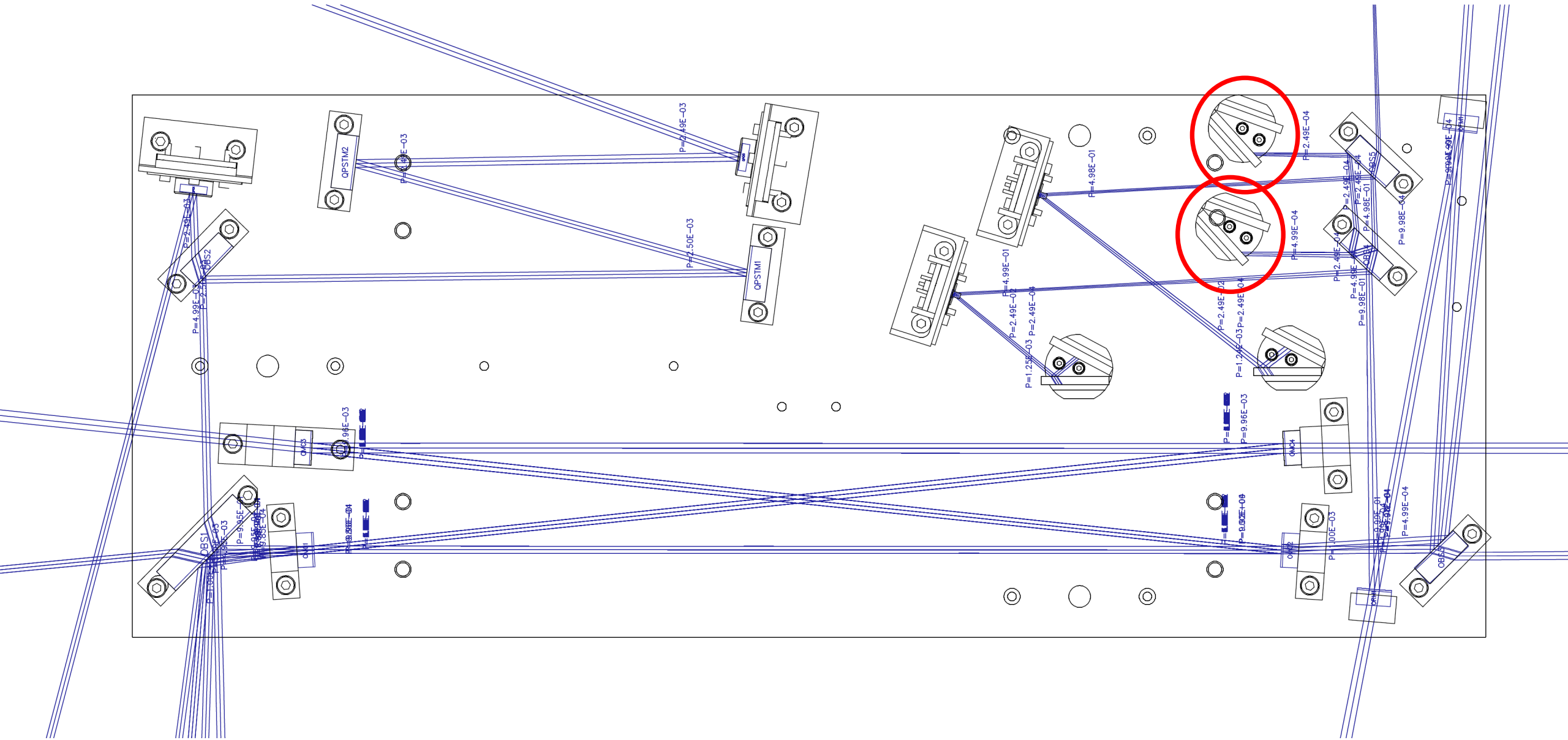
There is a possibility to make OBS3 curved. However, in this case, strong astigmatism is induced, due to the 45deg. AOI. This limits the achievable beam spot size to over 1.8mm (3sigma dia.)

Moreover, buying a curved mirror with 99.95% reflectivity for P-pol 45deg AOI may take some time (asking Layertec now).

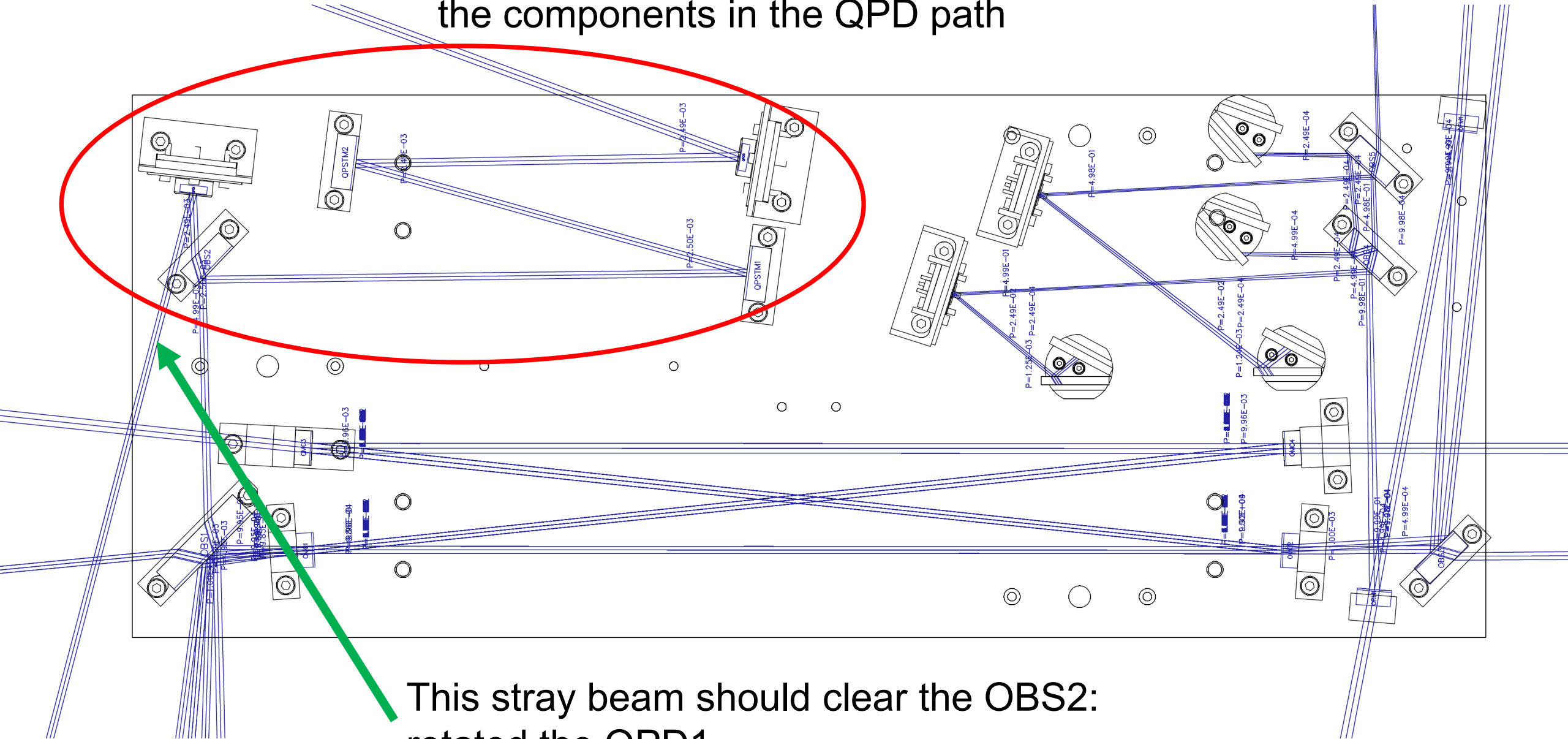
Normal incident high reflectivity mirror with R=500mm is available in stock from Layertec.

The folded layout does not induce strong astigmatism. Therefore, the achievable beam size is smaller.

Modification point 4: Additional beam dumps



Modification point 5: Tweaked the orientation and position of the components in the QPD path



Since we want to modify many things,
it is probably better to make a new breadboard with proper screw holes

In order to damp the 700Hz resonance, I propose to attach lossy material to the breadboard, such as M2052.
Adding screw holes for the damping material is possible if we make a new BB.
We can also add screw holes for the mirror positioning jigs.