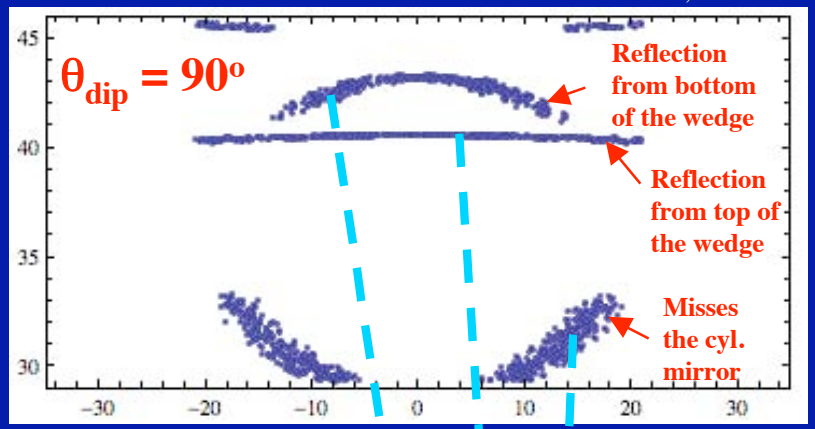
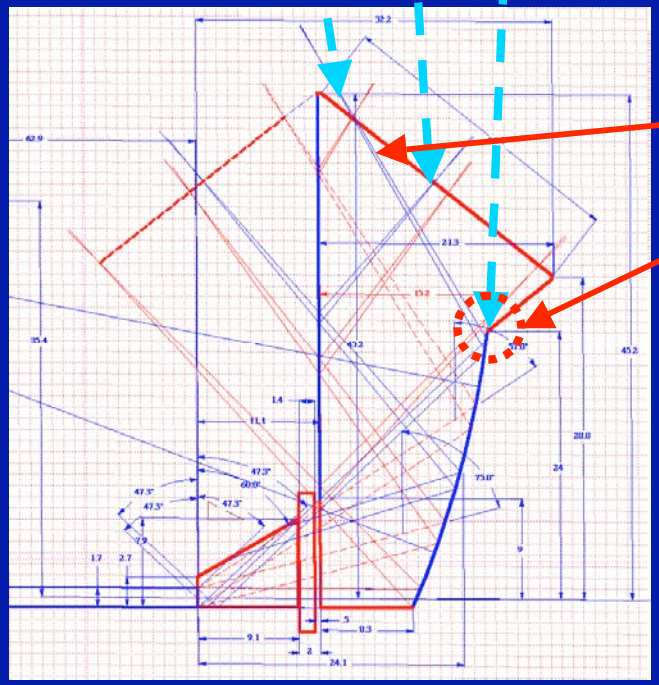
Update on the FDIRC design

J. Va'vra, SLAC

Several problems with the 1-st FBLOCK design

J. Va'vra, Presentes at SLAC SuperB workshop





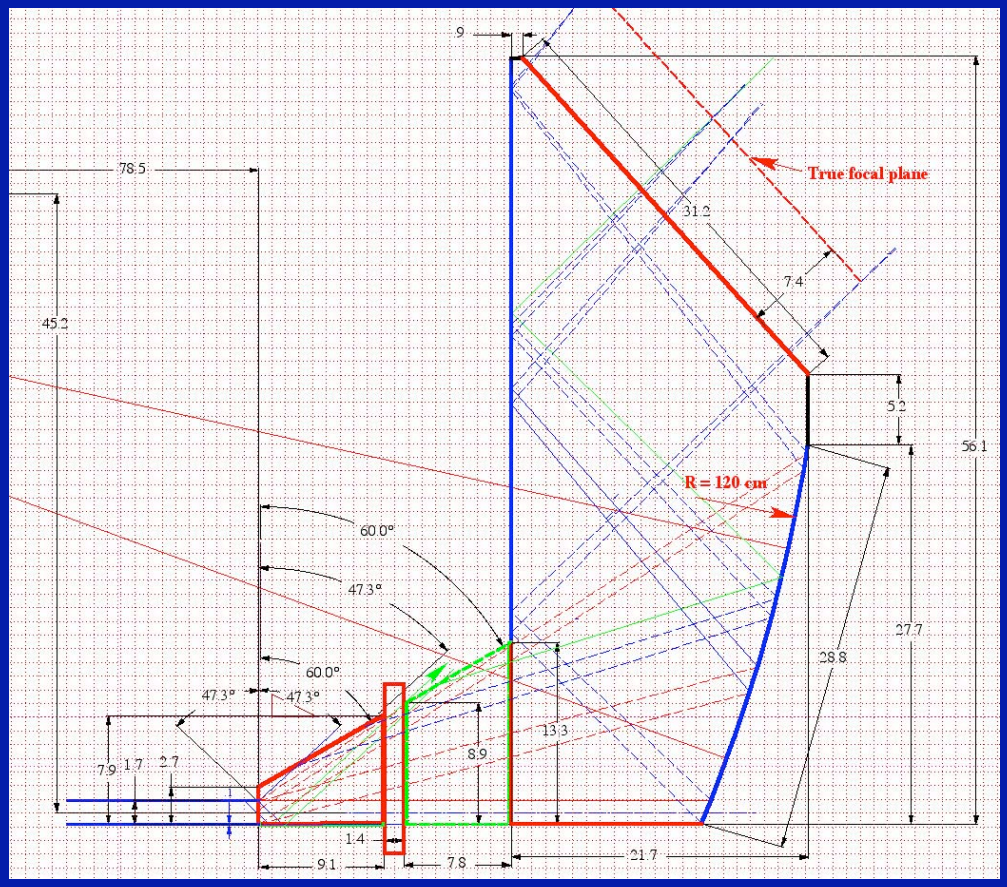
Problems:

- Bar box wedge is too short.
- As a result not all rays are reflected to good region of cylindrical mirror.
- This leads to some unfocused rings and to some rays coming to the detector plane at grazing angles, inviting reflections

=> more tweaking needed…

New FBLOCK design

J. Va'vra, Design version: FDIRC_fblock_design_12a.vc6



Improvements:

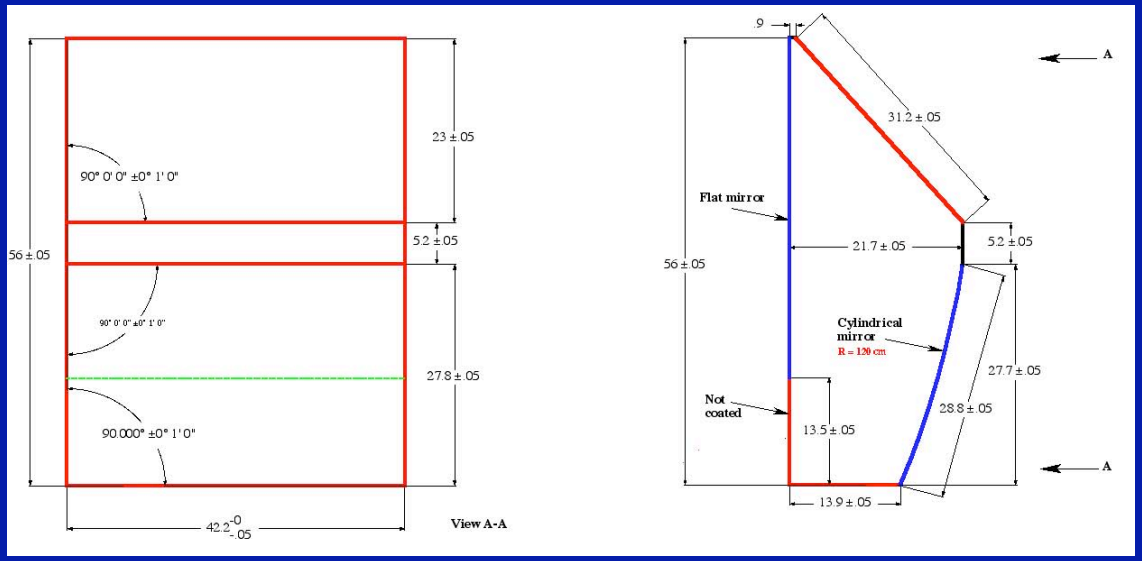
- All rays are focused
- Rays enter the detector plane almost perpendicularly
- Adding a micro-wedge will hopefully help the resolution (being studied in MC)
- Bottom surface of WEDGE and FBLOCK are aligned with the bottom surface of a bar

- **Add an external wedge to rotate all rays.**
- **Increase radius of the cylindrical mirror and rotate it a bit.**
- **Wedge has a micro-wedge glued at the bottom to remove a 6 mrads angle.**
- **The new design will increase a number of detectrs to a total of 576 (48/FBLOCK).**

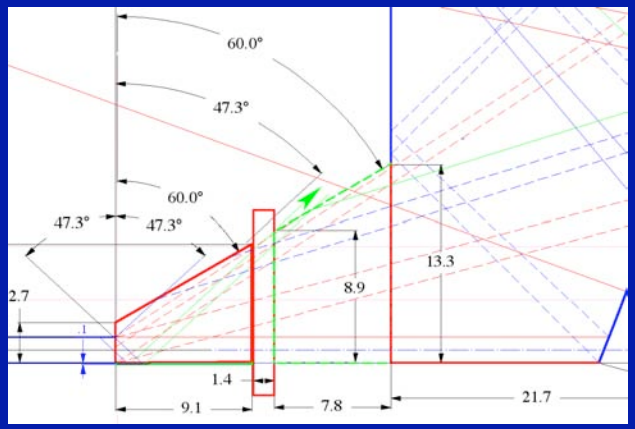
Some details

Design version: FDIRC_fblock_design_12b_1.vc6, FDIRC_wedge_12b_1.vc6, FDIRC_micro-wedge_12.vc6

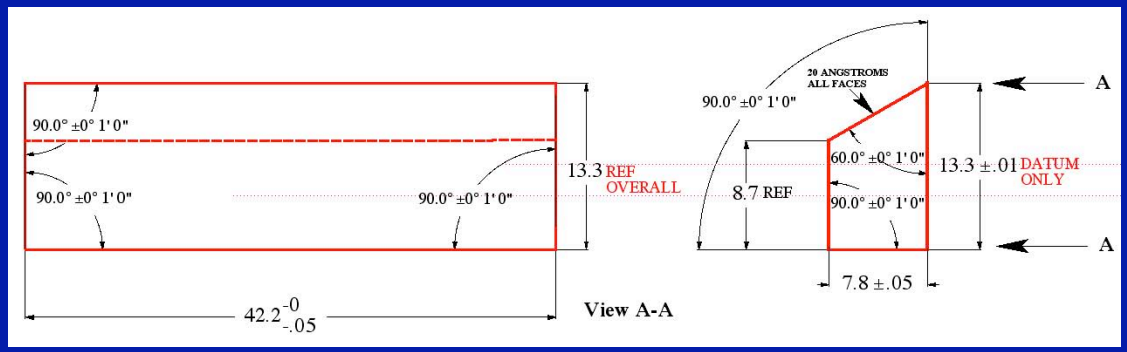
FBLOCK:



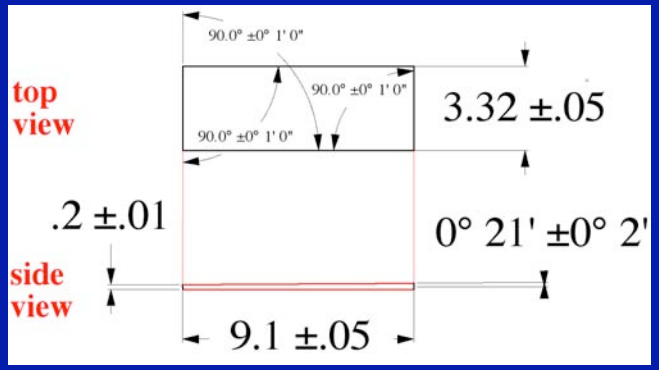
OLD & NEW WEDGES:



WEDGE:



MICRO-WEDGE:



- **Blue: mirrorized surface; red: polished to 20A rms; black: not polished; FBLOCK & WEDGE sides are polished; MICRO-WEDGE has a 6 mrad angle and will be glued to the old wedge.**

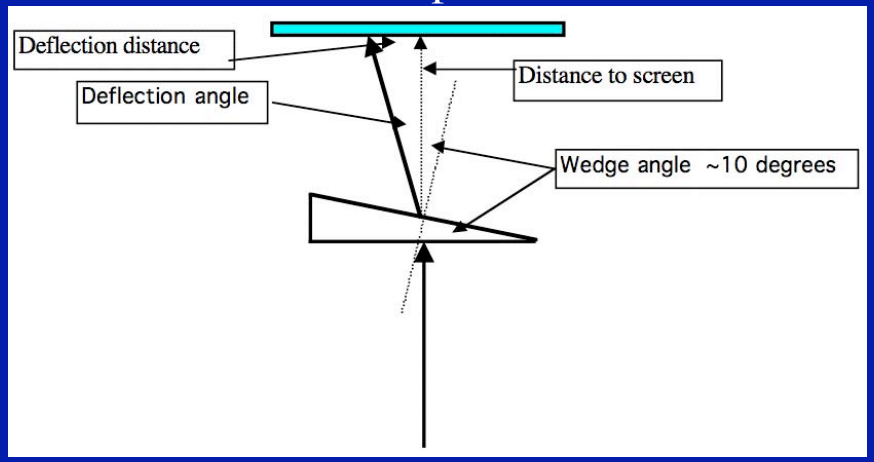
Progress report if one can make it

- **Discussions with Matt McCulloch and Steve Dardin about the bar box rework options: (a) replacing the present wedge is a work comparable to rebuilding the bar box, (b) adding a micro-wedge is easier, but still a lot of work. Option (b) is presently considered; or do nothing if we find the gluing the micro-wedge does not help or if it even hurts.**
- **Iterating with Dynasil/Corning on the material choice. A candidate is Corning Fused silica 7980. It comes as a 60" dia. bull and they can make it in our thickness. They guarantee dn/n $<10^{-6}$ in axial direction only, and do not specify other directions at all. This problem (?) is being investigated at present. Do not know yet the cost either.**
- **Request a quote from 13 optical companies to produce the new FBLOCK, WEDGE and MICRO-WEDGE. 2 companies did not reply at all, 4 rejected the offer, as being unable to make this size.**
- **At the moment, we have 1 offer. It is consistent with our planned budget.**
- **Expect 2 more bids within days.**
- **Four additional companies are still in the loop.**

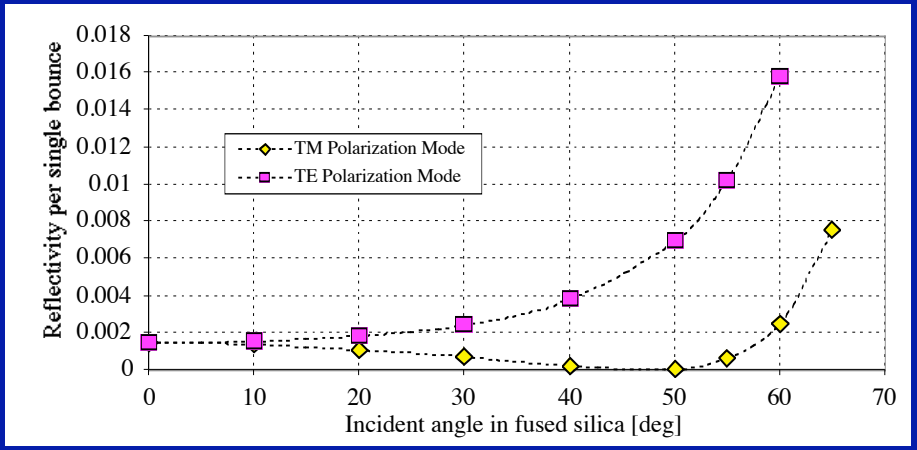
Micro-wedge: Reflection from glue/quartz joint

J.Va'vra, DIRC internal note #140, 2001

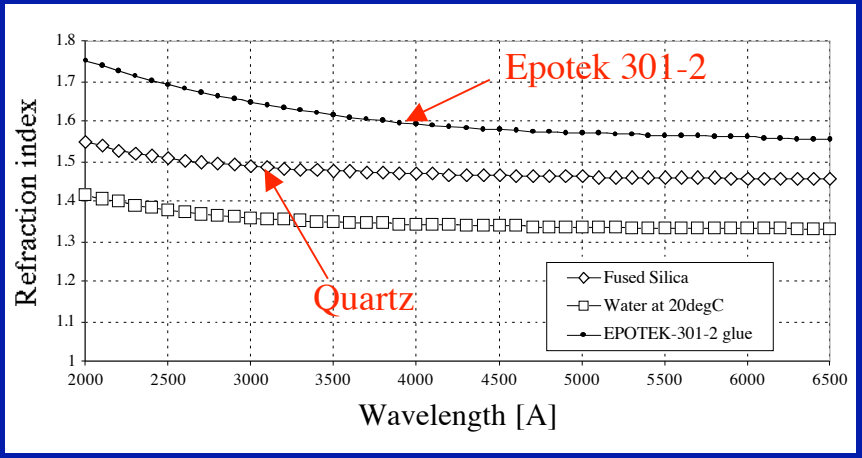
Measurement of the Epotek refraction index:



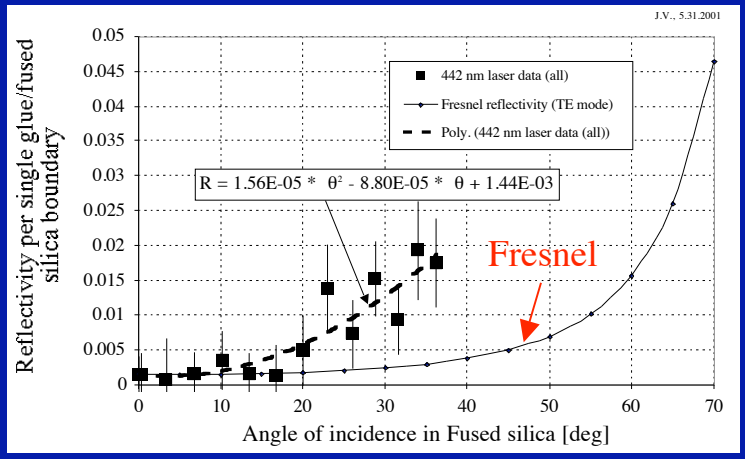
Fresnel reflection for glue/quartz boundary:



Refraction indicies:



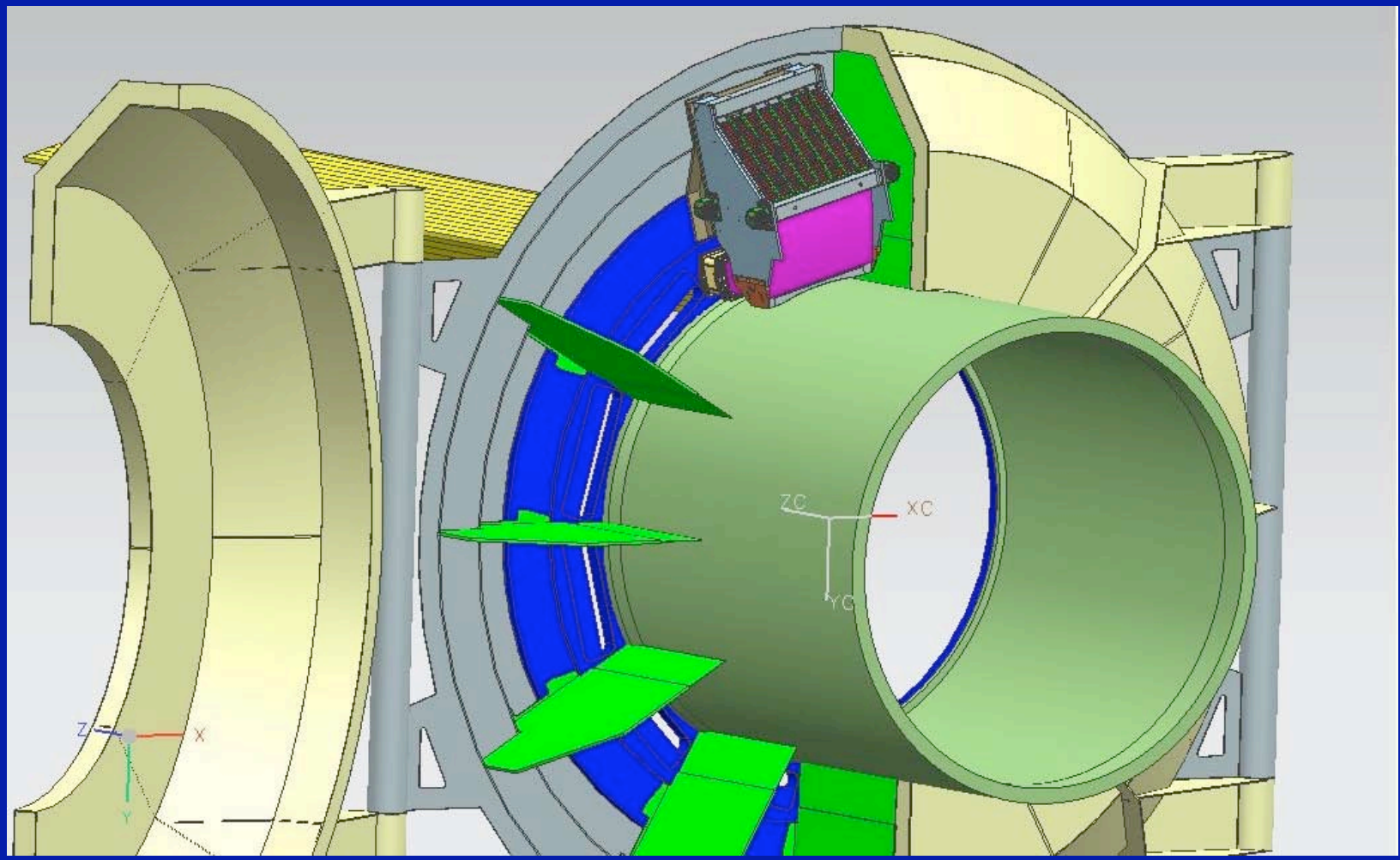
Measured reflectivity for glue/quartz boundary:



The measurement did not agree with the Fresnel estimate. To be very conservative, should we use it instead of the theoretical curve in our MC simulation of the MICRO-WEDGE interface ?

How could FDIRC look like ?

Massimo Bennetoni, Padova



- This drawing just shows a direction we are heading.