"CHAMBER CONCEPTS"

Requirements

1. Φ locking of all lasers which share 4km tubes shall be accomodated.

2. There shall be two classes of vibration isolation for vacuum chambers. Test masses, beam splitter & recycling mirrors are in a high isolation requirement class, conditioning optics (with the exception of 12 m mode cleaner mirrors) are in a class with less isolation requirements. The 12m mode cleaner mirror isolation requirement is similar to that for test masses.

3. Optical tables (within vacuum chambers) which have different vibration isolation requirements shall not be mechanically referenced to each other.

~ 3/6/89
FR notes

"BEAM CONDITIONING OPTICS"

Site 1

A. Corner chamber shall accomodate:

1. Single Broadband Recycling
2. Dual Broadband Recycling
3. Single Resonant Recycling
4. Dual Resonant Recycling

} w/o moving corner or diagonal chambers

B. Diagonal chamber shall accomodate:

A.1.
A.2.
A.3.

} w/o moving corner or diagonal chambers

Site 2.

Both corner & diagonal chambers shall accomodate

A.1.
A.3.

} w/o moving corner or diagonal chambers

The designs shall maximize commonality of design.

The beam conditioning optics shall be accomodated by horizontal axis vacuum chambers.

~3/6/89
FR notes

1. Vertex chamber is only chamber which must accomodate Dual Resonant Recycling.

2. ϕA Diagonal chamber shall accomodate Single Resonant Recycling + Single & Dual Broadband Recycling, if possible. If Single Resonant Recycling does drive size we shall adopt this diagonal chamber throughout ϕB.

3. If Dual Broadband Recycling drives size of item 2 ⇒ we shall design a second type of diagonal splitter chamber for ϕB addition, which is driven by the most demanding requirement of either Single Resonant Recycling or Single Broadband Recycling

4. Only after steps 1→3 should commonality or additional flexibility drive the design of vertex & diagonal chambers

5. Site 2 uses ϕB diagonal chambers

~3/6/89
FR notes

Splitter Chamber Status 3/6/~~88~~ 89 10:00 pm (FR notes)

1. Working from MZ's drawings, WEA, BM, & LJ developed key concepts on how to rationalize connecting nozzles and tubes in a modular design.

2. WEA, BM & LJ identified pressure to keep horizontal axis (HA) chambers as small as possible. The downward pressures arise from unit cell size and cost. MZ identified pressure to up HA chamber size to maximize usable length with adequate headroom. REV proposed a 7' Ø HA chamber as a best guess for optimizing both criteria.

3. It was agreed that at this point LJ could tackle doing drawings with occasional access to MZ. MZ would deliver a final set of drawings on a.m. 3/7/89. The basis for LJ's work would be the rules arrived at in (1) and (2) above, with the purpose of identifying if any problems arise in merging rules & module concepts into a rational whole. This entails dwg's of ØA diagonal & vertex layouts and a ØB layout.

4. It was agreed that work on the conditioning optics between the main mode cleaner (MC) and splitter chambers was completed for the purposes of current design effort.

5. A question was raised on the length of the optical conditioning chain between the main MC and the laser.

Ron's dwg's showed a 24' length which disagreed with a worst case estimate by AA (20 Jan 89) for a 100W system which gave 50'. FJR tracked this down to the assumption by AA that the main interferometer spec's be given by 100W shot noise but that MC performance be limited by current mirror technology (heating). Allowing for order of magnitude mirror performance reduces this worst case to 28'. This is quite close to Ron's estimate considering that Ron did not count some components in AA's estimate (because RD assumed them out of vacuum) & RD had squeezed components very close together (perhaps too close).

6. FJR voiced the question whether current concepts would accomodate suspension pt. (SP) interferometer. It was argued & accepted that because of its less critical spec's the SP interferometer could be made to work provided adequate space for beam was provided in beam tube connecting splitter to testmass chamber.

7. It was agreed that one missing requirement was documentation of the clear aperture useage of proposed 30" tubulation to accomodate main optical beams, SP interferometer beams and pointing beams. RD agreed to provide documentation by 8 a.m. on 3/7/89.

8. RD agreed to give conceptual design of ∅ locking vacuum system by 8 am 3/7/89.

9. WEA, FJR & RD agreed to meet @ 8 am on 3/7/89 to discuss completeness of items (7) and (8) and to meet later with REV to discuss whether splitter chamber work should be turned over to Engineering Team. It is assumed that once engineering accepts task there would be need for further scientific errands as defined by engineers.

10. If (9) is OK work of REV, RD, WEA & FJR would shift to test mass chambers. Upon acceptance of (3) MZ would work with RS & AJ on item III of Conceptual Design Work Plan, already in progress.

PRELIMINARY

3/8/89
RV + RD + FJR + WE?

Review Test mass chamber design concepts

1) Work by AA & PS. has introduced no new aspects for considerations of vib isolation in test mass chambers

2) 4th Phase B test masses as proposed by RD fit into 5' aperture

3.) The possibility of evolutionary additions protects us against all identified risks.

4.) Agree that, if resources permit, it ~~would be~~ is desirable to increase the 5' aperture dimension