CO-PHASING WITH THE CHARA PHASE REFERENCE
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Last updated by Judit Sturmann: April 10, 2019

The phase reference for the CHARA-Array is the visible beam combiner (VIS Beams). In order to co-phase beam combiners "VIS Beams" provides two alignment beams at a time, which can be selected using the "VIS Beams" GUI. The choices are: 1&2, 2&3, 3&4, 4&5, 5&6, and 6&1.
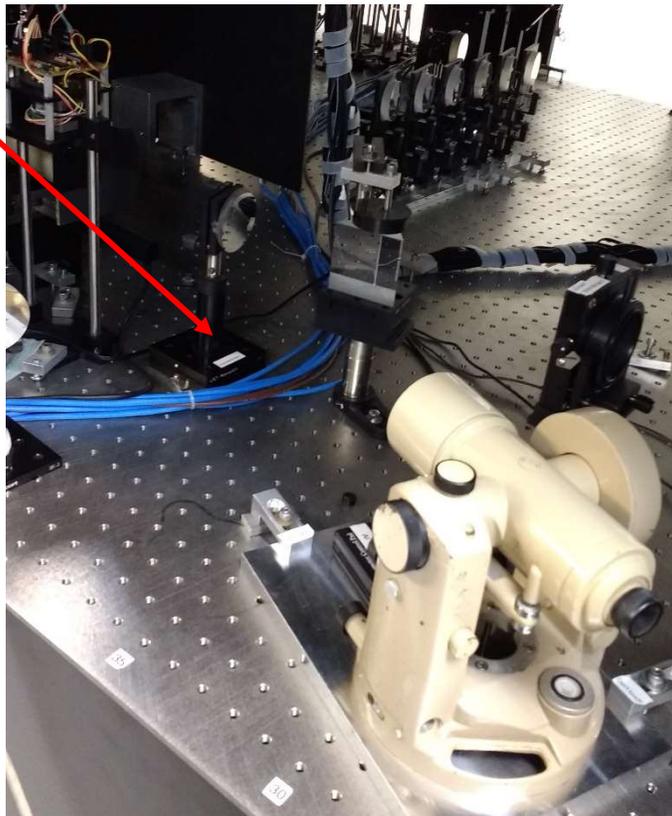
Finding and viewing VIS fringes

The first step in co-phasing is to find VIS fringes by the "VIS Beams" combiner using the internal white light source. Channel fringes can be observed with CHANCAM, after the dedicated fold mirror (oval shaped) is put in place on the VIS table for CHANCAM. The label on the mirror base reads:
"Fold to MedResSpect"

CHANCAM can see the two beams - selected with "VIS-beams" beam sampler stage - reflected back by the BIG-retros.

The BIG-retros currently aligned on the W table, they should be placed on the dedicated kinematic bases for fringe finding. The base at W1 is on a remotely actuated translation stage controlled by a Newport ESP controller called "Retro". This controller is normally off; do not forget to turn it on.

BIG-retros out:
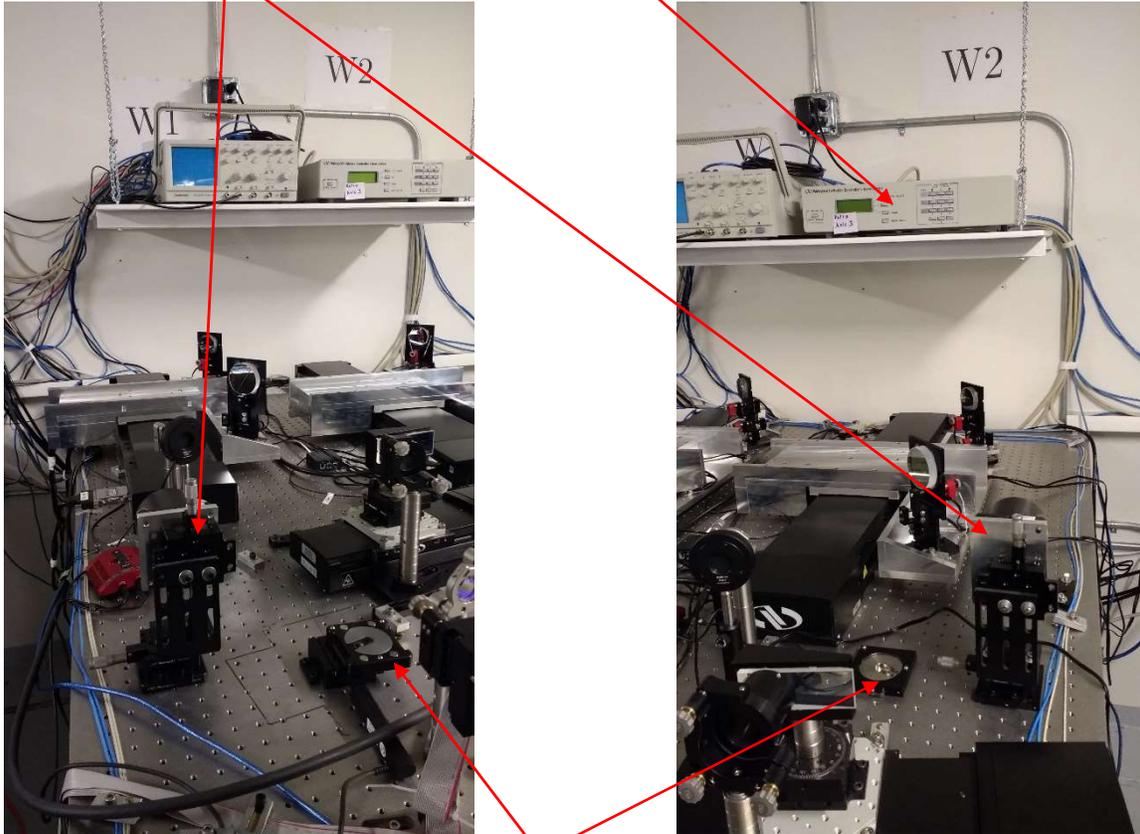
The kinematic bases for the BIG-retros.

The server RETRO to talk to the ESP conroller runs on ctrscrut, the GUI is litsted under ESP controllers.

When looking for internal fringes align W1 on beam N, and W2 on beam N+1, where $1 \leq N \leq 5$.

The X,Y positions of the BIG-retro corner cubes can be precisely controlled by manual micrometers. Make sure that the retros are centered on the incoming beam in order to avoid extra path within the corner cubes. If the cubes are not centered on the beams, you would find the fringes off from the positions listed below. A good check is looking at the incoming and outgoing beams near the edge of a piece of white paper.

In order to view CHANCAM images, the reference camera power has to be on ("REF CCD" on Power GUI), and the "REFCAM server" has to be started. Press CHANCAM in "RefCam" GUI, this will display the image by CHANCAM. Open WL shutter and the shutters of the two beams selected for fringes.

The positions of the remotely controllable translation stage where CHARA VIS fringes were found are listed below.

As of May 23, 2017   Obsolete at the time of the latest update.

VIS-beams	RETRO axis 3: RETE1 positions [mm]	
W1 & W2	Stage on W1	
1&2	6.4462	
2&3	7.9085	
3&4	7.6254	
4&5	7.6343	
5&6	7.6075	

The "VIS Beams" combiner was adjusted today on April 10, 2019 in order to make it more regular, so the fringe position for the 1&2 pair changed relative to the other pairs. Note that there has been also an overall drift in the RETRO positons, which was probaly due to a drift in the alignment laser over the 2-year period. This overall drift had little effect on the fringe positions for each pair relative to one aonther.

As of April 10, 2019

VIS-beams	RETRO axis 3: RETE1 positions [mm]	
W1 & W2	Stage on W1	
1&2	8.336	
2&3	8.395	
3&4	8.160	
4&5	8.092	
5&6	8.101	

Co-phasing with other beam combiners

Do the routine alignment up to the point when the beam sampler dichroics (W1DICHR, W2DICHR) are aligned, and also the IR mirrors for IR combiners. The above listed fringe positions are normally repeatable to better than 1/10th of 1 mm, depending on the

actual alignment. For best result check VIS fringes again as described above. VIS fringes will be easily found around the above listed positions.

Home "RETE1" before start searching. The searching range with "RETE1" is roughly from 0 to 12 mm. In most cases it is easier to search for fringes made by the other combiner by moving the "RETE1" stage, but in the end the other beam combiner should be walked back to the position where "RETE1" is listed for VIS fringes.

Proof read and posted on June 29, 2017 by Gail Schaefer