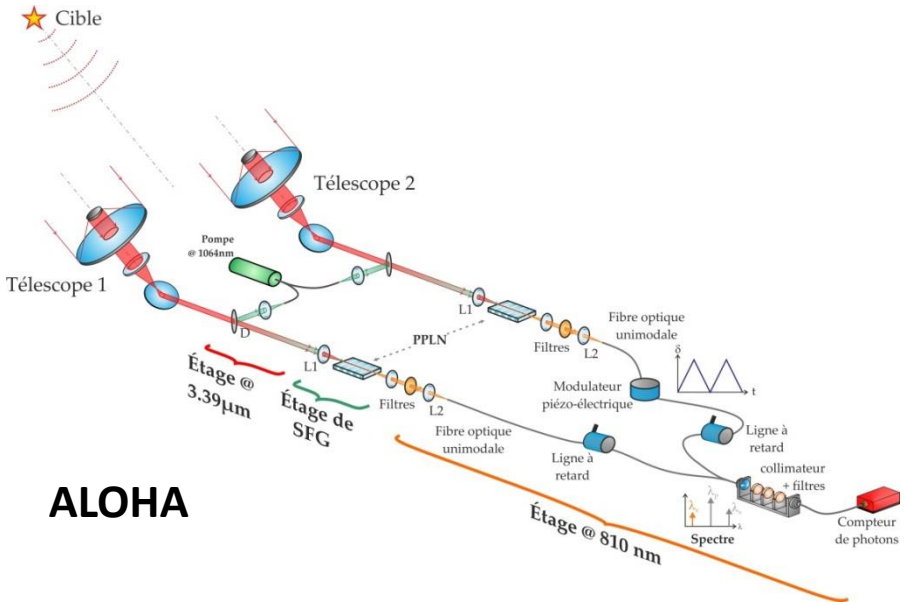
ALOHA@CHARA L band Project

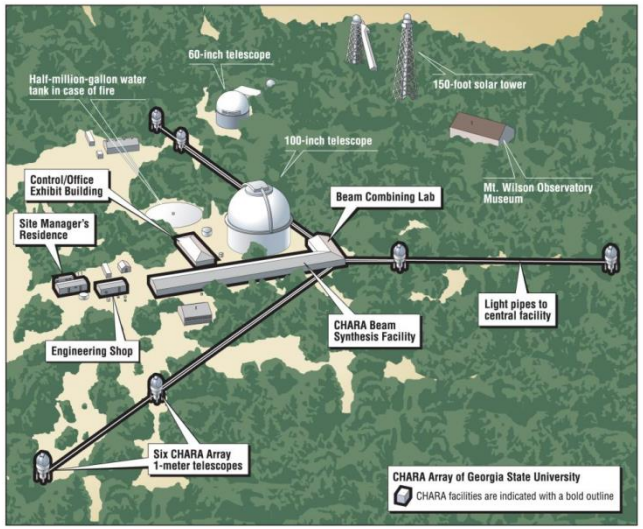
F.REYNAUD

L. LEHMANN, L. GROSSARD, L.DELAGE

Evolution of the project



ALOHA



CHARA

@ 1.55 µm / H band : ALOHA development in lab >>> On the sky test @ CHARA

First fringes ; new functionalities ; launching interface = JOUFLU

@ 3.39 µm / L band : ALOHA development in lab >>> On the sky test @ CHARA

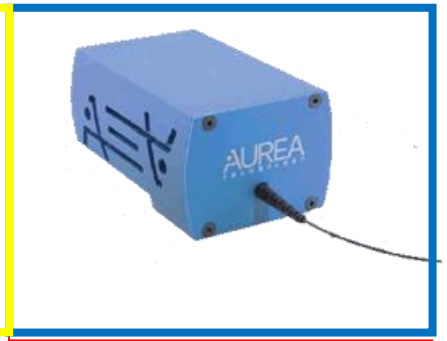
The spectral windows selection

pump laser (µm)			1,064		1,3		1,5		2	
Astro band (µm)										
H	1,50	1,80	0,62	0,67	0,70	0,75	0,75	0,82	0,86	0,95
K	2,00	2,50	0,69	0,75	0,79	0,86	0,86	0,94	1,00	1,11
L	3,20	3,90	0,80	0,84	0,92	0,98	1,02	1,08	1,23	1,32
M	4,50	5,00	0,86	0,88	1,01	1,03	1,13	1,15	1,38	1,43
N	8,00	13,00	0,94	0,98	1,12	1,18	1,26	1,34	1,60	1,73
Q	17,00	25,00	1,00	1,02	1,21	1,24	1,38	1,42	1,79	1,85

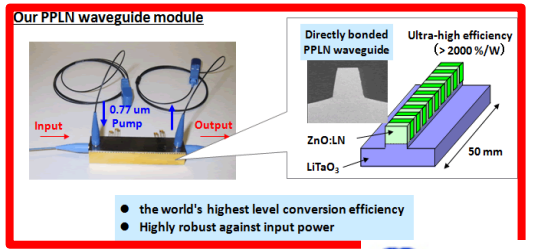
Ambient temperature photon counting detectors

PPLN	0.5-4.5 µm
OP GaAs	1-18 µm

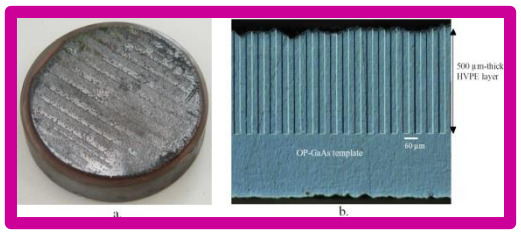
Si APD



In GaAs APD



UNIVERSITÄT PADERBORN femto ENGINEERING NTT



THALES RESEARCH & TECHNOLOGY

ALOHA strategy

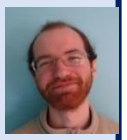
Inlab tests

On sky test

ALOHA @1.5 µm
1.5µm + 1.06 µm > 630 nm

*Noise investigation

***Multi channel spectral mode**



*Sensitivity 2014
*Fringes 2015

Spectral mode
Photometry

ALOHA @3.4 µm
3.4µm + 1.06 µm > 810 nm

*Noise investigation

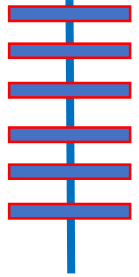
***Acquisition with a blackbody source**

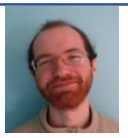
*New crystals

*Sensitivity
*Fringes….

ALOHA @ 10 µm
10µm + 1.5 µm > 1.3 µm

*Starting activity

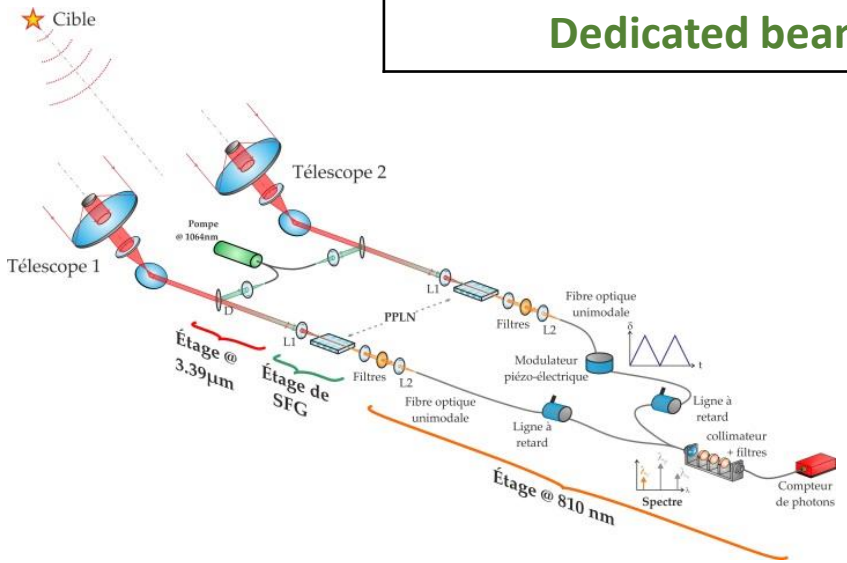




= Lucien LEHMANN
Next talk

Context for ALOHA/CHARA @ 3.4 µm

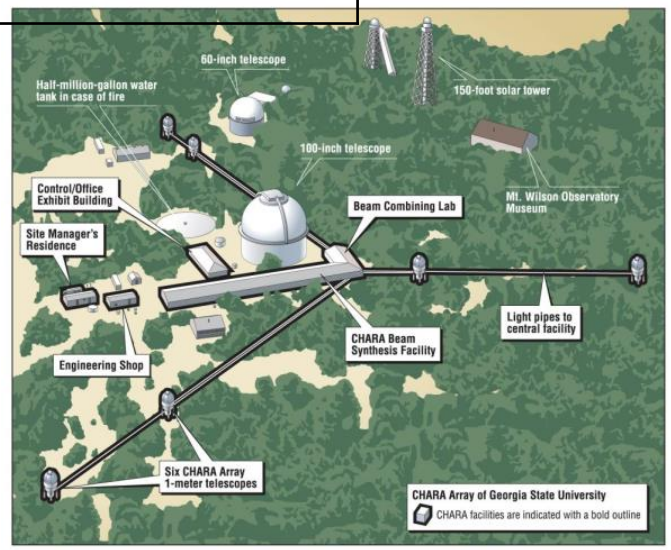
ALOHA	CHARA
On the sky demonstration?	Telescopes and beams stabilization
Conversion MIR >>810 nm	Windows not compatible with L band
Fibre Propagation from Telescope to lab	Large number of mirror in the optic. train
Currently no delay line	CHARA Delay lines
Dedicated beam combiner	



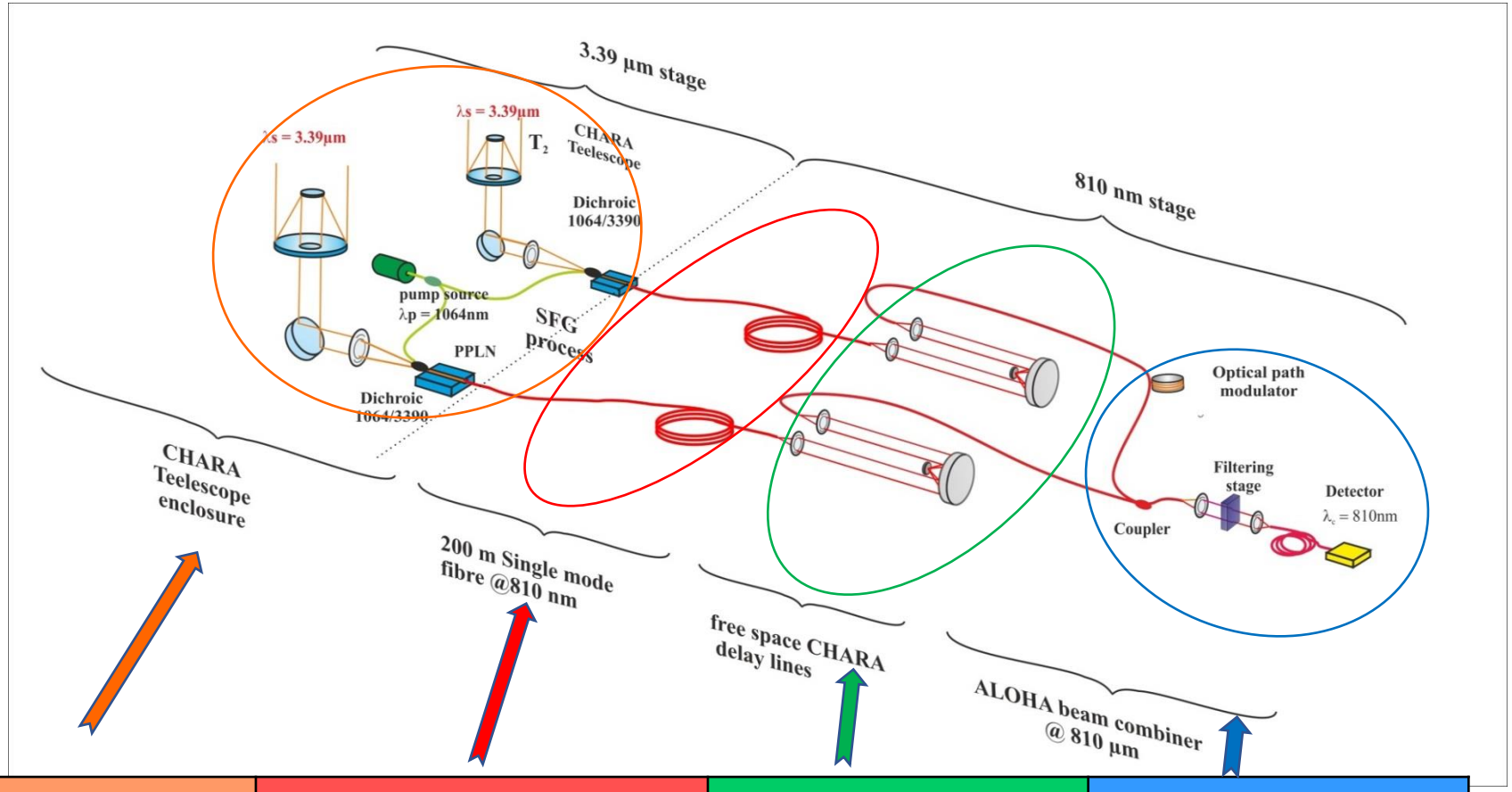
ALOHA + CHARA

= ALOHA / CHARA @ 3.4 µm ……

The only L band instrument of the northern hemisphere….?!



General scheme



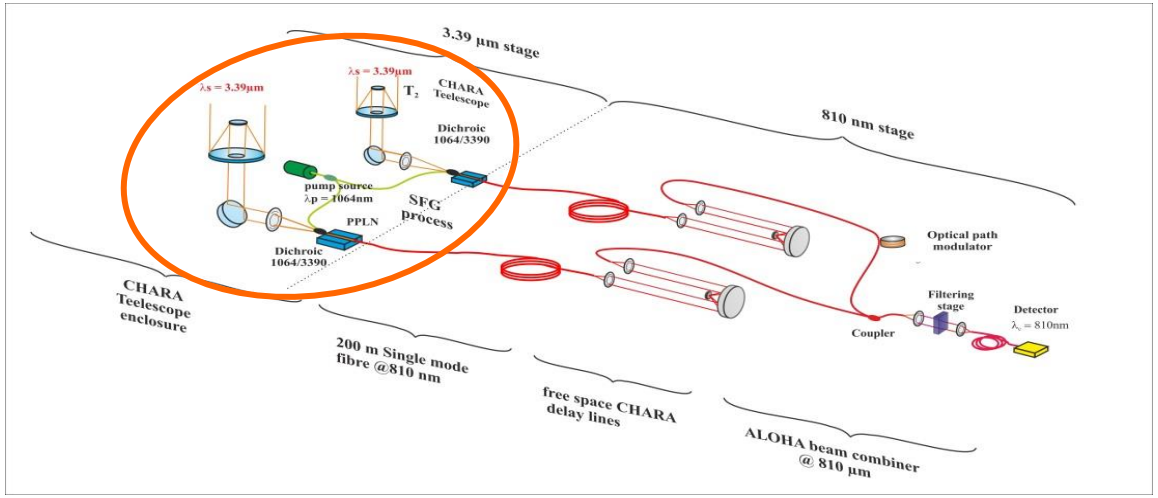
Telescope	Propagation	Delay Lines	Beam combiner
Dichroic Injection Raster scan	250 m PM 810nm fibers OPD stabilization	CHARA DL Interfaces	Specific

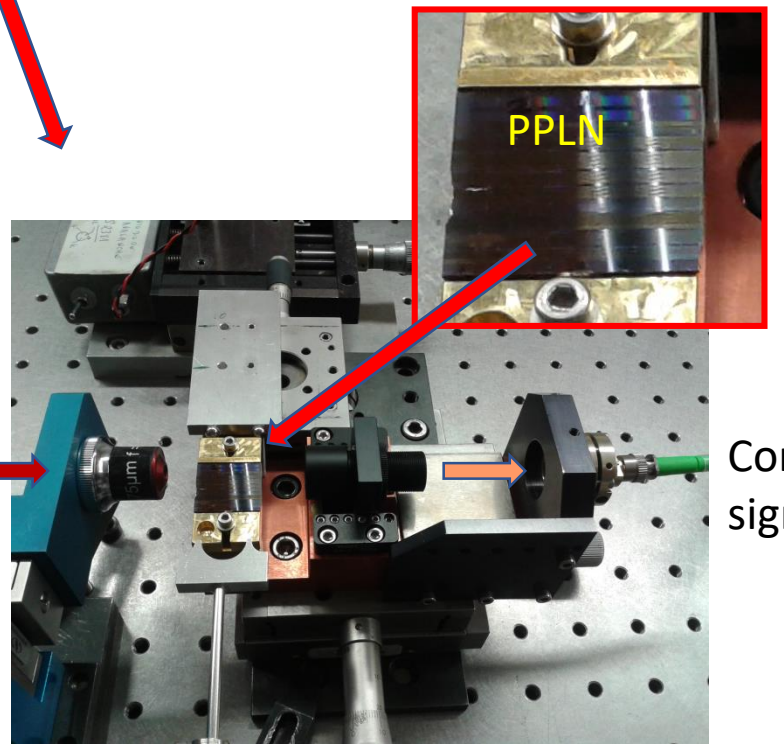
Telescope stage

Status :

*Tip tilt + AO + raster >> existing on CHARA

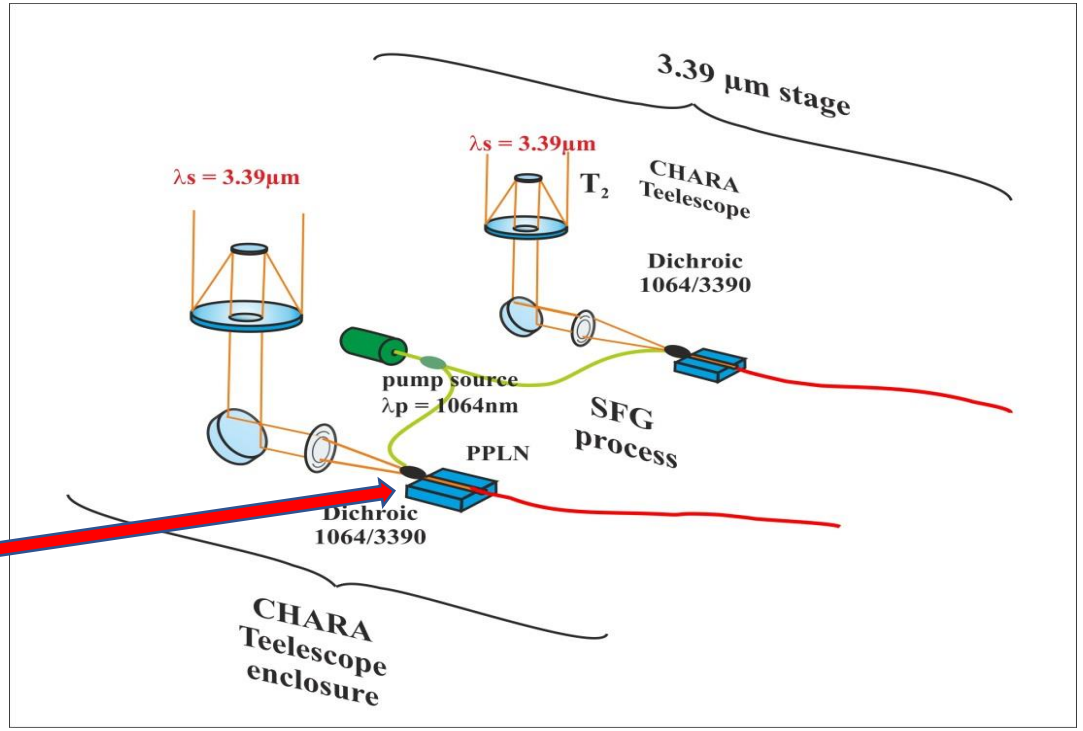
* Injection / conversion stage under development @XLIM





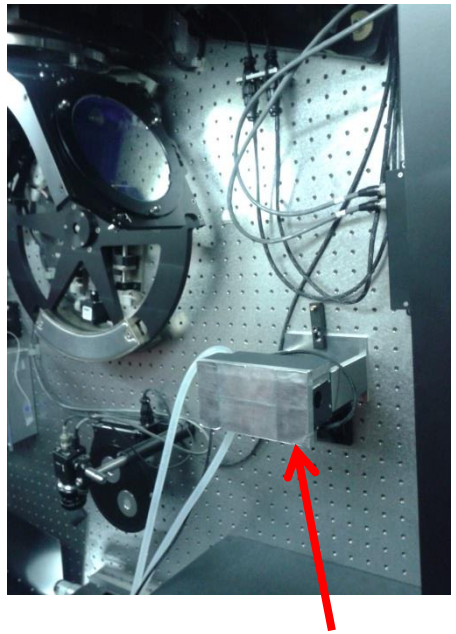
MIR signal
3.4 µm

Converted signal 810 nm

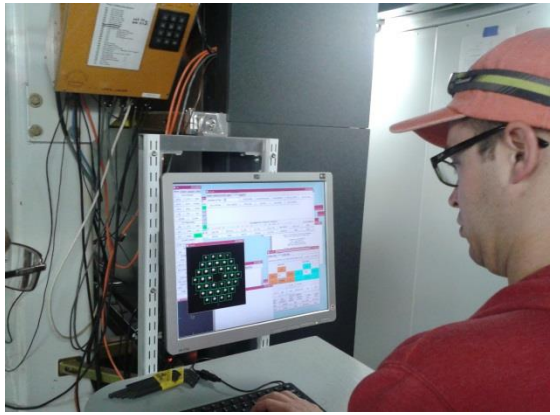


Telescope stage

Status :
* Thermal tests on the AO (done 2017)



Conversion module

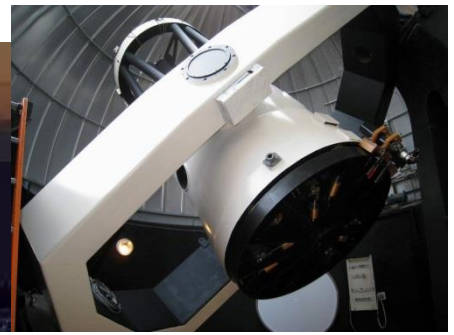


Monitoring of the induced turbulence by the AO sensor

Open questions : *To be investigated with Laszlo, Matt and Theo*
*S1 S2 or E1 E2 for the first tests?
*Dichroic plate in the convergent beam of the AO or on the carousel?
* Reference source existing source but vis + NIR MIR ?

Intermediate steps
* Injection test @ 1.5µm or/and 810 nm? >> sensitivity tests next mission at CHARA?

* Sensitivity tests for the conversion module at C2PU May –June 2018

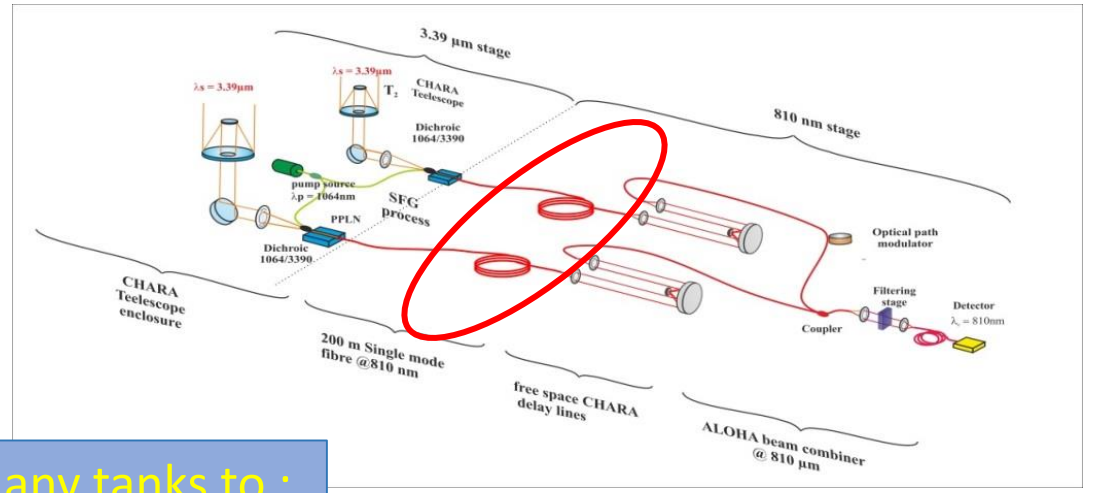


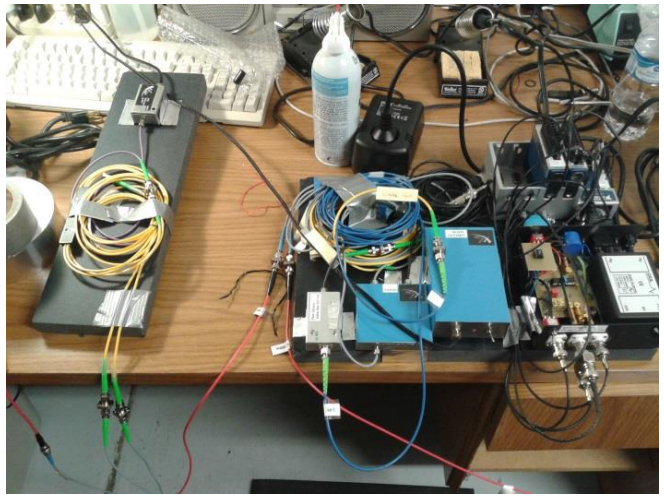
1m class telescope

Fiber link

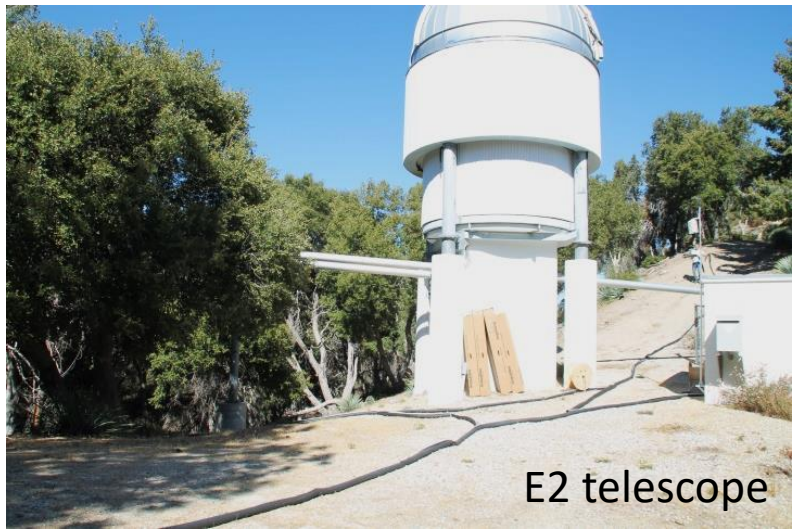
Status :

* First test and stabilization with the OHANA fibers @ 1.55 µm (See Lucien LEHMANN next presentation)





Many tanks to :
* Larry Webster
* Steve Golden
* Craig Woods



Fiber link

Open questions : *To be investigated with Larry and Theo*

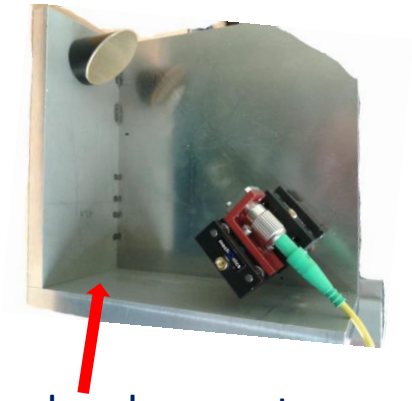
* S1 S2 vs E1 E2
* Find the convenient route
* Use the duct to lay the 810 nm (To be implemented) and 1.5 µm (OHANA) fibers ?

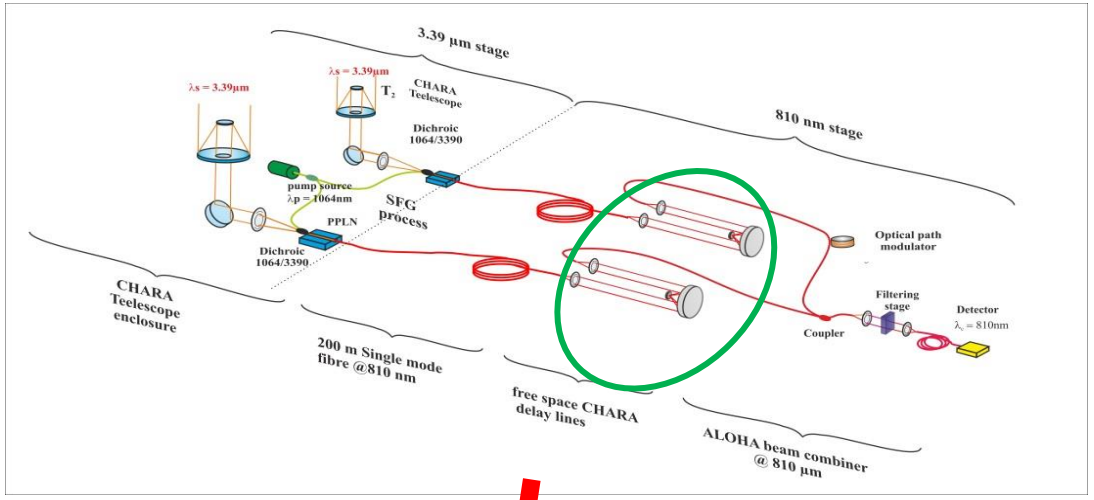
Intermediate steps :

* Packaging of the 250 m long fibers (XLIM lab and outside the lab…)
* Dispersion balance between the fiber arms (XLIM lab)
* Implementation of the fiber routes. (CHARA)

Rq : Experimental skills to be used for the pump sharing between the telescopes.

Delay lines





Status :

*use of the CHARA delay lines

*Collimation and injection prototype under development

* Beam diameter 1-2 ” (Lf >> 100m !!!)

To be achieved :

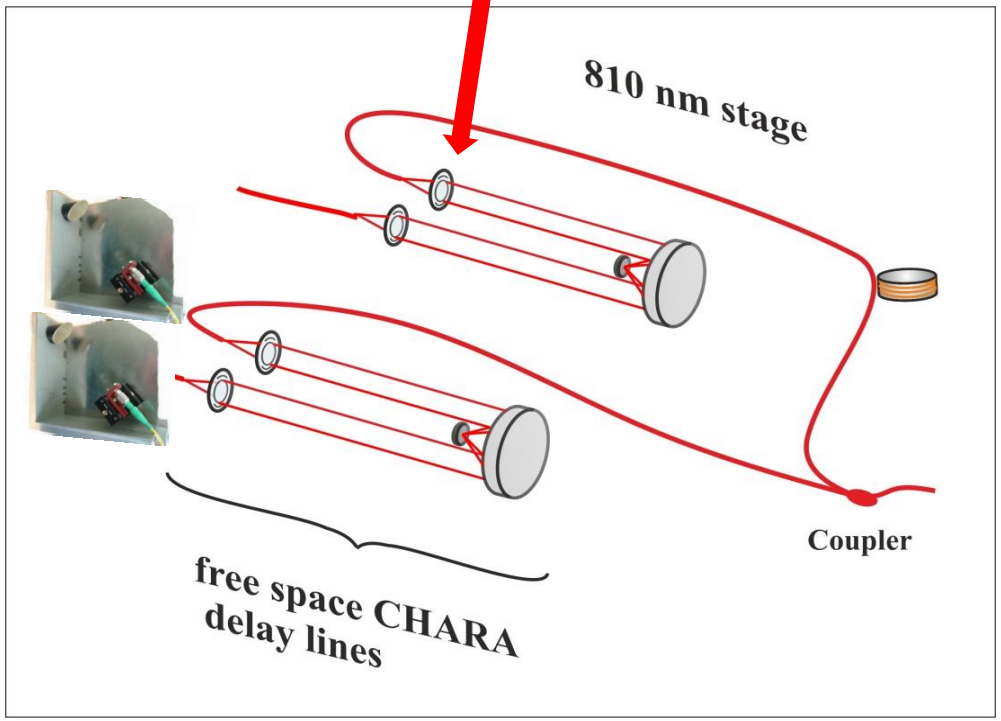
* Collimator and injection stage final version

* Mechanical mounting on the Delay Line at CHARA

(CHARA team)

*Test at CHARA (Stability of the coupling with an internal source)

(Help of Judit and Matt?)



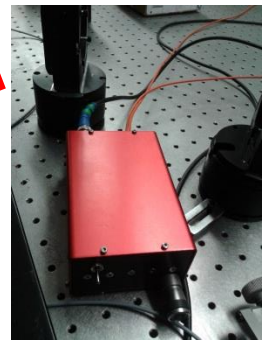
Beam Combiner

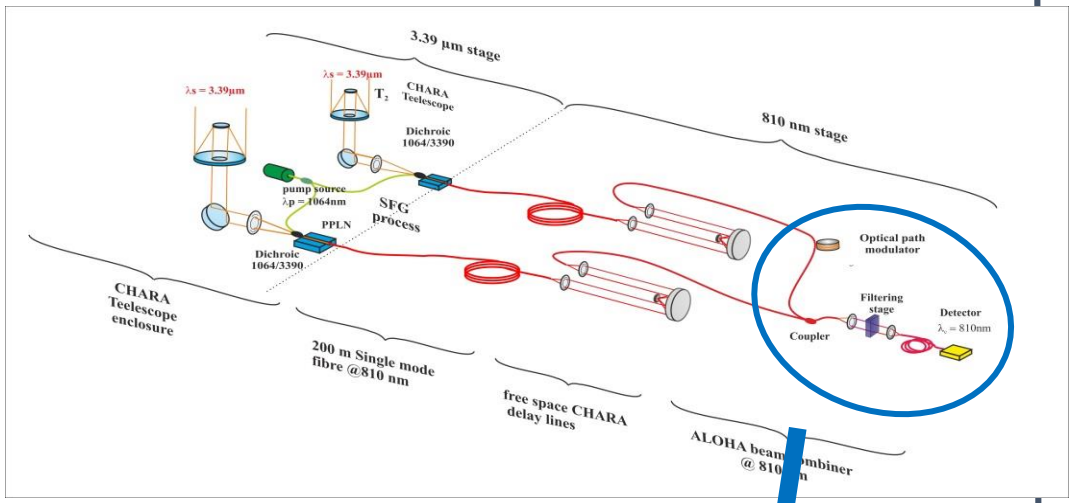
Status

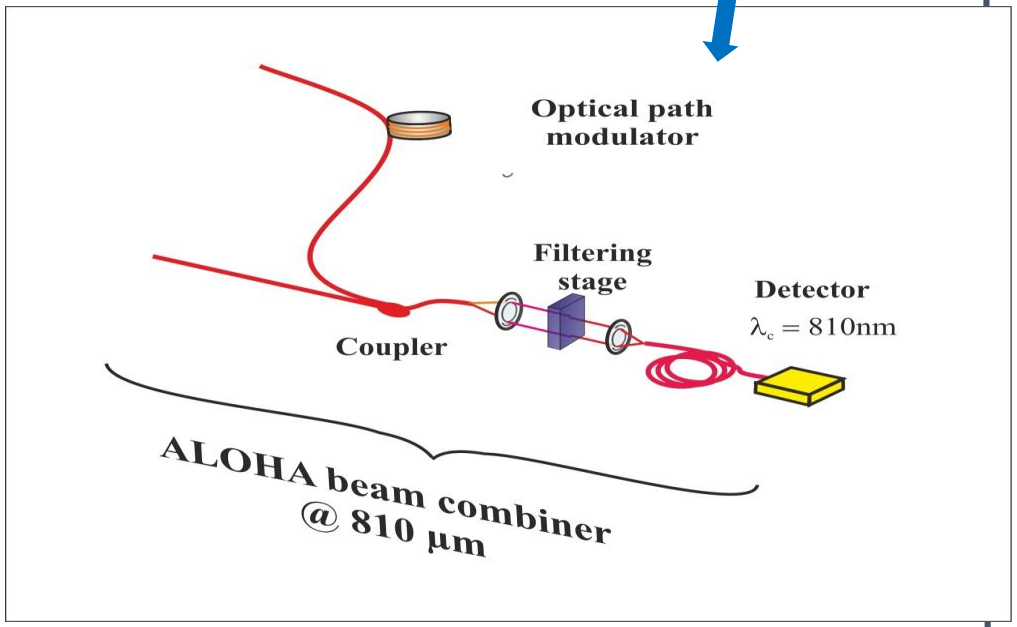
* Under development in the lab @XLIM
* Full expertise @ XLIM
  (Skills developed for more than 30 years)
* All guided combiner with fibers waveguides and coupler
* OPD modulation by PZT + short delay line
* Si APD detector + data processing

To be achieved

* Packaging and implementation
* Software interface

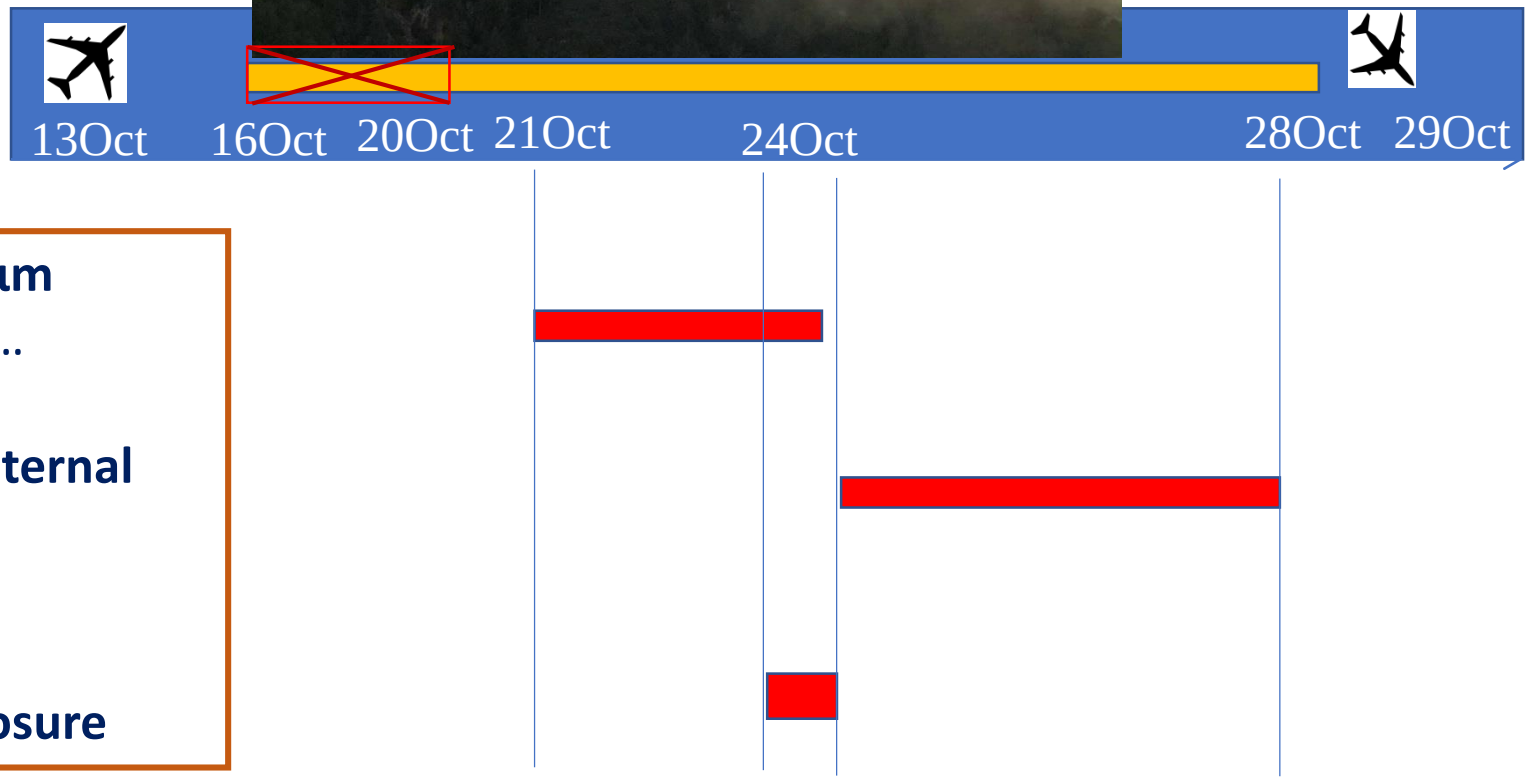






ALOHA CHARA Mission 2017

"hot mission!!!"

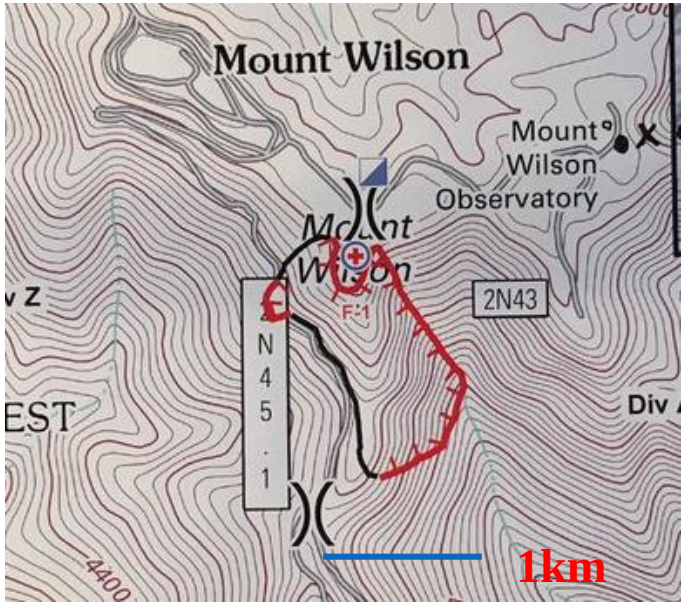


*** Tests of ALOHACHARA@1.55µm**
4 days in Pasadena…. Pb on S1 …

***Fiber linkage ALOHA 200 m (internal source)**

***thermal test of the MIR conversion stage in the S2 enclosure**

ALOHA CHARA Mission 2017



Many tanks to Larry Webster and all the CHARA team for their help!!!!