FLUOR Instrumentation

by

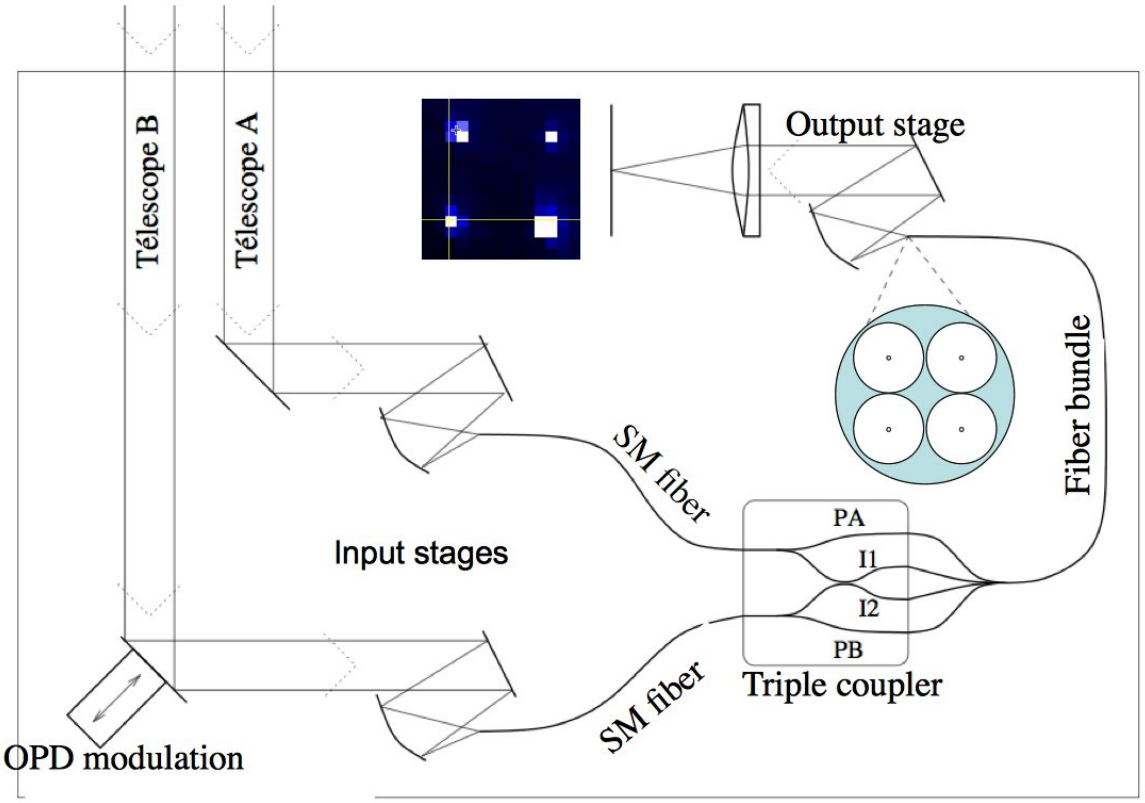
Benjamin Mollier

Short description of FLUOR

- FLUOR is a singlemode fibers recombiners
- Works in K-band (2 – 2.4 μm)

- Singlemode fibers :
  - Pupil phase corrugations
  → intensity fluctuations
  - Easier calibration
  - Piston not filtered

- 4 outputs
  - 2 photometric channels
  - 2 interferometric channels



Temporal relevance of FLUOR

- Complementarity FLUOR and other CHARA instruments
- What is the niche of FLUOR ?

	Visible	near-IR	mid-IR
Imagery	NPOI	VLTI/Amber CHARA/MIRC MROI VLTI/Gravity	
High-Dynamic	CHARA/VEGA	CHARA/FLUOR	VLTI/MIDI LBT/Nuller Kech-I/Nuller

+ Maturity, accessibility, long baseline, data simplicity

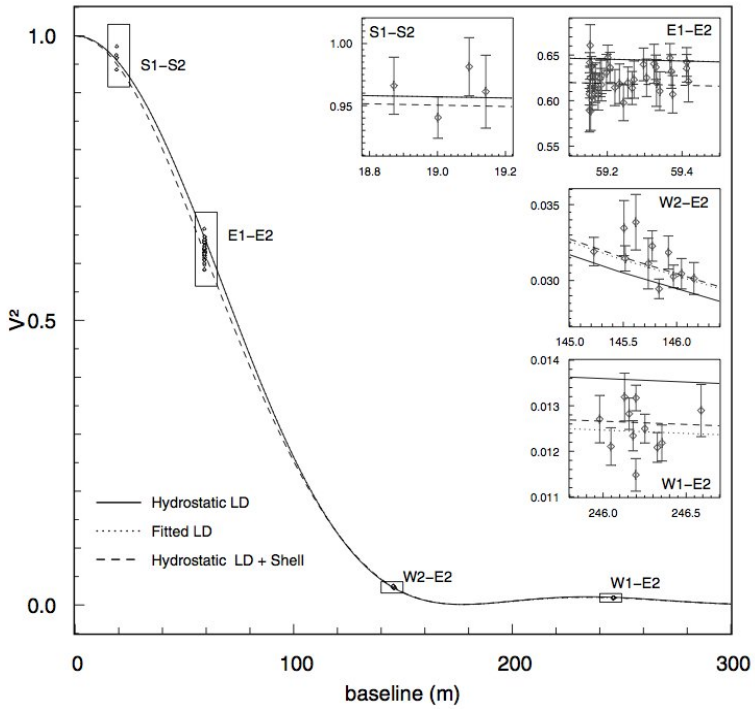
Why JOUFLU ?

(Rejuvenation and upgrading of FLUOR)

- FLUOR has not changed since IOTA
- We must adapt FLUOR to the environment CHARA
  - Being able to follow evolution of CHARA
  - Being able to connect to other subsystem (VEGA, CHAMP)
- Remote observing on a routine basis

Increase dynamic

- Currunt dynamic is arround 300
- Dynamic is limited by some bias :
  - Piston
  - Chromatic bias
  - Number of scans
  - …
- Solutions :
  - Fringe tracking
  - Spectral dispersion
  - Faster observation sequences



Mérand et al. 2006, A&A 453, 155

Spectral resolution

- Implement spectral resolution : 2 options
  - Prism
  - Double Fourier mode
- What it implies ?
  - Greater coherence length → change fast scan
  - Need phase stability → CHAMP connection

FT from CHAMP

- We need to stabilize fringes
  - Long exposure
  - Reduce phase error
  - No piston for double fourier interferometry

→ Increase spatial and spectral resolution

- Idea : Use CHAMP
- Is it possible that CHAMP work with only 2 telescopes ?

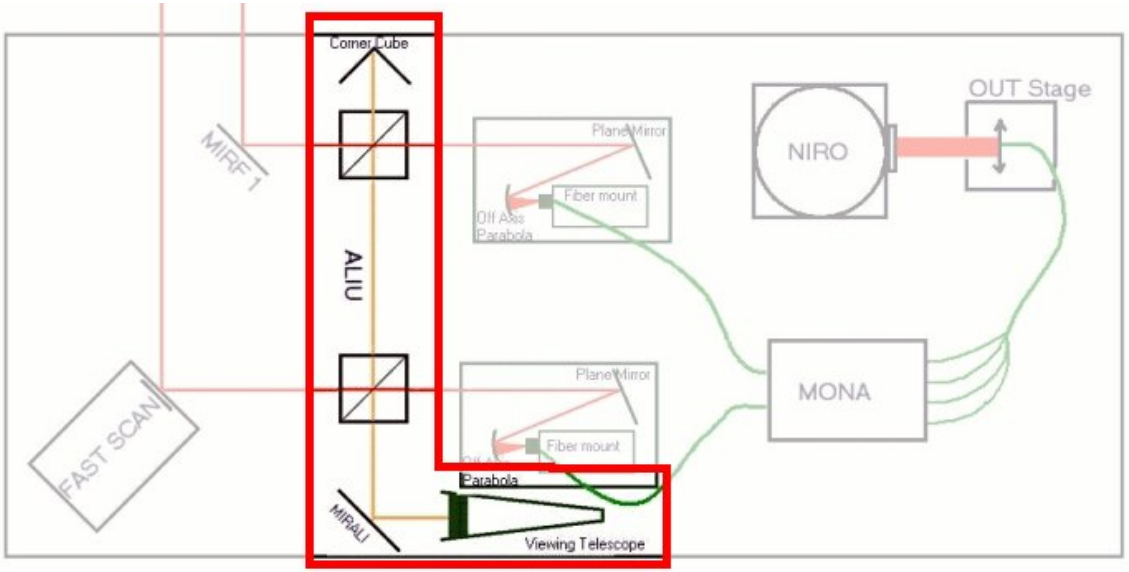
Remote mode, automatisation

- Automatisation of ALIU (Aligment procedure)

  2 goals :

  – Limit number of intervention in the lab.

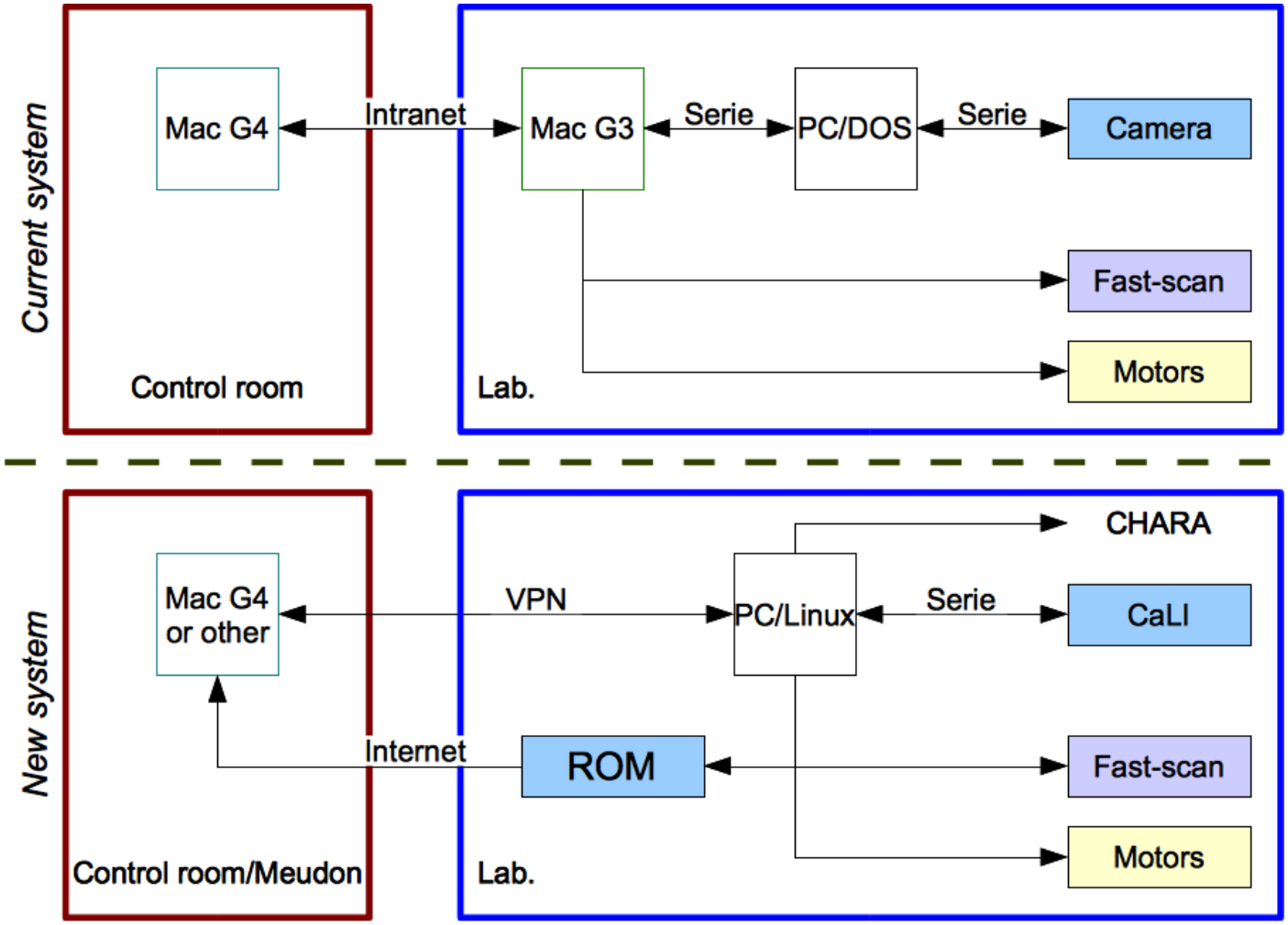
  – Implement remote mode



Pupil from VEGA

- New in ALIU : Alignment of pupils
- Why ? CHARA's pupil move during the night
  → Flux can fall suddenly
- Problem : FLUOR cannot image the pupil
- Idea : Use pupil location system of VEGA

New control system



Take home message

- Increase dynamic from 300 to higher as possible
  - Spectral resolution
  - Fringe tracking (CHAMP)
- Connect with VEGA
  - Imaging pupil
  - Simultaneous multicolor observations with VEGA
- Automatisation of alignment procedure
  - Remote mode
- New control system
  - Follow evolution of CHARA
  - Connect to CHAMP, VEGA...

CHARA
CENTER FOR HIGH ANGULAR RESOLUTION ASTRONOMY
GEORGIA STATE UNIVERSITY

GeorgiaStateUniversity

NSF

NOAO

l'Observatoire
de Paris
LESIA

THE UNIVERSITY OF MICHIGAN
1817

NExScI
NASA Exoplanet Science Institute

SUSI
SYDNEY UNIVERSITY STELLAR INTERFEROMETER
AUSTRALIA

Observatoire
de la CÔTE d'AZUR