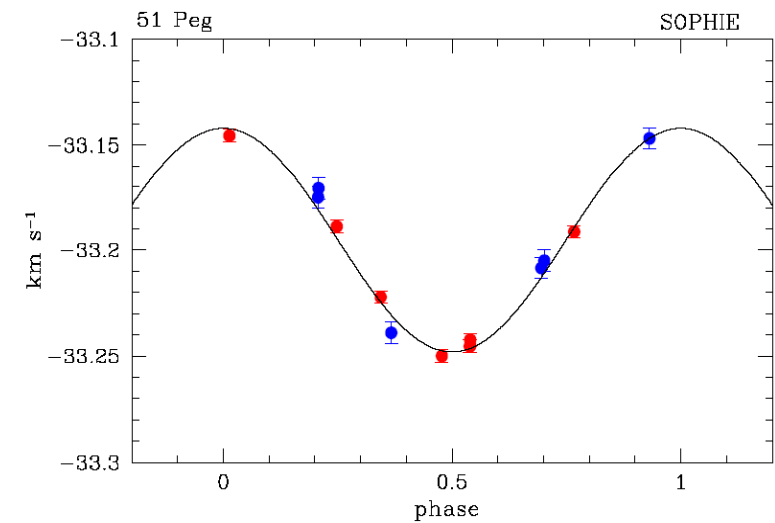
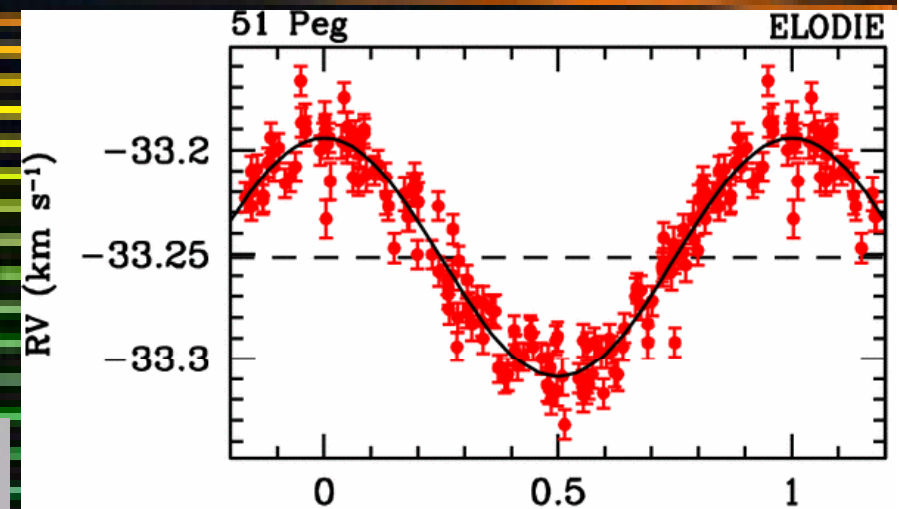
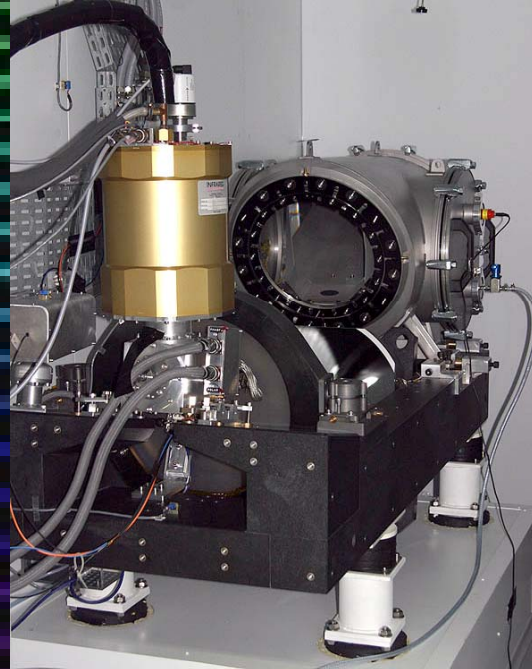


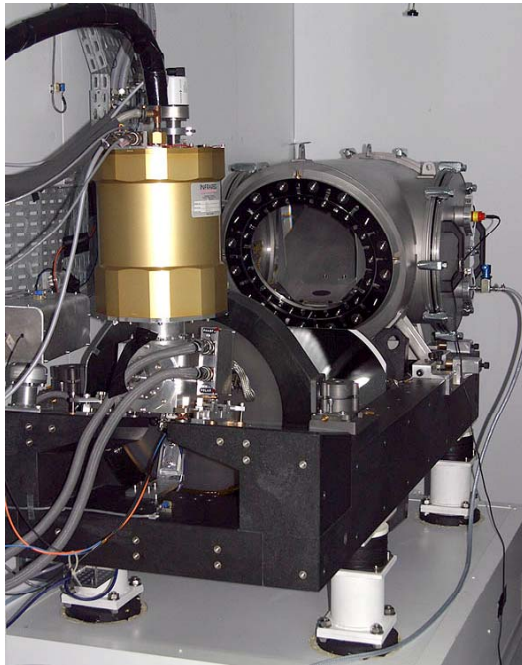
## Summary

- OHP193/SOPHIE spectrograph
- OHP193/MISTRAL Spectrograph and ToO
- OHP and TNA

# T193 and SOPHIE

- Replaces ELODIE (1995-2006)
- In operation since November 2006
- Res. = 70'000 -  $\Delta\lambda = 380\text{-}680\text{ nm}$
- RV precision 1-2 m/s
- 90 % of time for Exoplanets studies





SOPHIE spectrograph @T193

**SOPHIE took place for ELODIE(1993-2006, 51Peg b)**

**Major improvements since SOPHIE start of operation in 2006:**

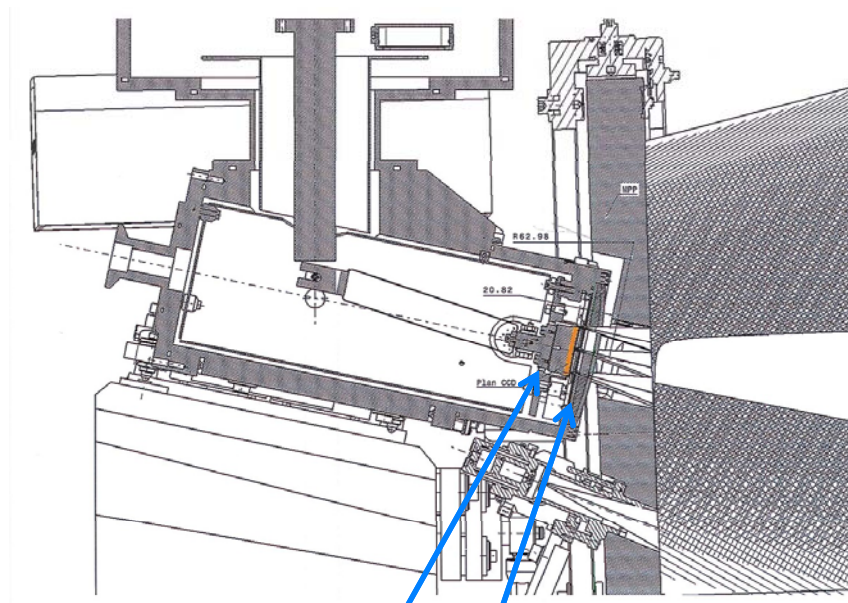
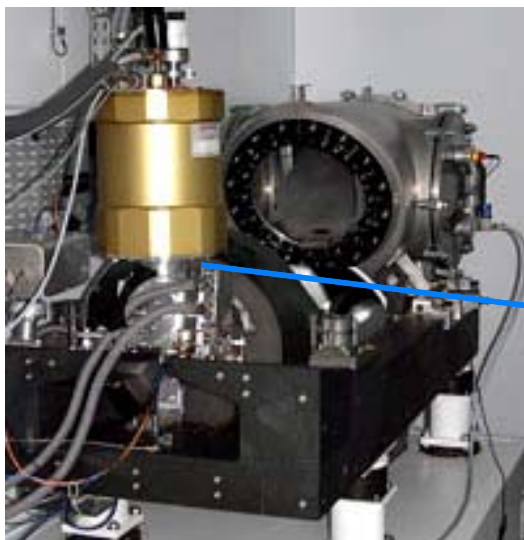
- ① **2012 : Octagonal fibers 5m/s to 1-2 m/s RV precision (SPIE 2012 S.Perruchot and al.)**
- ② **2015 : New Robotic Calibration Unit, added Fabry-Perot device, in good thermal controlled room**
- ③ **2016 : New SOPHIE container thermalization system 1/100 ° C on large timescale**
- ④ **Cassegrain Control : Programmable Logic Controller**



## **SOPHIE-RED**

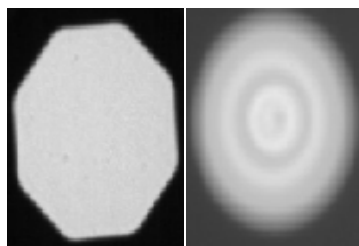
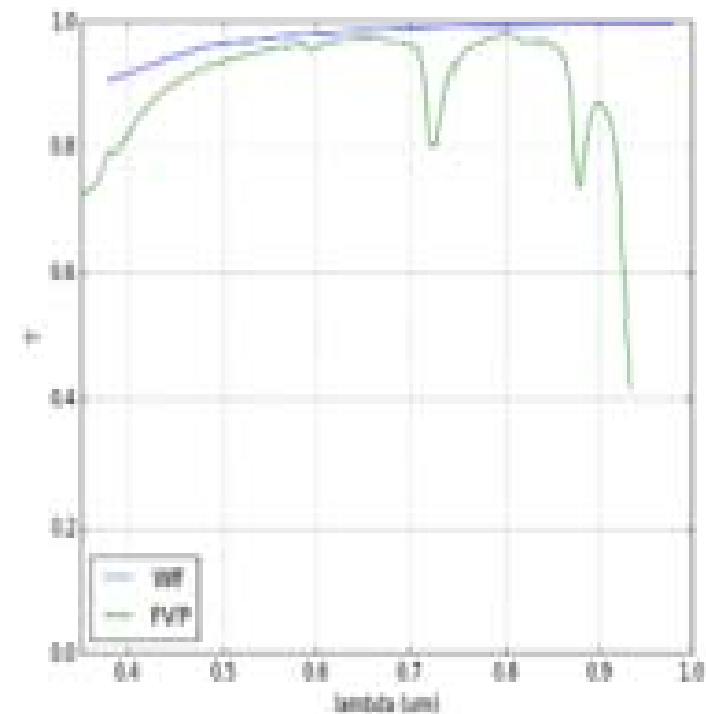
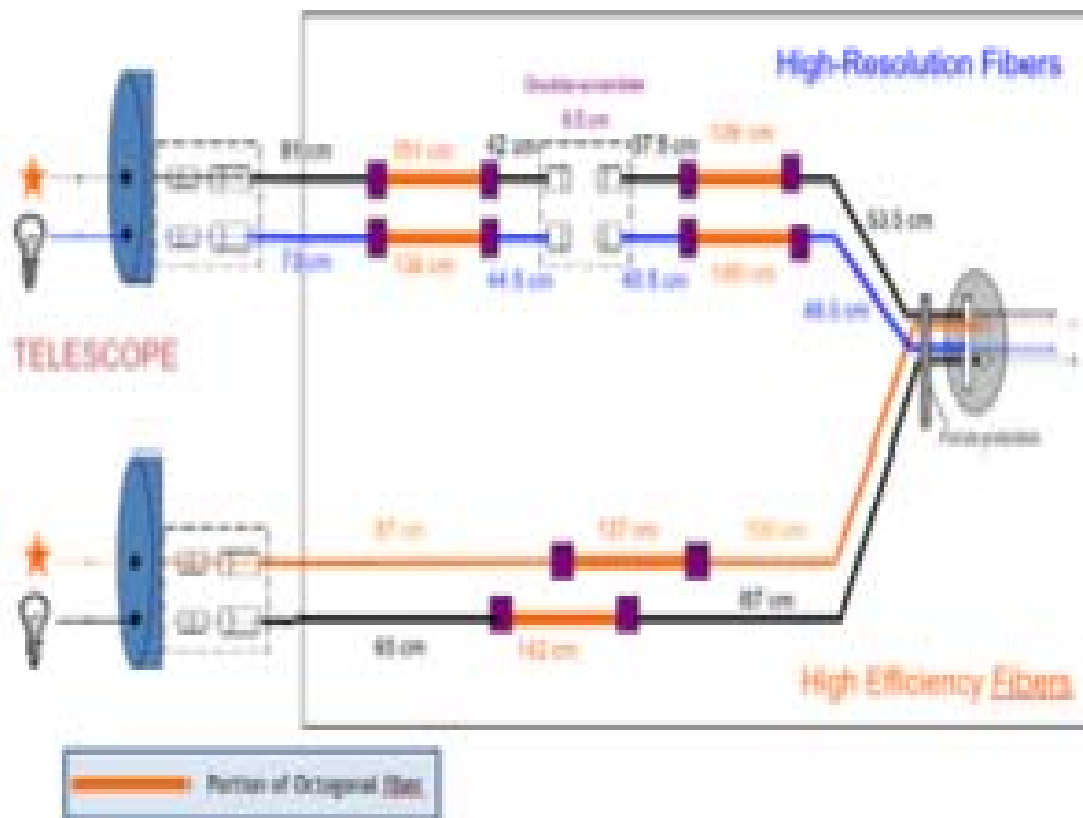
- **Larger CCD sensor to get more grating orders**
- **Extend spectral range to RED**
- **Higher sensitivity**
- **Better efficiency**
- **Gain in transmission**
- **New complete set of octagonal fibres and light injection system**

## CCD cameras in SOPHIE-RED



Back Illuminated Very Large Area CCD using  
e2v CCD231-84  
Deep depleted  
4096x4096 pixels, 15x15 $\mu$ m pixel size

## SOPHIE-Red : new full set of octagonal fibers



Goals compared to current set :

- Better efficiency ( >20%)
- Better transmission



# SOPHIE @OHP193

## Current SOPHIE

- 160 nights offered @OHP193/semester , 90 % of OHP193 allocated to SOPHIE runs
- since 2018A ~50 nights/semester are dedicated to Large Programs (over 4 and 6 semesters)
- 5% of time can be performed in service mode (8 nights max /semester)

## SOPHIE-RED (camera and fibers system)

- On sky : 2021A

# Mistral

**Multi-purpose InSTRument for Astronomy at Low-resolution**

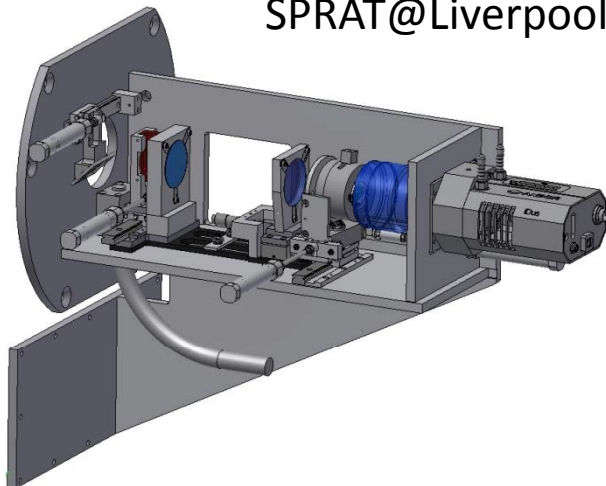
**New low resolution spectro-imager for OHP T193 telescope**

**Design from the Liverpool SPRAT (thanks to Ian and his team)  
Adapted to T193 OHP telescope**

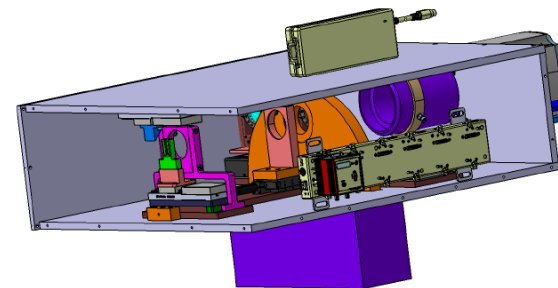
Benefits from Liverpool staff expertise, all of their mechanical, optical, electronic and SW drawings and designs.

Low cost components

SPRAT@Liverpool



MISTRAL@OHP193



Vue isométrique  
échelle : 1:1

| no | description | date       | dessiné par | révisé par | statut         |
|----|-------------|------------|-------------|------------|----------------|
| 01 | 01          | 01/01/2019 | M. P. J.    | M. P. J.   | 001 21000_F.01 |
| 02 | 02          | 01/01/2019 | M. P. J.    | M. P. J.   | 001 21000_F.02 |
| 03 | 03          | 01/01/2019 | M. P. J.    | M. P. J.   | 001 21000_F.03 |
| 04 | 04          | 01/01/2019 | M. P. J.    | M. P. J.   | 001 21000_F.04 |
| 05 | 05          | 01/01/2019 | M. P. J.    | M. P. J.   | 001 21000_F.05 |
| 06 | 06          | 01/01/2019 | M. P. J.    | M. P. J.   | 001 21000_F.06 |
| 07 | 07          | 01/01/2019 | M. P. J.    | M. P. J.   | 001 21000_F.07 |
| 08 | 08          | 01/01/2019 | M. P. J.    | M. P. J.   | 001 21000_F.08 |
| 09 | 09          | 01/01/2019 | M. P. J.    | M. P. J.   | 001 21000_F.09 |
| 10 | 10          | 01/01/2019 | M. P. J.    | M. P. J.   | 001 21000_F.10 |

O.H.P.

MISTRAL OHP

TDF meeting Garching May 30-31, 2019  
ALVS. OHP-Institut Pythéas

# Characteristics

**Major operating feature : in parallel with SOPHIE and ready-to-start**

**2 available observing modes :**

**Spectroscopy:**

- Wavelength range:  $\sim 3700 - \sim 9000 \text{ \AA}$ .
- Résolution  $R=700$  (and an additionnal mode :  $\sim <2000$ ).
- Slit width : 2 arc

**Imager:**

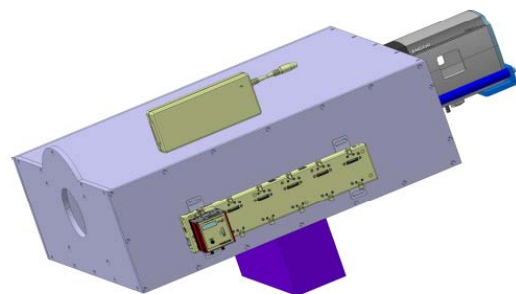
- Field of view 6.5 arcmin .
- Filters UBVRI / SDSS.

**Sensor: Andor iKon-L 936 series, 2048 x 2048 pixels CCD.**

**Calibration lamps : xenon, tungsten.**

**Fast swicthing from SOPHIE to MISTRAL  $\ll 20$  minutes.**

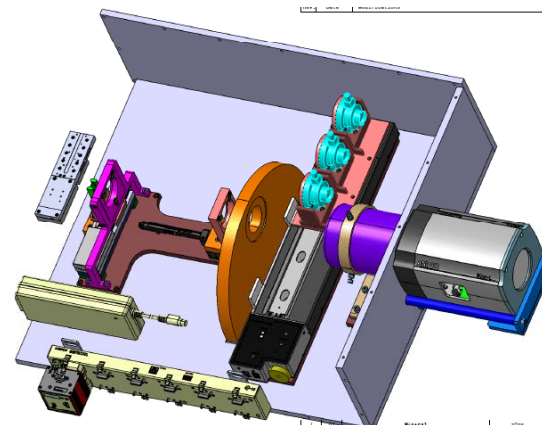




Vue isométrique  
 Echelle : 1:4

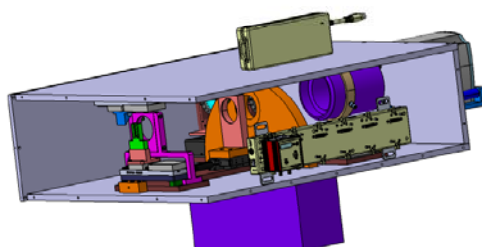
| Rep. | Qté | Designation                      | Matière   | Annoté | Date |
|------|-----|----------------------------------|-----------|--------|------|
|      |     |                                  |           |        |      |
| 1    | 1   | BOITIER DE MONTAGE PROTECTOR OHP | ALUMINIUM |        |      |
| 2    | 1   | MONTAGE DE MONTAGE PROTECTOR OHP | ALUMINIUM |        |      |
| 3    | 1   | MONTAGE DE MONTAGE PROTECTOR OHP | ALUMINIUM |        |      |

MISTRAL OHP



| Rep. | Qté | Designation                      | Matière   | Annoté | Date |
|------|-----|----------------------------------|-----------|--------|------|
|      |     |                                  |           |        |      |
| 1    | 1   | BOITIER DE MONTAGE PROTECTOR OHP | ALUMINIUM |        |      |
| 2    | 1   | MONTAGE DE MONTAGE PROTECTOR OHP | ALUMINIUM |        |      |
| 3    | 1   | MONTAGE DE MONTAGE PROTECTOR OHP | ALUMINIUM |        |      |

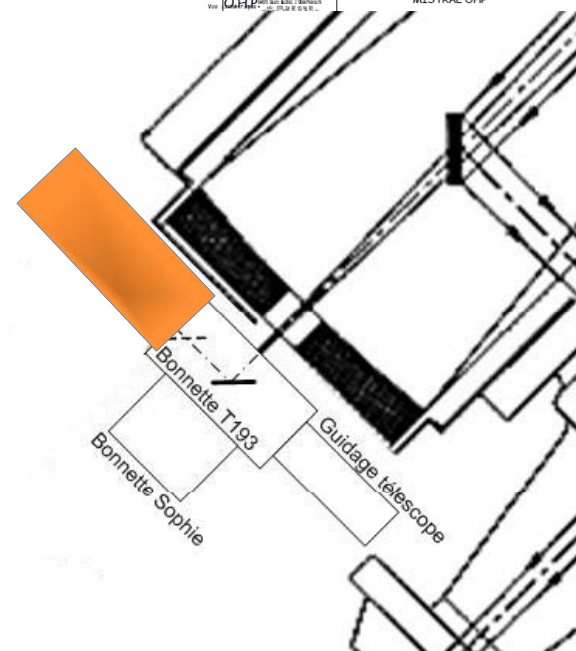
MISTRAL OHP



Vue isométrique  
 Echelle : 1:4

| Rep. | Qté | Designation                      | Matière   | Annoté | Date |
|------|-----|----------------------------------|-----------|--------|------|
|      |     |                                  |           |        |      |
| 1    | 1   | BOITIER DE MONTAGE PROTECTOR OHP | ALUMINIUM |        |      |
| 2    | 1   | MONTAGE DE MONTAGE PROTECTOR OHP | ALUMINIUM |        |      |
| 3    | 1   | MONTAGE DE MONTAGE PROTECTOR OHP | ALUMINIUM |        |      |

MISTRAL OHP



# MISTRAL @OHP193

**Operational mode always installed in parallel to SOPHIE:**

- Standard observing mode (whole night)
- ToO fast switching to MISTRAL on alerts

**Amount of time dedicated to MISTRAL < 10% of OHP193 nights**

**On sky : end of 2020A**

## OHP193 and TNA

- Search for good scientific programs for OHP193, not limited to French PI's : **EUROPEAN ASTRONOMERS COMMUNITY, QUALITY**
- Money from the TNA allocated nights, helps in OHP budget : **MONEY**
- If TNA stop funding : **no direct impact** in the short term OHP193 operation or about staff Employment ( main funding comes directly from CNRS).
- The nights offered for TNA and not allocated are offered to non-french astronomers (allocation on the basis of CTAC ranking ) : **KEEP LARGE COMMUNITY**

## In few words

- SOPHIE-RED extended field to RED
- MISTRAL rapid and will cope with ToO and TDA
- Last CNRS-INSU prospective (2014) plans to have OHP193 in operation 2025 up to 2030 (new French CNRS-INSU prospective to come in autumn 2019)
- unfortunately :
  - o no robotic (but always observers @ OHP193 they can react very fast)
  - o Very few nights in service mode

-