

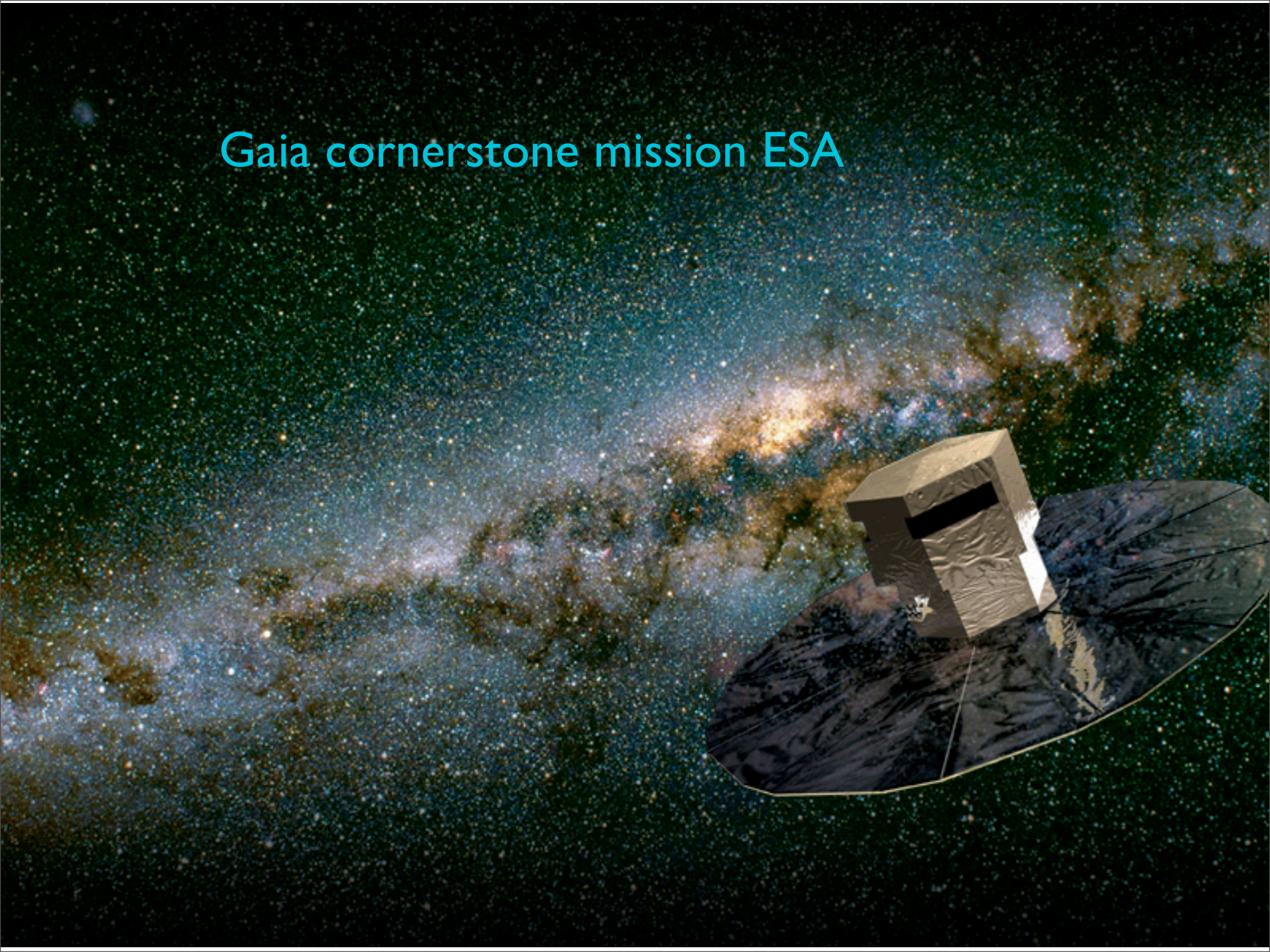


- A multi-object spectrograph for the CFHT



Piercarlo Bonifacio & the GYES Team

Gaia cornerstone mission ESA



Complement the Gaia catalogue

Gaia

1. radial velocity but no metallicity for $V > 12$ (only ~ 0.2 dex below)
2. low precision on radial velocity at the faint end (none fainter than $V=17$)

GYES

1. metallicity & abundances for numerous species (Li, Na, Mg, O, Al, Si, Ca, Ti, Mn, Sc, Co, Sr, Y, Ba) down to $V=16$
2. radial velocities down to $V=18$ (cool stars): $\sigma_{Vr} < 1$ km/s

2 spectral domains: 390-450 nm & 587-673 nm
@ $R=20,000$

Aim: $S/N=100$ at $V=14$ in 1 hour

→ Up to 1 million stars will be observed

Kinematic structure and chemical labelling of stars

Thin disc - thick disc (M. Haywood)

- chemical dissection of the disc & identification of sub-structures
- measure of the level of homogeneity of the elements in various environments (arms / inter-arms, outer disc, bar, etc.)
- thick disc: interface with the thin disc at the metal-rich end and the halo on the metal-poor side

Bulge (C. Babusiaux)

- detailed analysis of the bulge & constraints on the bulge formation scenarios
- unprecedented combination of kinematics with abundance ratios ($[\alpha/\text{Fe}]$)

Halo (O. Bienaymé)

- detailed abundance ratios of more than 10,000 halo stars & chemical evolution of the early galaxy
- search for very-metal-poor stars with $[\text{Fe}/\text{H}] < -4$

- Hot Stars and ISM
 - B/Be stars & A/Ap stars & mapping of the ISM
- Pulsating Stars : Cepheids, δ Scuti
 - P-L relation & galactic gradients
- Open Clusters : 190 targets for GYES
 - age-metallicity relation & chemical history of the thin disk
 - chemical characterization of new OCs identified by Gaia
- Globular Clusters : 49 targets for GYES
 - internal dynamics & multiple stellar populations identification

Radial velocity

- Gaia RVS: 847-874 nm @ R=11,500

- no V_r for stars fainter than V=17
- modest precision for the faint end of the RVS

- GYES

- improve precision at the faint end
- provide radial velocities for V>17 for as many stars as possible

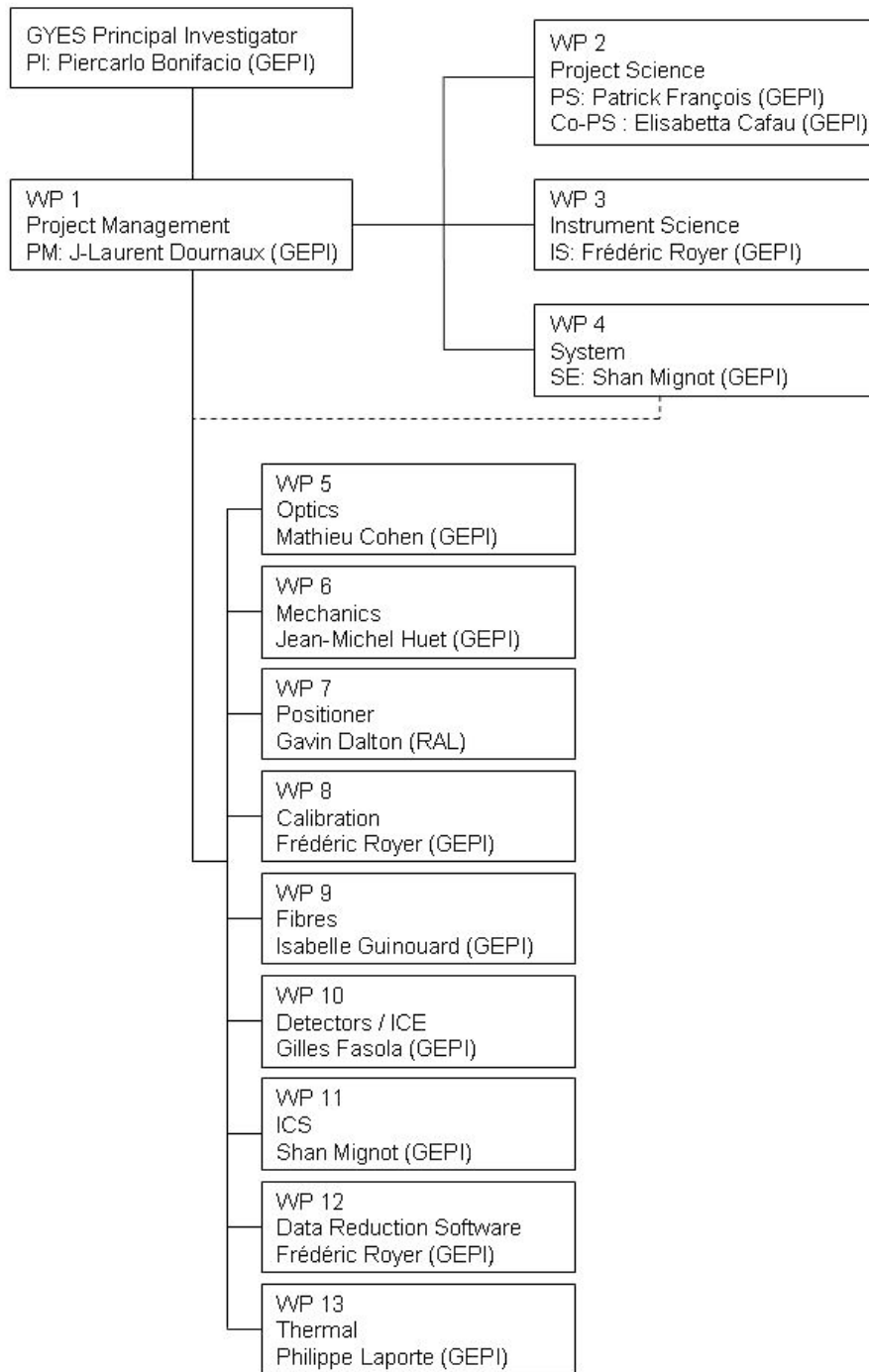
Radial velocity
precision estimates
(km/s) for Gaia

Spectral type	V magnitude									
	10	11.5	12.5	13.5	14.5	15.5	16.5	17	17.5	
K1 III	< 1	< 1	< 1	< 1	1.2	2.7	6.8	10.3	18.0	
K0 V	< 1	< 1	< 1	1.1	2.1	5.1	12.6	25.0	—	
G0 V	< 1	< 1	< 1	1.4	3.0	7.9	20.0	—	—	
F0 V	< 1	< 1	1.0	2.1	5.3	12.7	—	—	—	
A0 V	< 1	1.3	2.6	5.7	14.6	—	—	—	—	
B9 V	1.9	5.1	10.0	24.1	—	—	—	—	—	

GYES V_r Survey

Feasibility study

- Study 100% financed by CSAA/INSU (CNRS) + Observatoire de Paris
- Technical team GEPI + Oxford (positioner)
- Science Team
France+ Europe + Canada +Hawaii
- Fast-track study: document delivery by October 1st 2010



All WPs managed
by GEPI except
positioner (but
with participation
of GEPI)

Science Team

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C. Babusiaux, C. Balkowski, O. Bienaymé,
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System Team

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J.-M. Huet (Mechanics) ,

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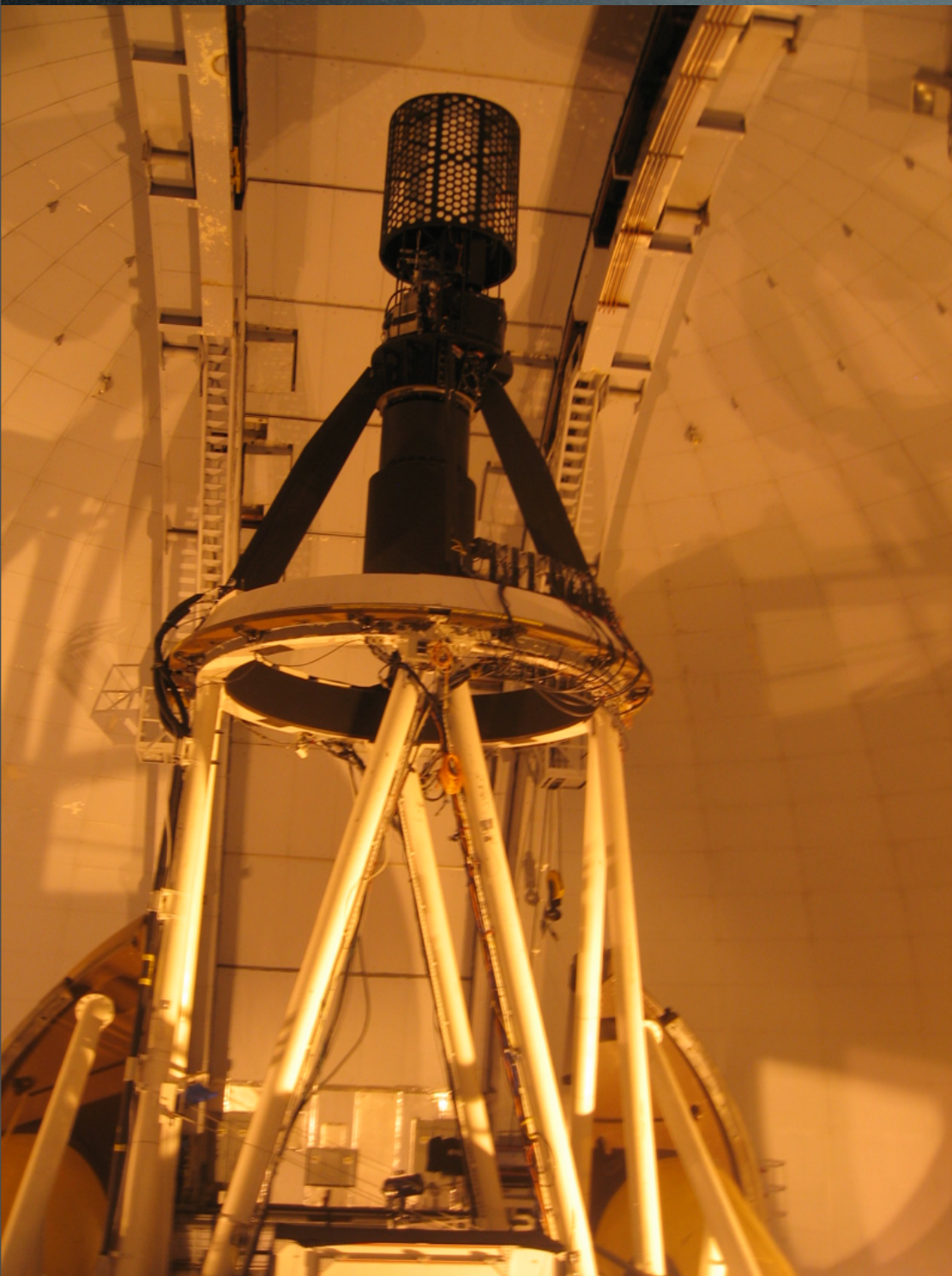
G. Fasola (detectors & electronics) ,

P. Laporte (thermal control),

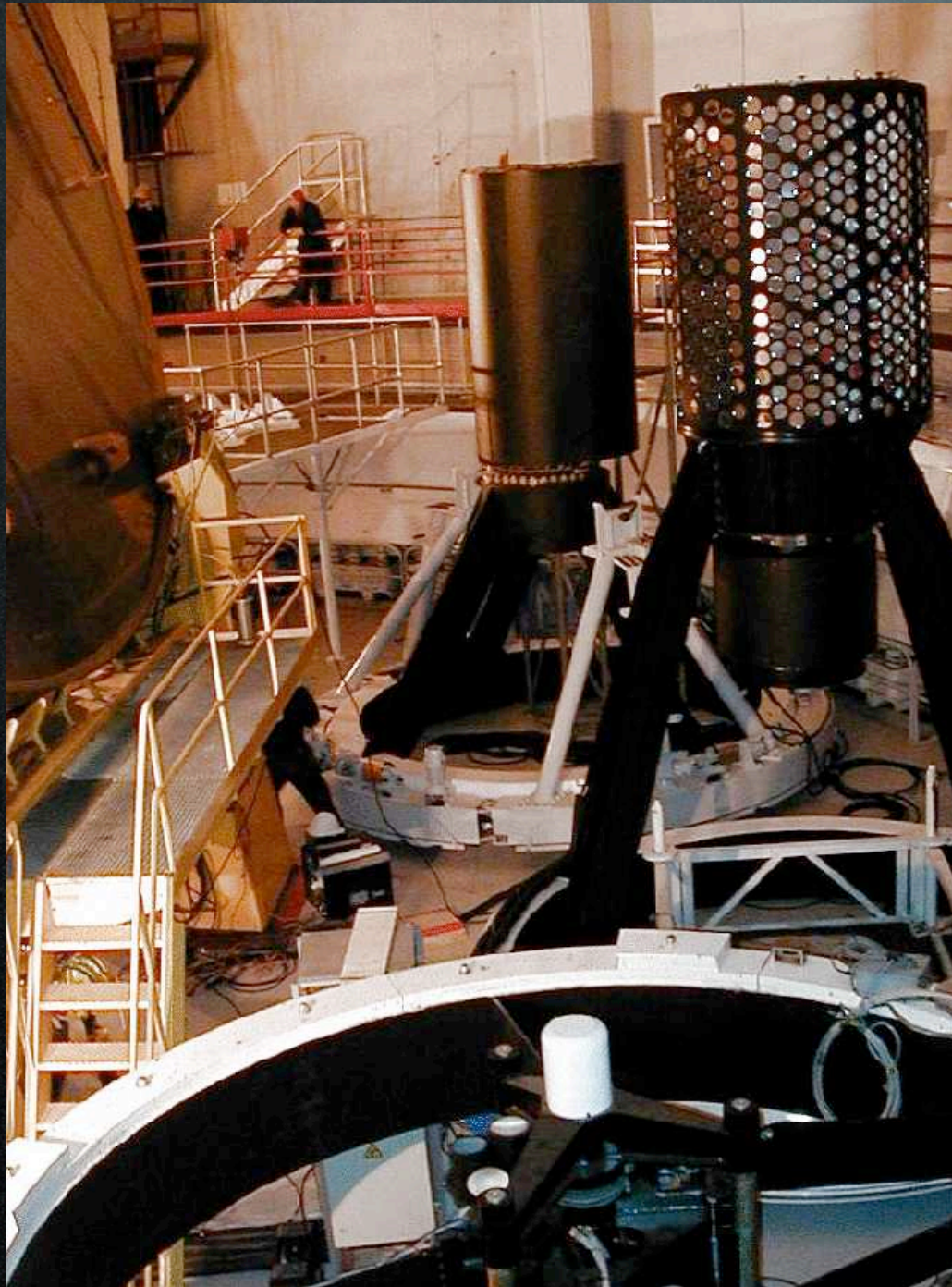
G. Dalton, I. Lewis (positioner),

F. Royer (IS),

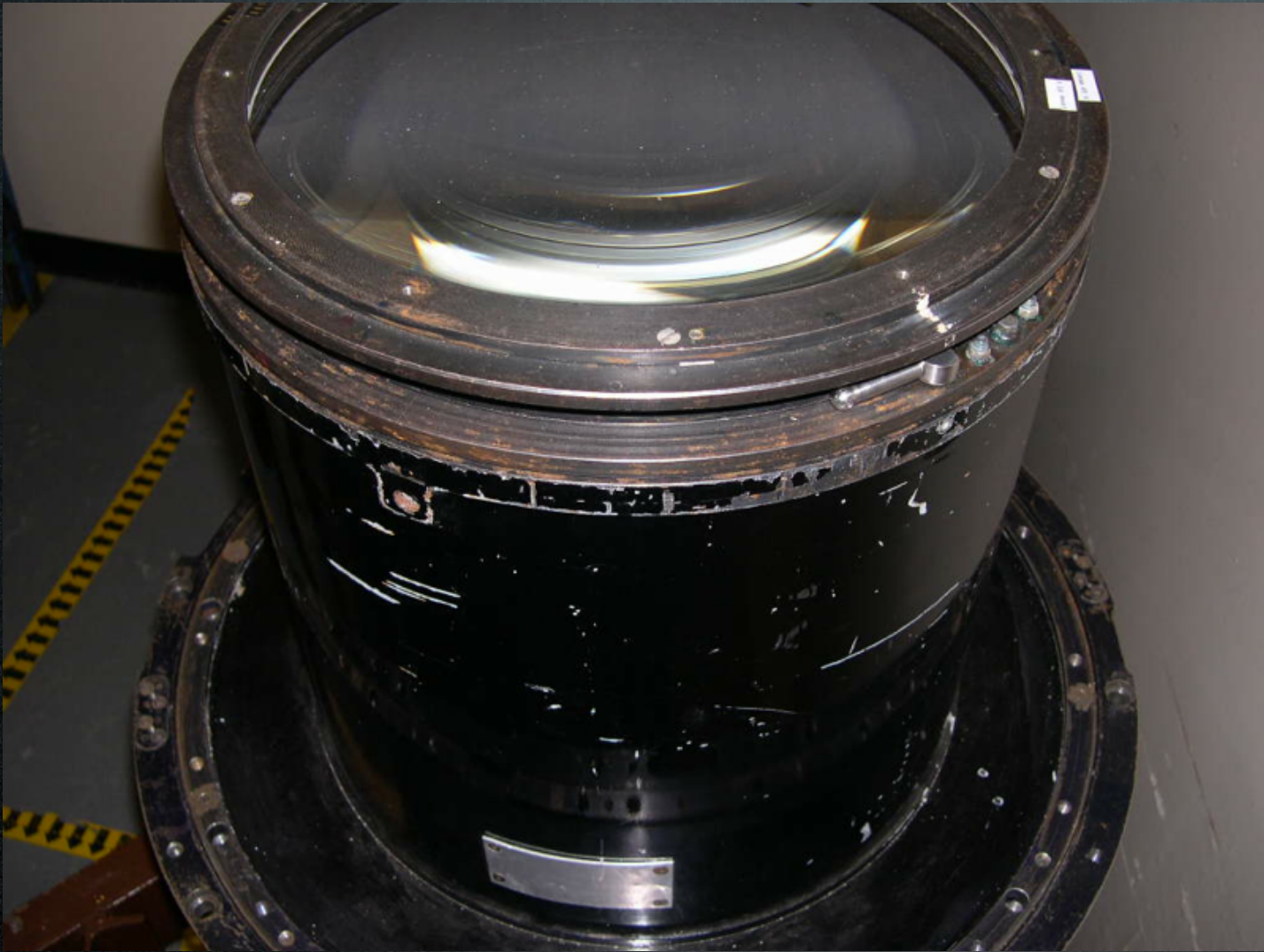
P. François (PS), E. Caffau (co-PS)



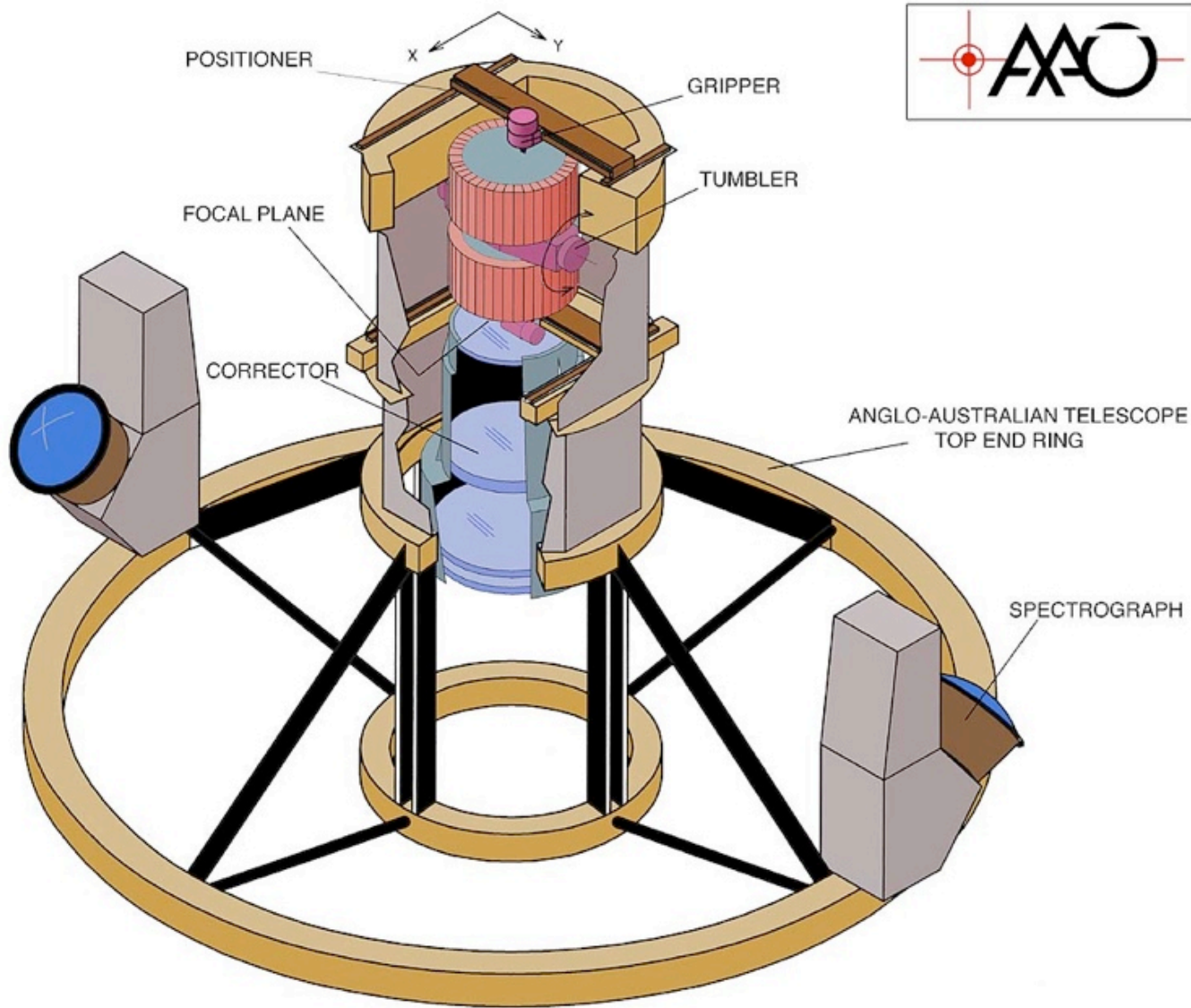
Prime Focus of CFHT
(MegaPrime mounted)



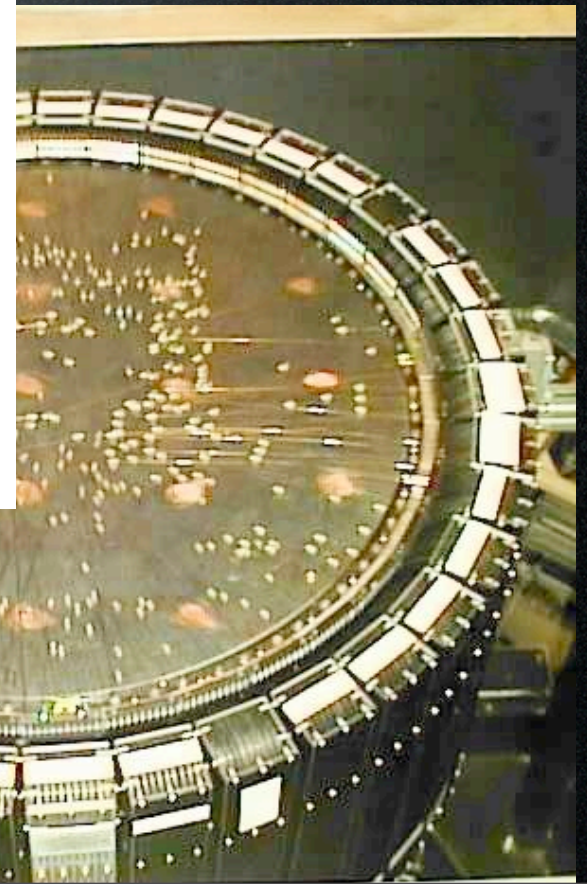
When not in use
upper ends are stored
on the floor of the
dome (presently 3:
MegaPrime, WIRCam,
Secondary Mirror)



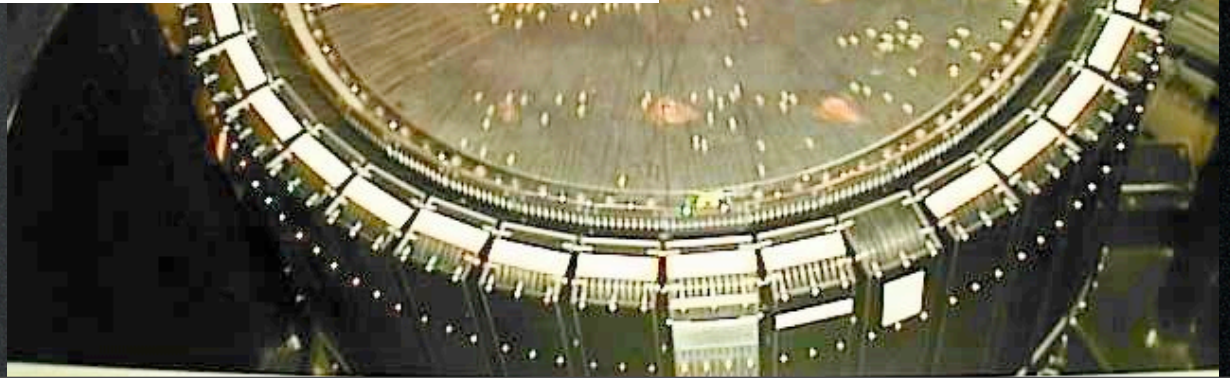
The old corrector, optical study shows it to be adequate, 0.9° diameter (unvignetted, 1° 5% vignetting)



Positioner: pick-and-place, like 2dF. Two plates with a tumbler



Suitable xy robots
available
commercially



Parallel project WHT MOS

Marc Balcells PI

consortium...structure...building up

Merci