***PLA**netary **T**ransits*
***and O**scillations of stars*

http://www.oact.inaf.it/plato/PPLC/Home.html

PLATO

- Ultra-high precision photometric space mission

- Candidate M-class mission in ESA Cosmic Vision programme

PLATO Science Objectives

Main objectives:

1. detect and characterize exoplanets of all kinds around stars of all types and all ages
   including telluric planets in the habitable zone
2. provide full observational basis to study stellar evolution
3. enable very wide additional science programme: stellar rotation, stellar activity, binarity, circumstellar environments, etc.

Three complementary techniques:

- photometric transits : R_p/R_s (R_s known thanks to Gaia)
- groundbased follow-up in radial velocity : M_p/M_s
- seismic analysis of host-stars (stellar oscillations) : R_s, M_s, age
  > measurement of radius and mass, hence of planet mean density
  > measurement of age of host stars, hence of planetary systems

Tool:

- ultra-high precision, long, uninterrupted, CCD photometric monitoring of very large samples of **bright stars**: CoRoT - Kepler heritage
- bright stars: capability of seismic analysis and efficient groundbased follow-up

The PLATO challenge

- very large number of targets

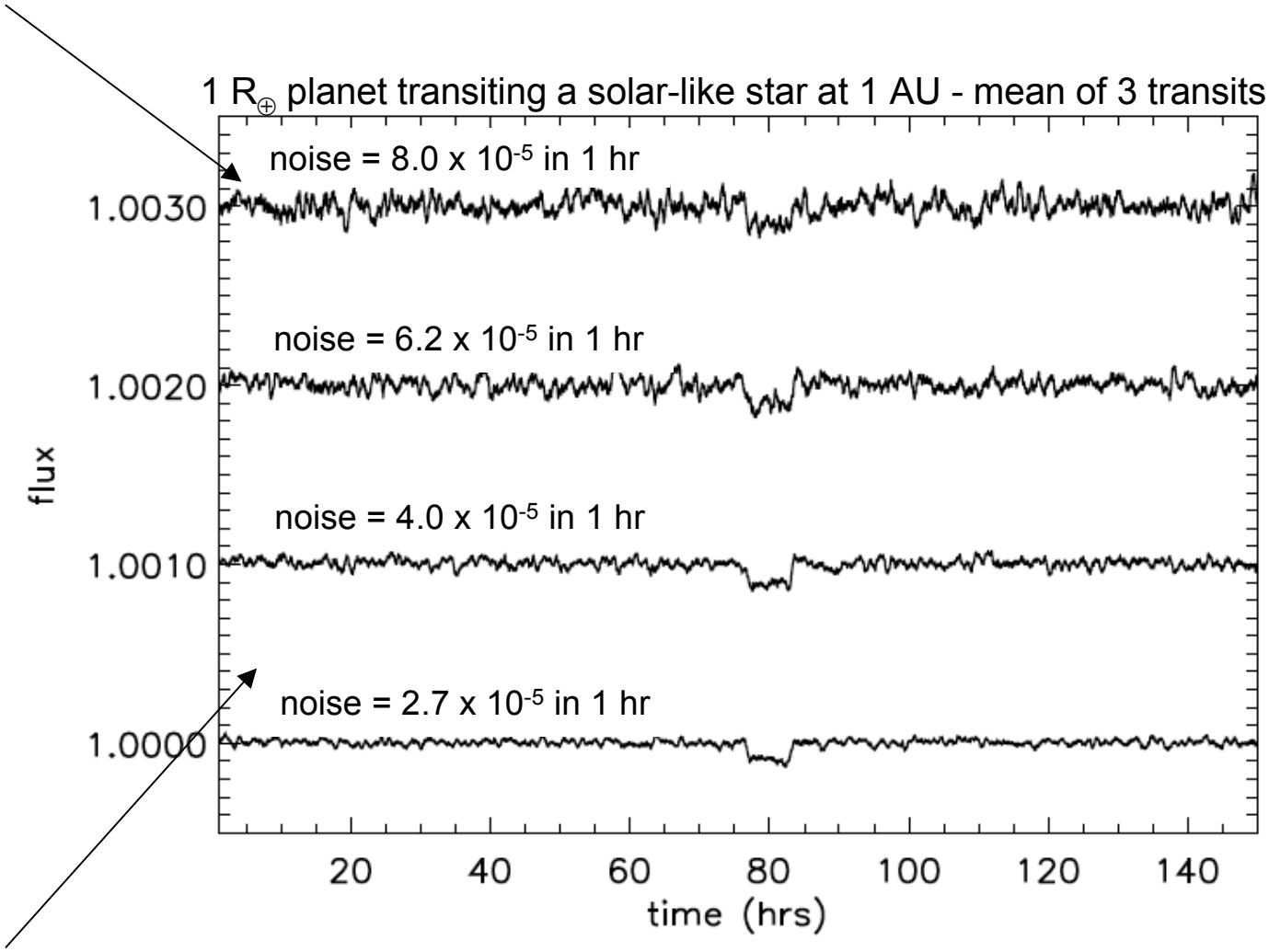
- bright and very bright stars

- very long term monitoring

- ultra-high precision photometry

Noise level requirements for PLATO

8.0 x 10^{-5} in 1 hr for marginal transit detection (faint targets)

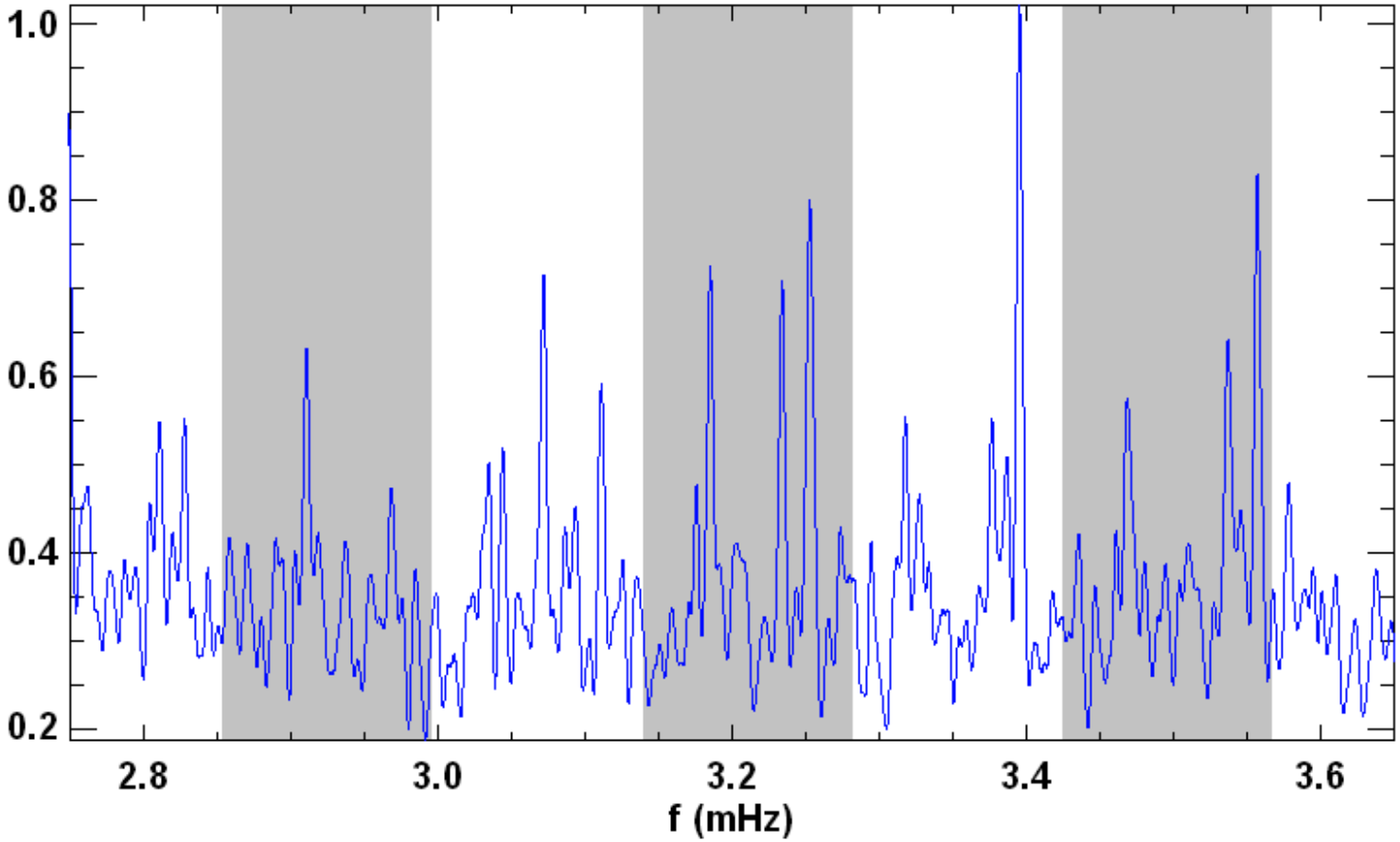


3.4 x 10^{-5} in 1 hr for high S/N transit measurement: also required for seismic analysis

Noise level requirements for PLATO

CoRoT observation of a G type star:
noise level = 3.4 x 10^{-5} in 1 hr
duration 3.2 months

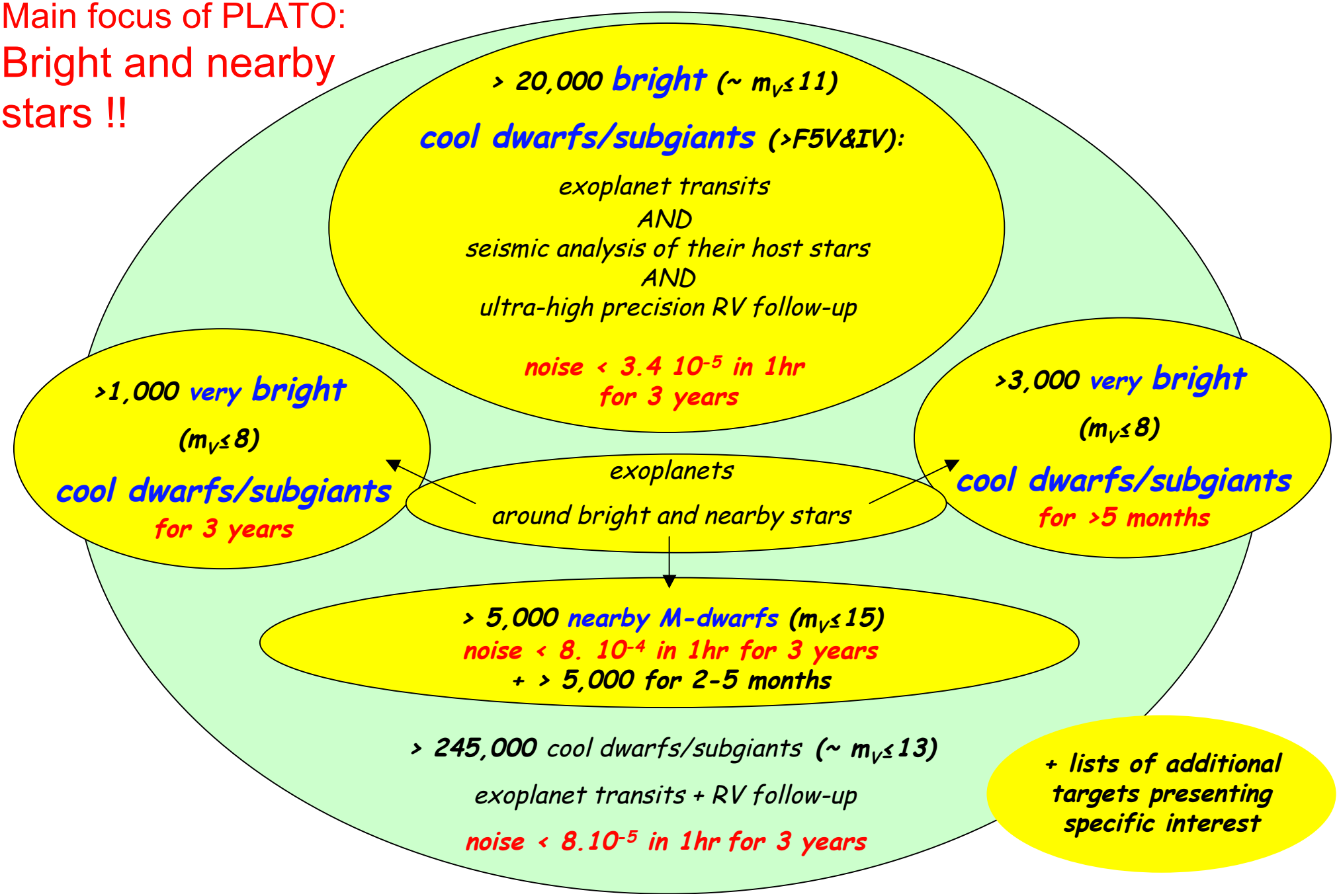
$\Delta\nu$ accuracy 1.2 μHz



3.4 x 10^{-5} in 1 hr sufficient for seismic analysis

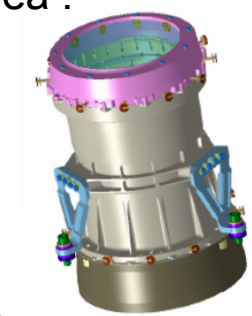
PLATO target samples

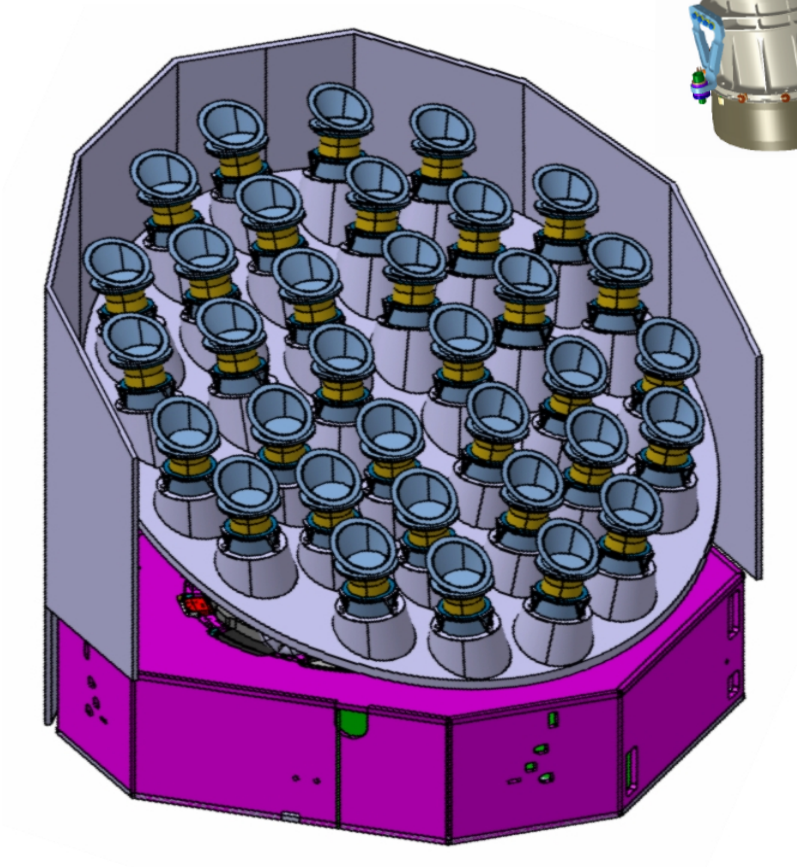
Main focus of PLATO:
Bright and nearby stars !!



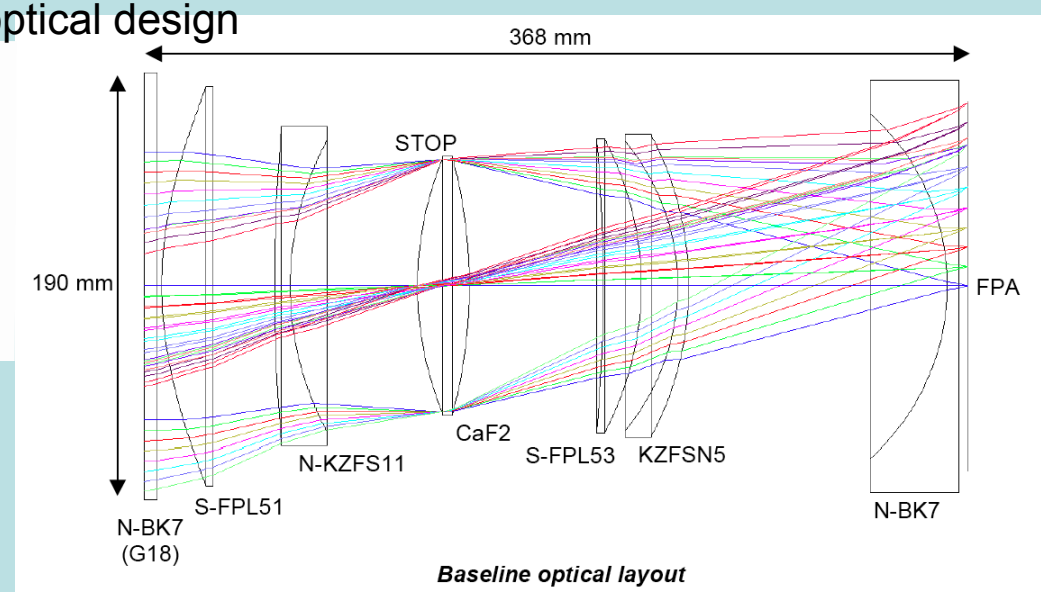
Instrumental Concept

Very wide field + large collecting area :
multi-instrument approach





optical design



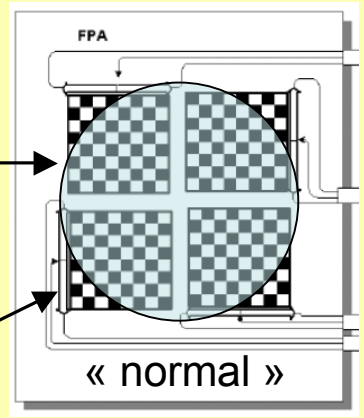
Baseline optical layout

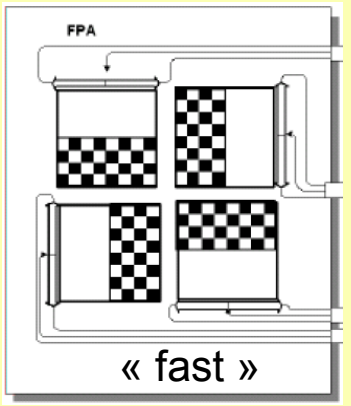
fully dioptric, 6 lenses + 1 window

focal planes

optical field
37°

4 CCDs:
4510^2 18μm





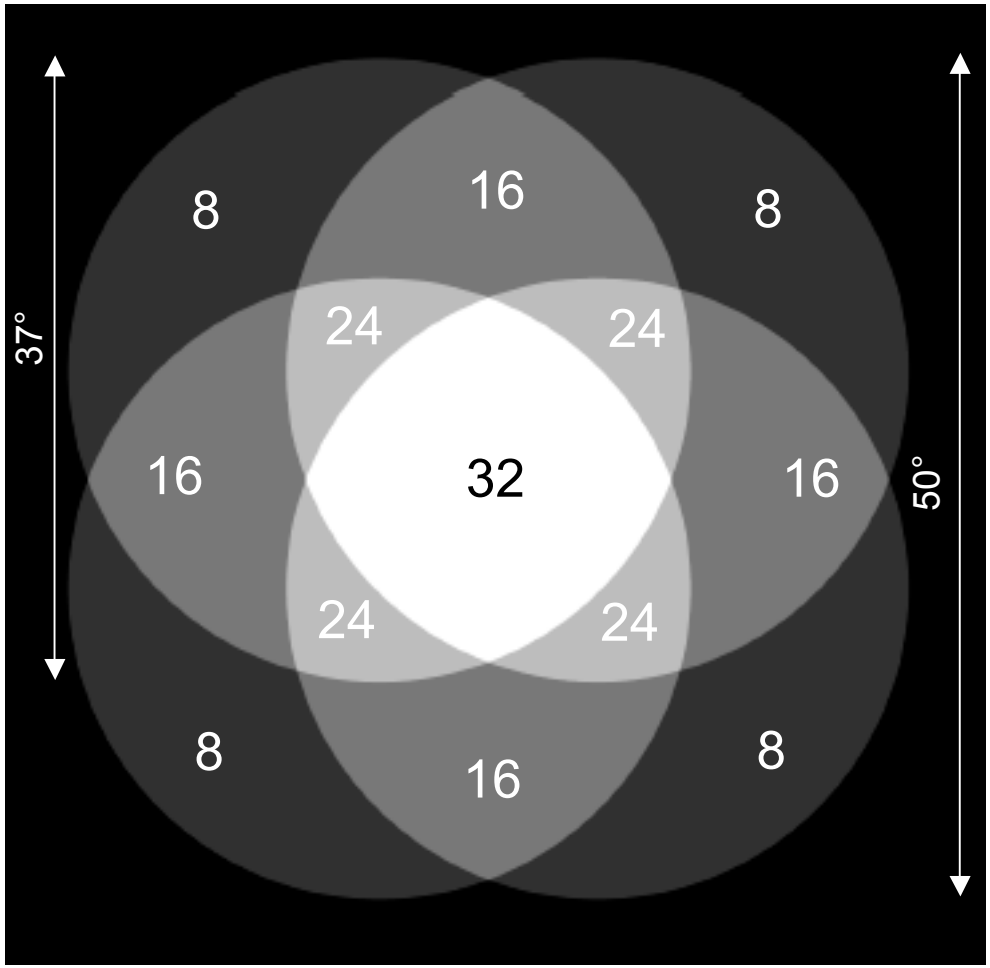
- 32 « normal » cameras : cadence 25 sec
- 2 « fast » cameras : cadence 2.5 sec, 2 colours
- pupil 120 mm
- dynamical range: $4 \leq m_V \leq 16$

On board data treatment: 1 DPU /2 cameras + 1 ICU
Science ground segment

Orbit around L2 Lagrangian point, 6+2 year lifetime

Concept of overlapping line of sight

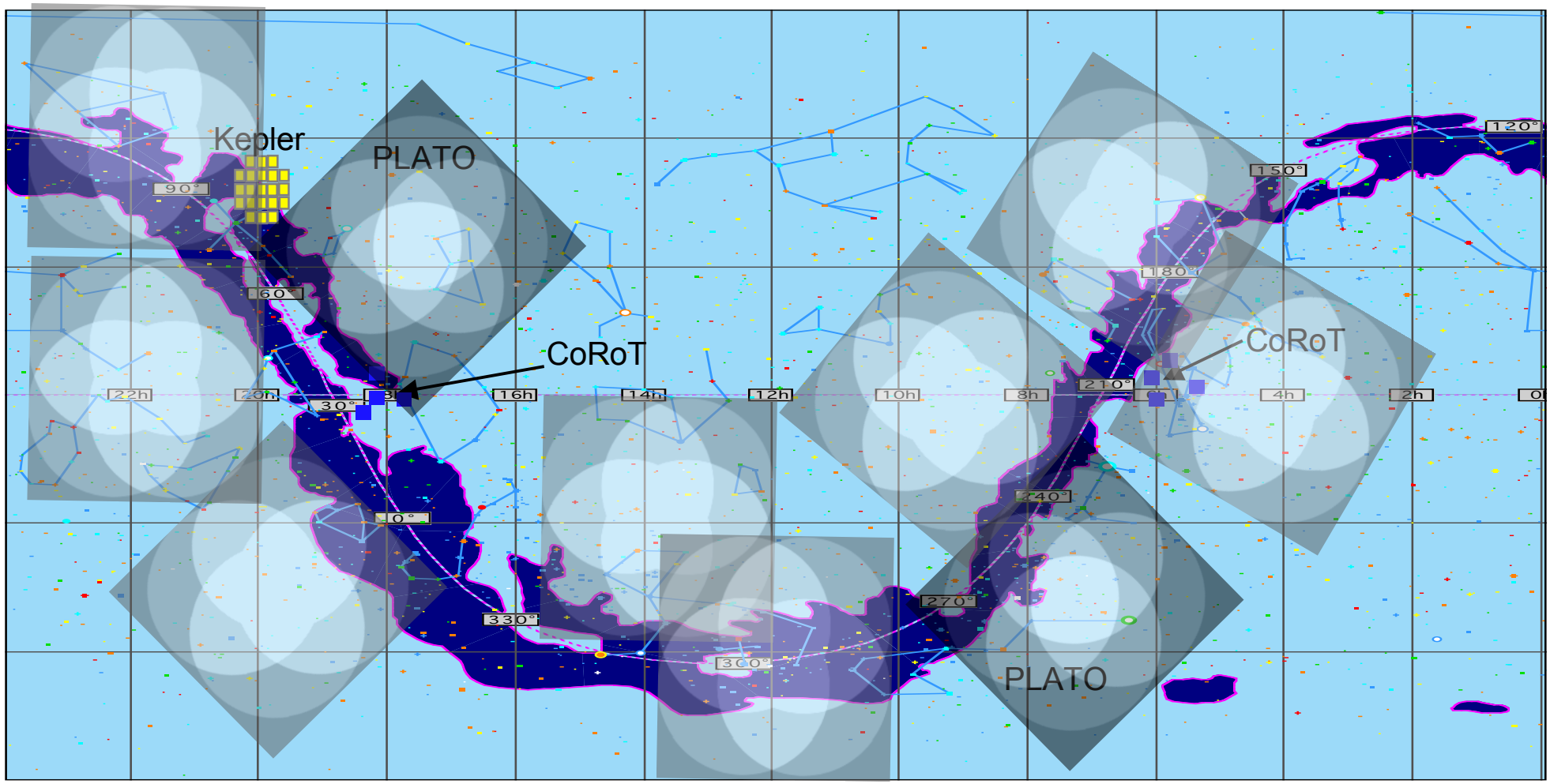
4 groups of 8 cameras with offset lines of sight
offset = 0.35 x field diameter



Optimization of number of stars at given noise level
AND of number of stars at given magnitude

Observation strategy and sky coverage

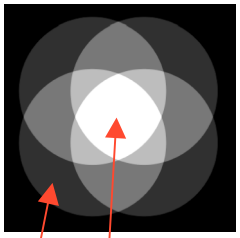
1. two long pointings : 3 years or 2 years
2. « step&stare » phase (1 or 2 years) : *N* fields 2-5 months each



~ 50% of the sky !

Expected performances

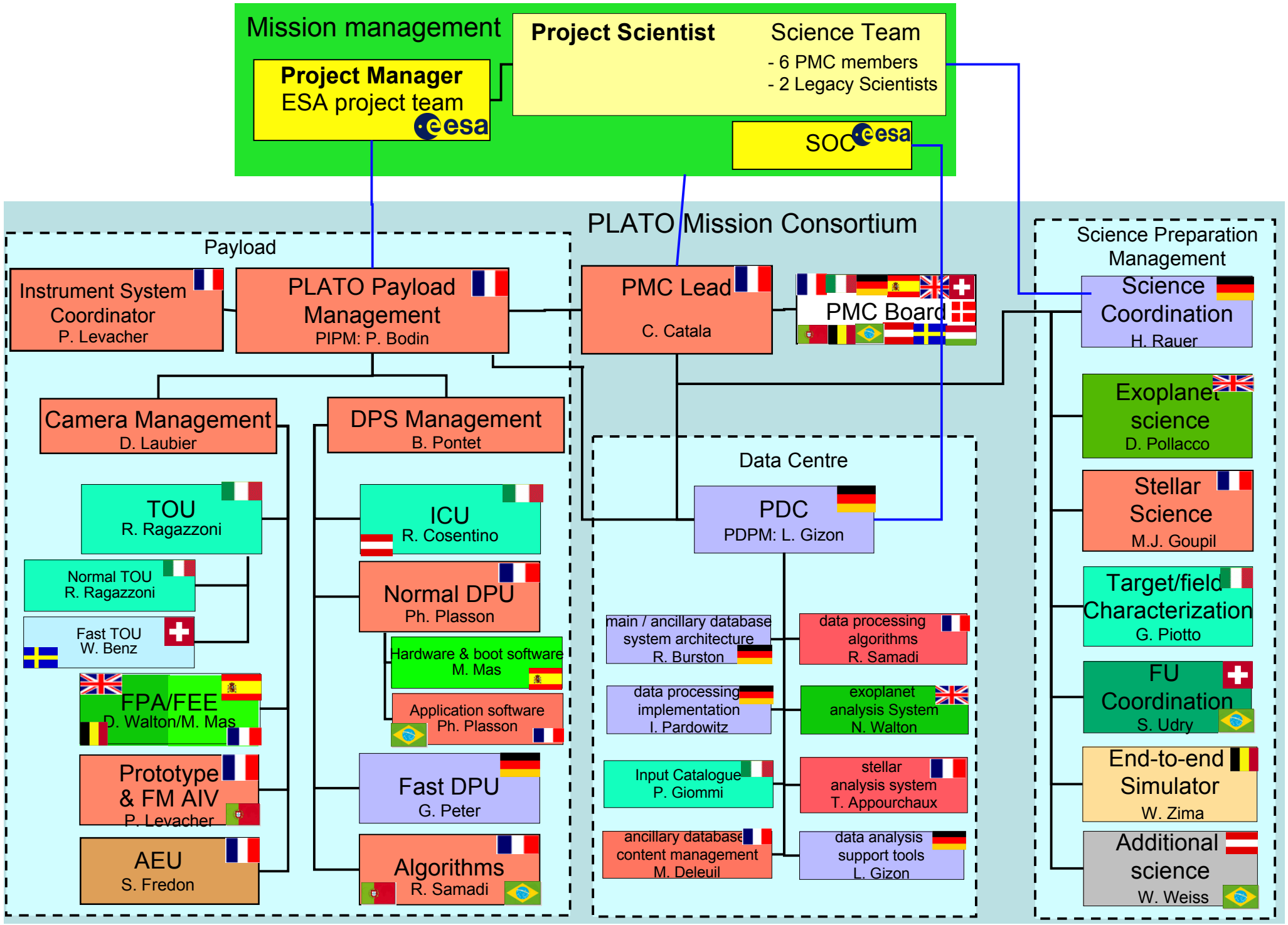
as a function of noise level



cf presentation by Giampaolo Piotto this afternoon

	PLATO (4300 deg^2)		20,000 deg^2	KEPLER (100 deg^2)	
noise level (ppm/√hr)	nb of cool dwarfs & subgiants long monitoring	m_V	nb of cool dwarfs & subgiants incl. step&stare	nb of cool dwarfs & subgiants	m_V
27	15,000	9.3 - 10.8	60,000	1,300	11.2
34	**22,000** 20,000	9.8 - 11.3	88,000		
80	292,000 245,000	11.6 - 12.9	1,000,000	25,000	13.6
	1,300 1,000	8	**5,000** 3,000	30	8
	36,000	11	145,000	1,300	11

as a function of magnitude


Mission management
Project Scientist
Science Team
- 6 PMC members
- 2 Legacy Scientists
Project Manager
ESA project team
SOC
PLATO Mission Consortium
Payload
Instrument System Coordinator
P. Levacher
PLATO Payload Management
PIPM: P. Bodin
PMC Lead
C. Catala
PMC Board
Science Preparation Management
Science Coordination
H. Rauer
Camera Management
D. Laubier
DPS Management
B. Pontet
Exoplanet science
D. Pollacco
Stellar Science
M.J. Goupil
Target/field Characterization
G. Piotto
FU Coordination
S. Udry
End-to-end Simulator
W. Zima
Additional science
W. Weiss
TOU
R. Ragazzoni
Normal TOU
R. Ragazzoni
Fast TOU
W. Benz
FPA/FEE
D. Walton/M. Mas
Prototype & FM AIV
P. Levacher
AEU
S. Fredon
ICU
R. Cosentino
Normal DPU
Ph. Plasson
Hardware & boot software
M. Mas
Application software
Ph. Plasson
Fast DPU
G. Peter
Algorithms
R. Samadi
Data Centre
PDC
PDPM: L. Gizon
main / ancillary database system architecture
R. Burston
data processing implementation
I. Pardowitz
Input Catalogue
P. Giommi
ancillary database content management
M. Deleuil
data processing algorithms
R. Samadi
exoplanet analysis System
N. Walton
stellar analysis system
T. Appourchaux
data analysis support tools
L. Gizon

***PLA**netary **T**ransits*
***and O**scillations of stars*

http://www.oact.inaf.it/plato/PPLC/Home.html

Danke !

Expected noise level