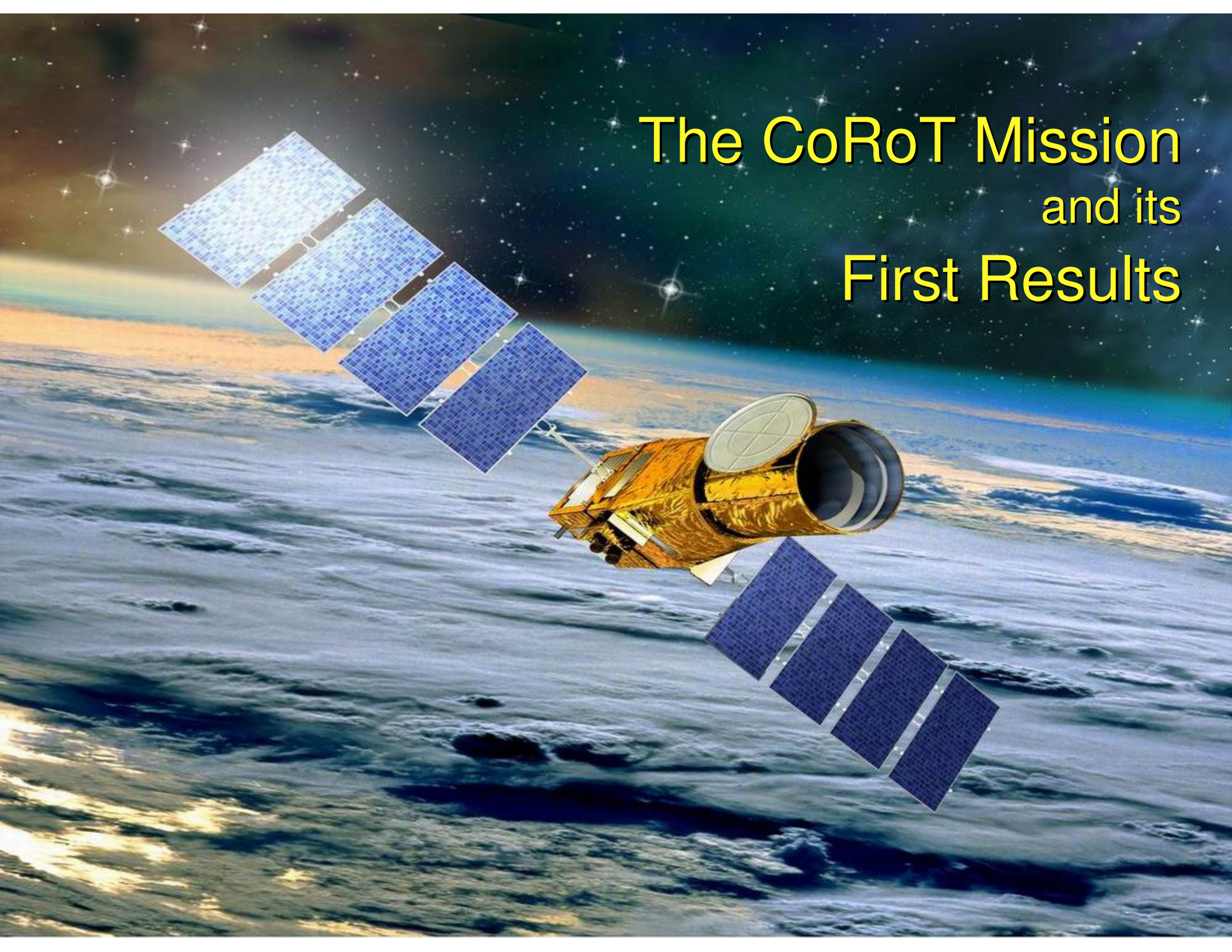


The CoRoT Mission and its First Results

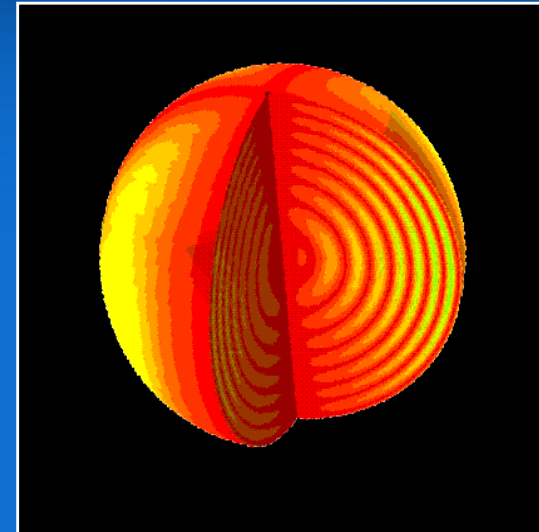




The definition of the mission

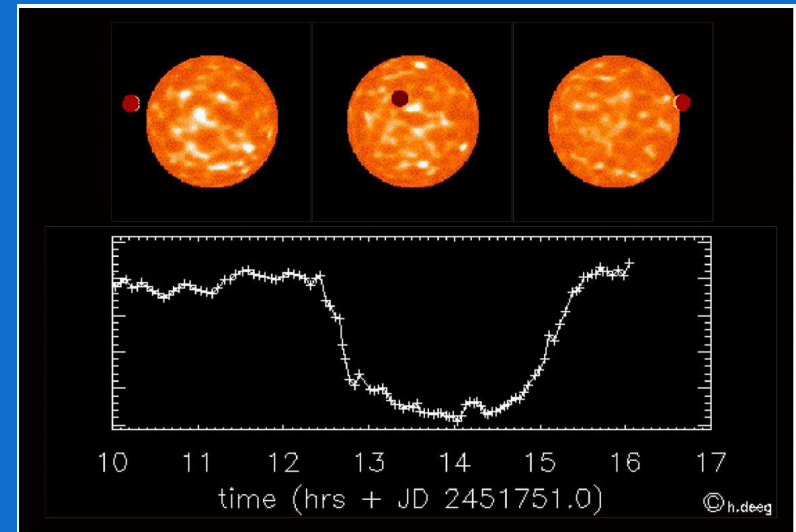
Two major
scientific programmes

And many others.....



See
Inside
the stars

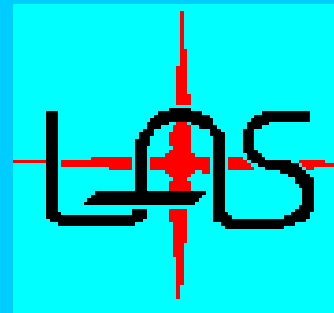
Ultra high stellar photometry
from space (1000 times better)
Very long durations (150 days)
Very high degree of continuity ($> 90\%$)



Detect small planets
and measure their size



Partners



LAT, CESR / OMP
OCA
LUTH, GEPI / OPM



Austria



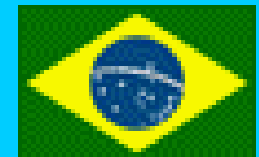
Spain



Belgium



Germany
ESA, Sc prog.



Brazil

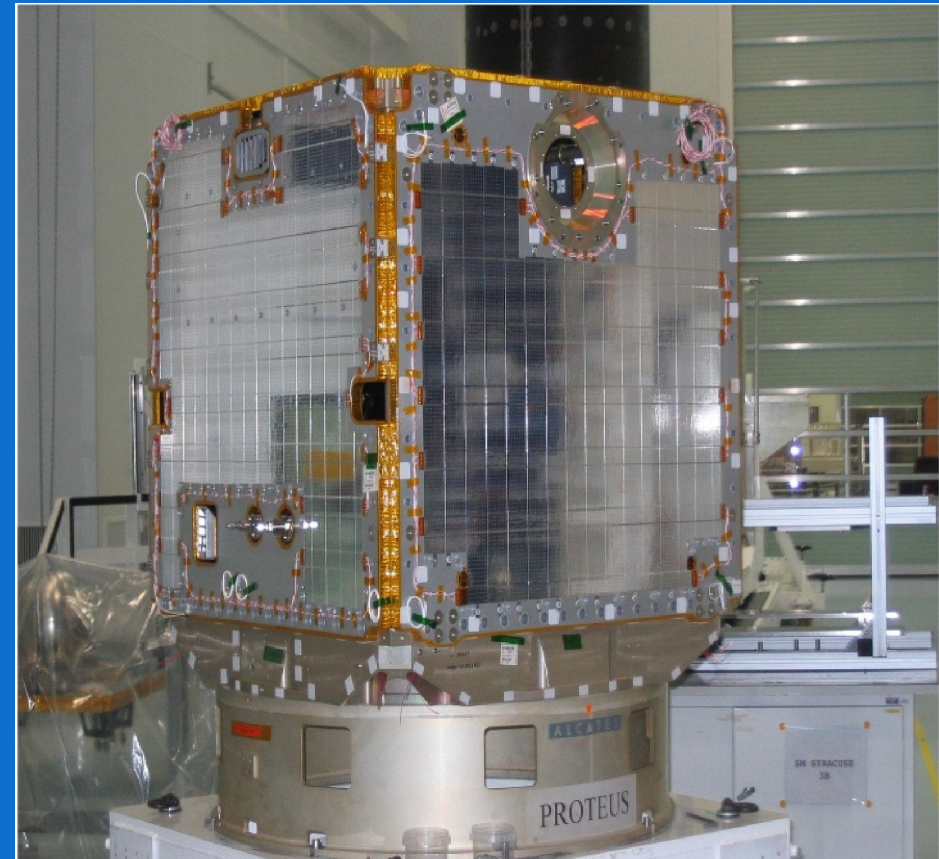
<http://corot.oamp.fr> <http://smc.cnes.fr>



The platform

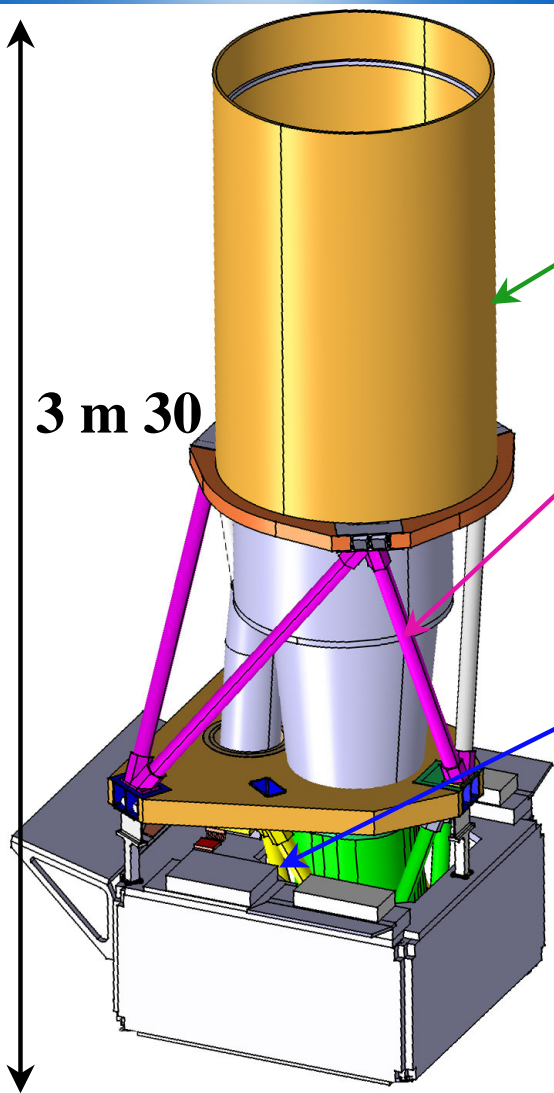
**Third PROTEUS Platform for intermediate size satellite
600 Kg, in Low Earth Orbit**

CNES Thales Alenia Space





The instrument



3 m 30

Very efficient Baffle

~ 1 photon over 10^{12}

Afocal Telescope :

diameter 27 cm

Field : 7 square degrees

Camera:

4 detectors CCD

2000x2000 pixels

2 for each program

Service module
(électronics)



1/09/05

CNES Toulouse

Dec 2001



Launch

- Soyuz II-1b maiden flight
- Baïkonour cosmodrome



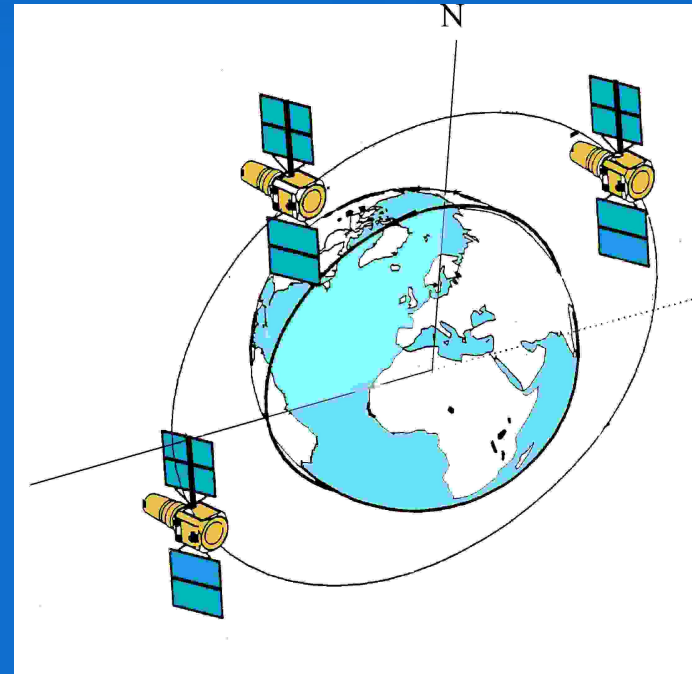
December 27th 2006 at 14:23:38 UT

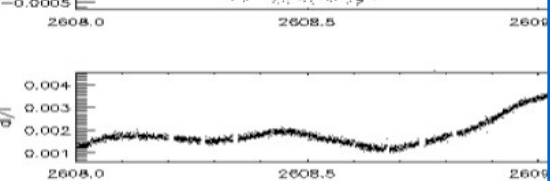
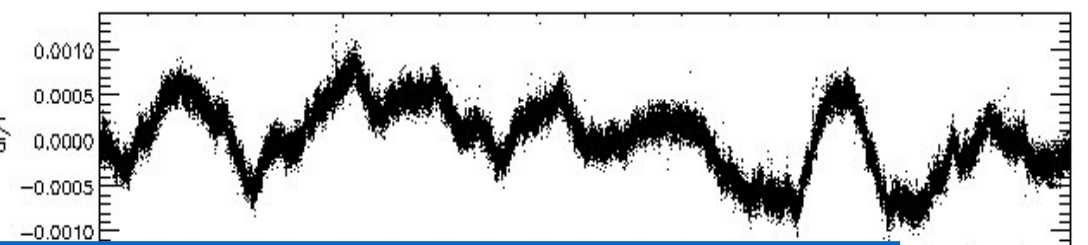
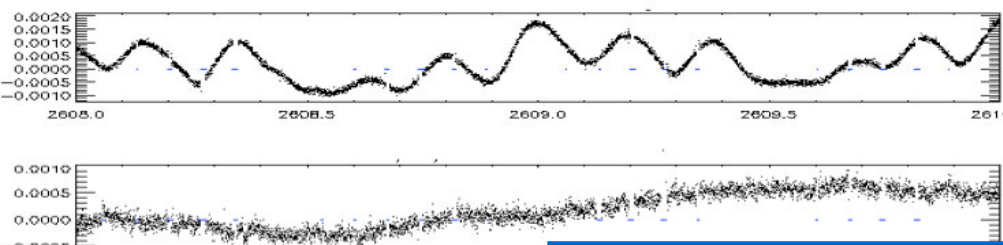
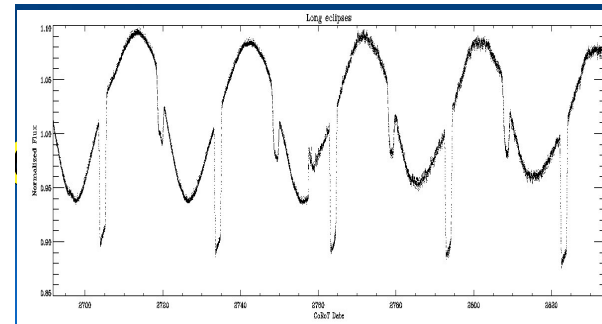
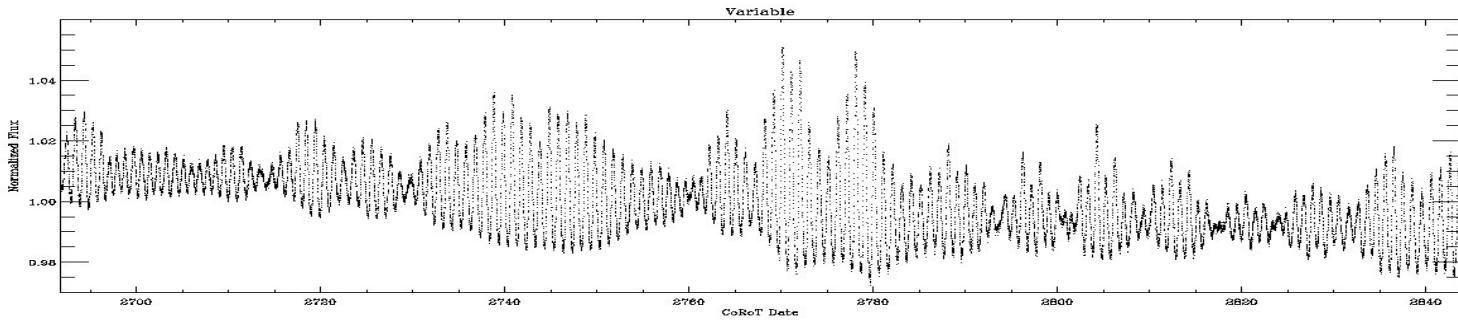
783 days in orbit



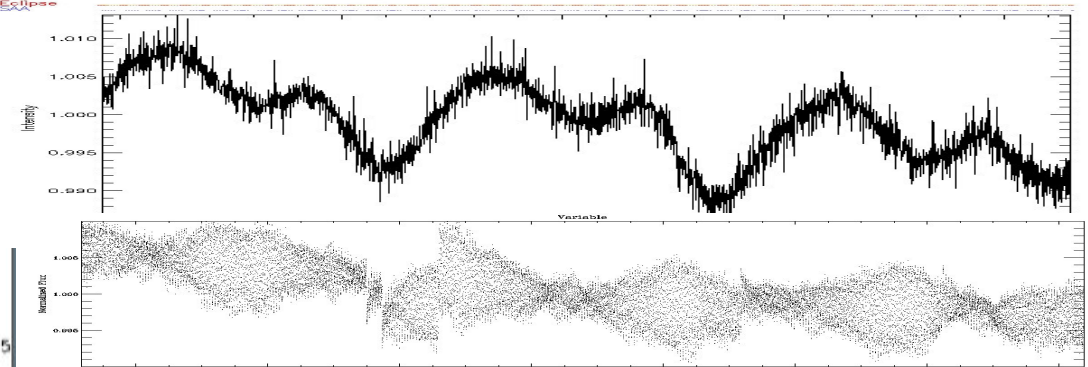
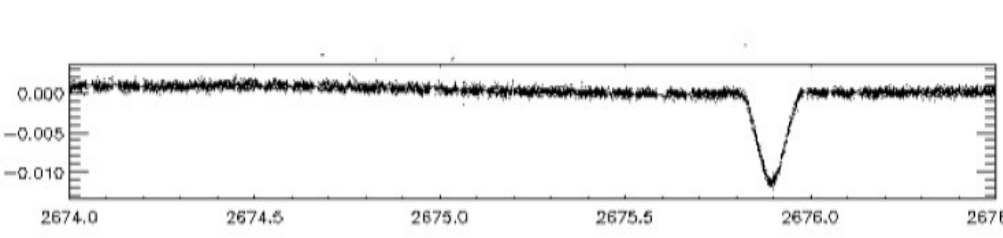
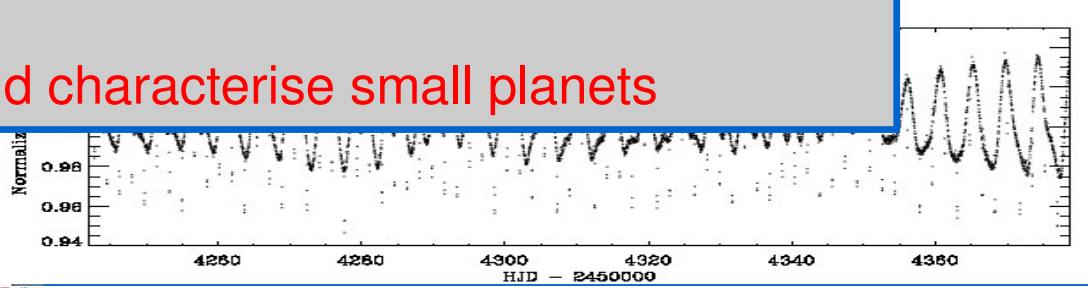
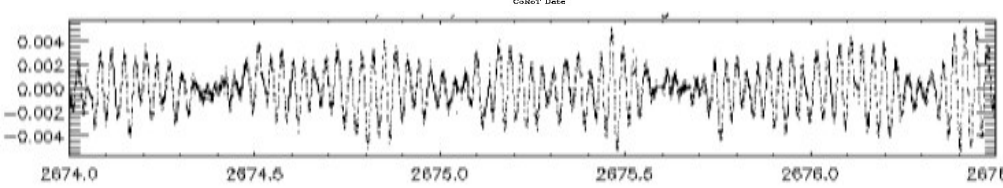
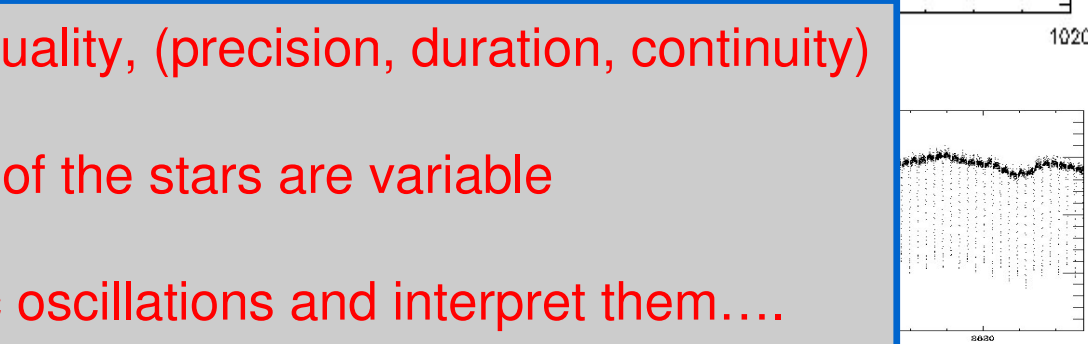
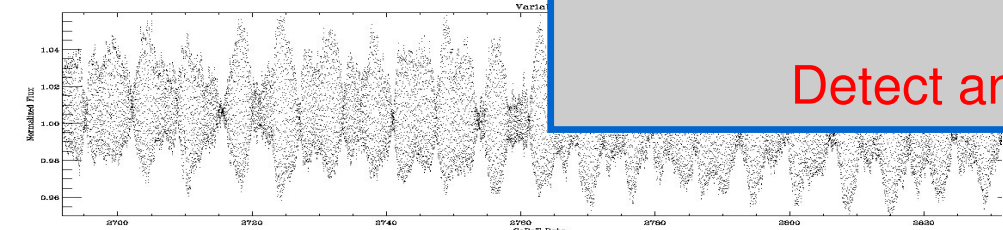
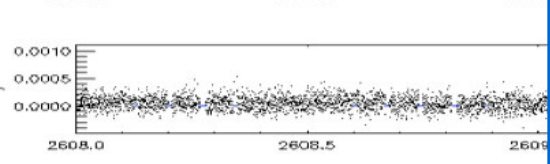
Orbit

A polar orbit at 896 Km
To be able to observe
for more than 100 days
in the same direction



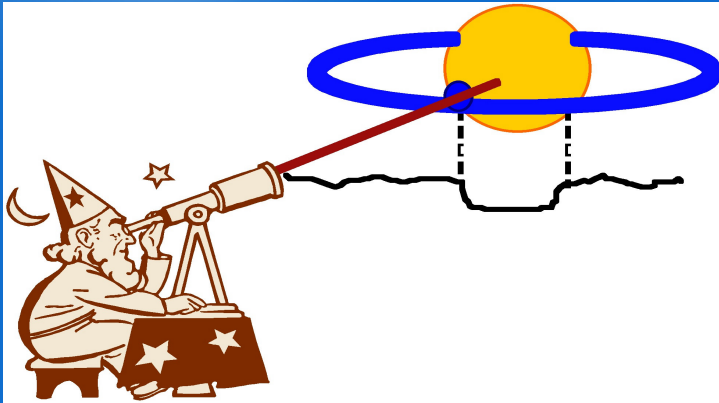


Data of excellent quality, (precision, duration, continuity)
 50% of the stars are variable
 Detect periodic oscillations and interpret them....
 Detect and characterise small planets



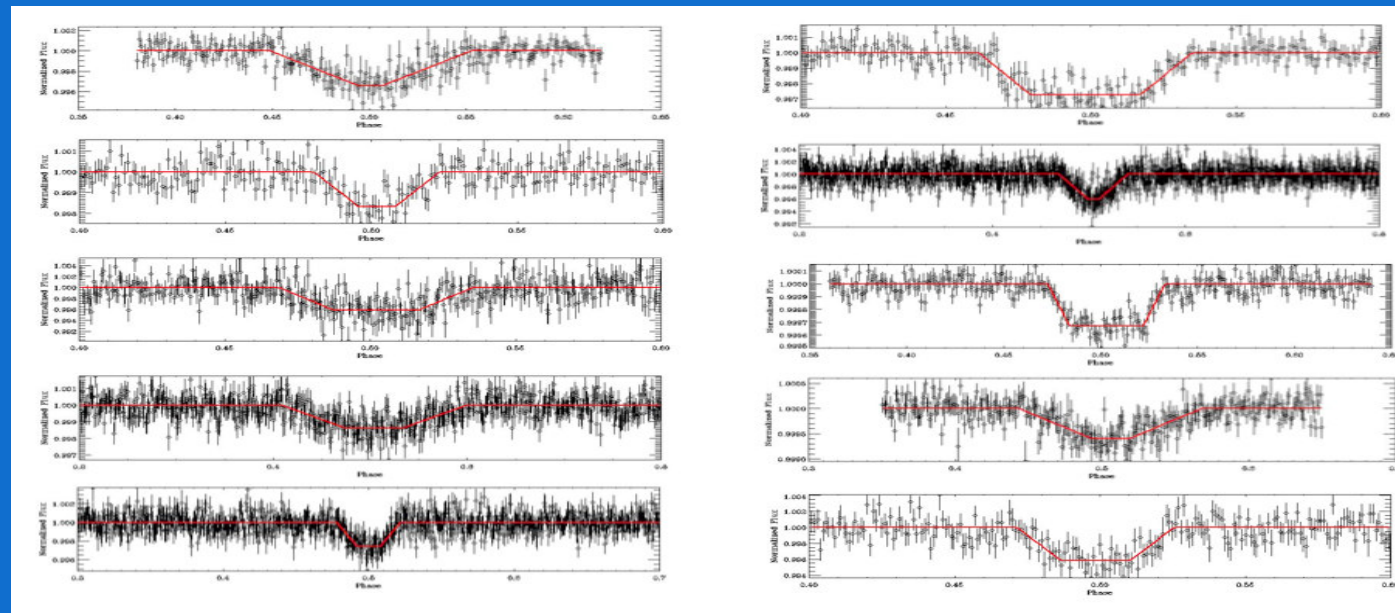


Planet detection: From light curves to « confirmed planets » ... long and complex



1- Detect a « transit » shape in the light curves

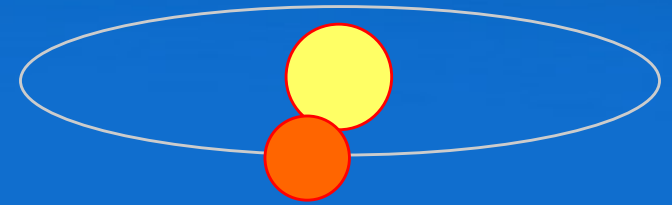
Already 40000 targets have been treated by 8 independant groups



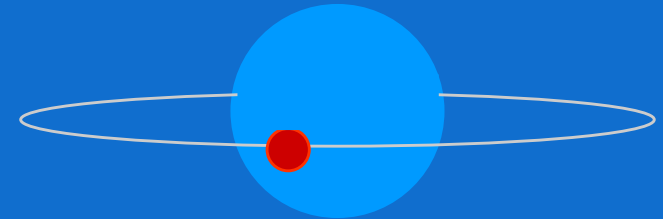


The impostors...to be eliminated

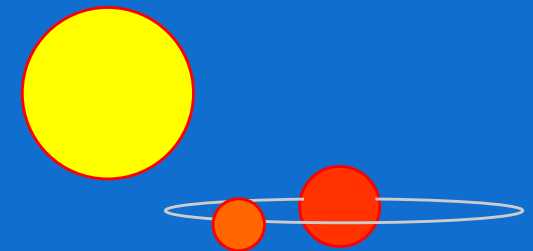
➤ Binary star with grazing eclipse



➤ Transit of a very small star on a very big one



➤ Binary star in the background



+ Complementary ground based observations with large telescopes
Takes time.....



3 Hot Jupiters

CoRoT-exo-1b

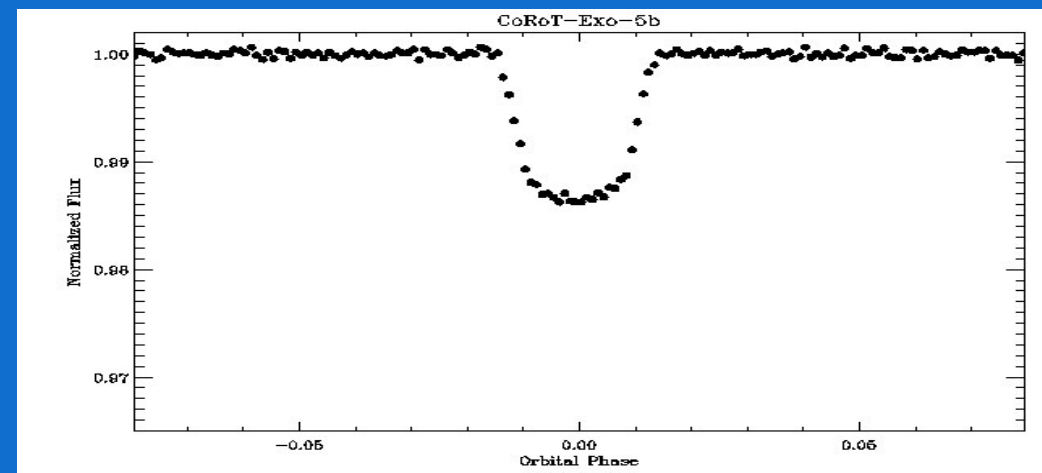
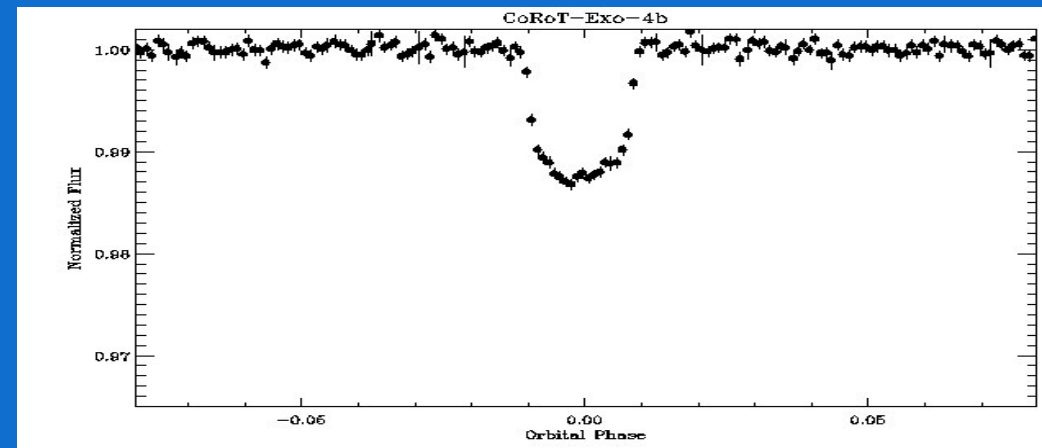
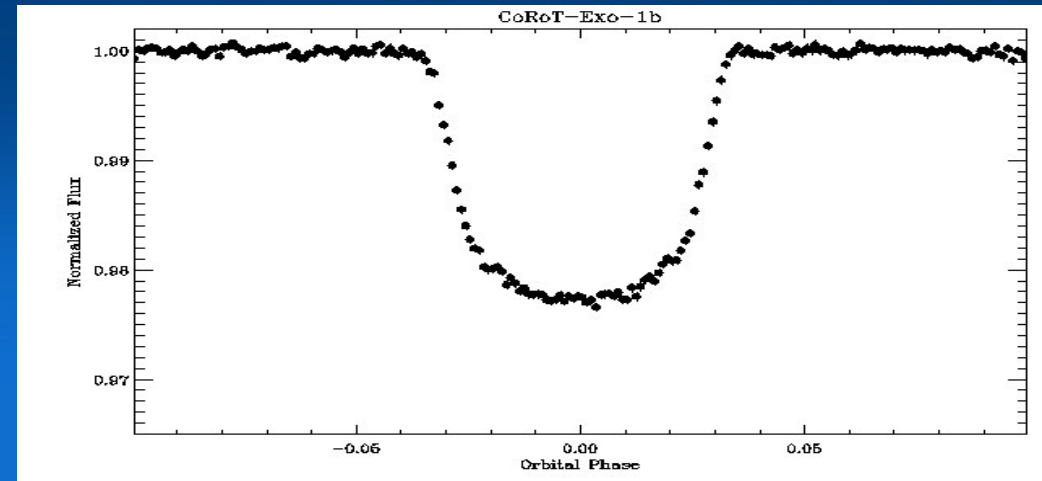
low density short period
36 successive transits

CoRoT-exo-4b

9.2 days synchronous orbit
46 successive transits

CoRoT-exo-5b

A classical Hot Jupiter
But very excentric
27 successive transits





Massive Hot Jupiters around active stars

CoRoT exo 2b

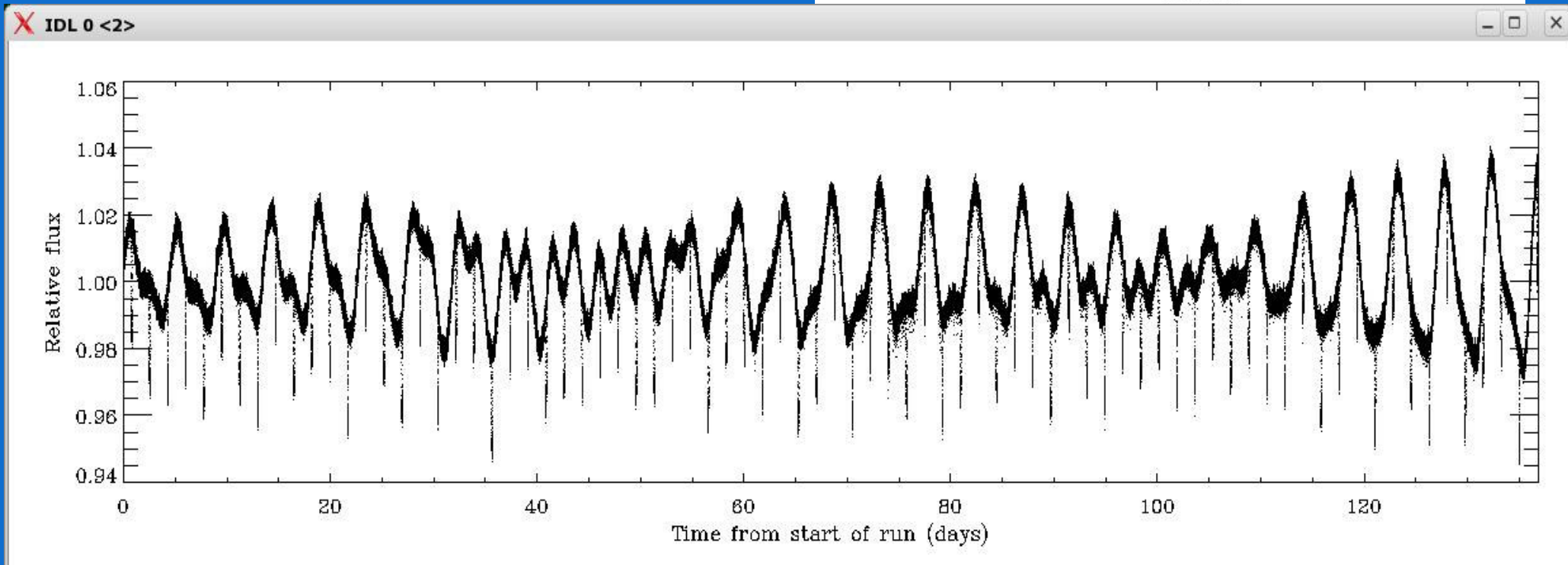
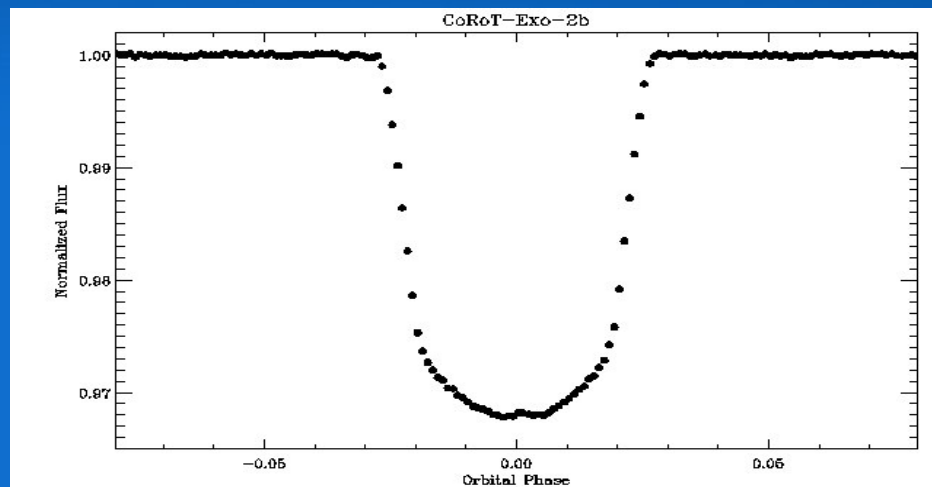
81 successive transits

Period: 1.742996 d

Radius: 1.465 R_J

Mass: 3.31 M_J

Rotation of the star 4.5 d





CoRoT-exo-6b

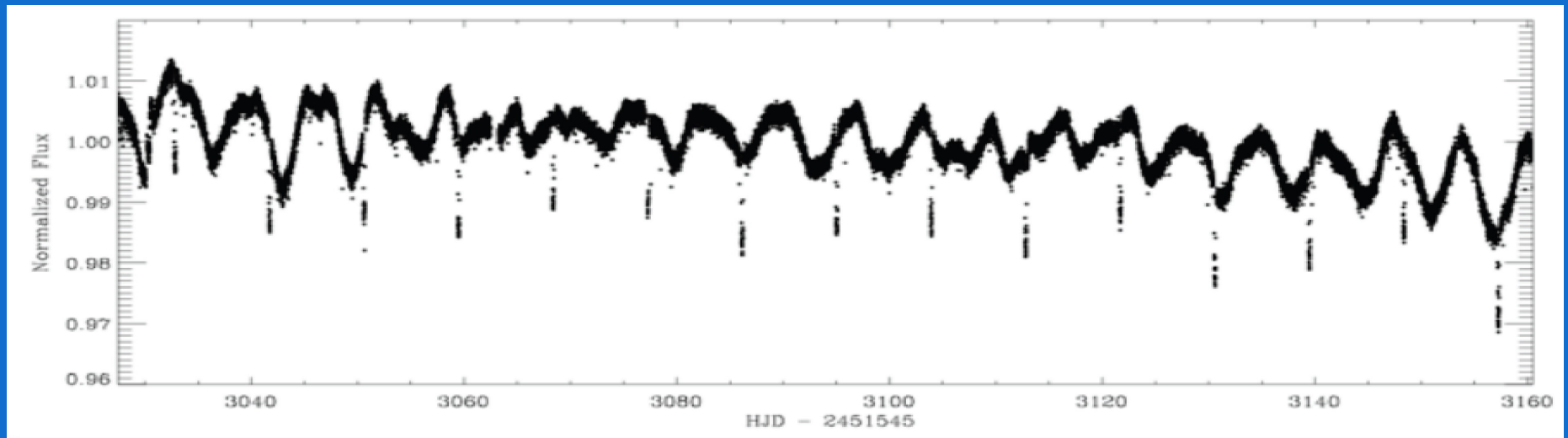
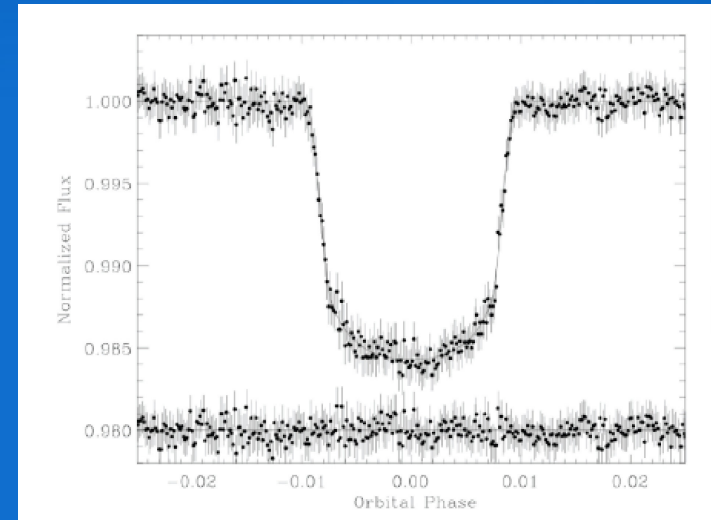
15 transits

Period: 8.88 d

Radius: 1.15 R_J

Mass: 3.3 M_J

Rotation of the star: 6 d

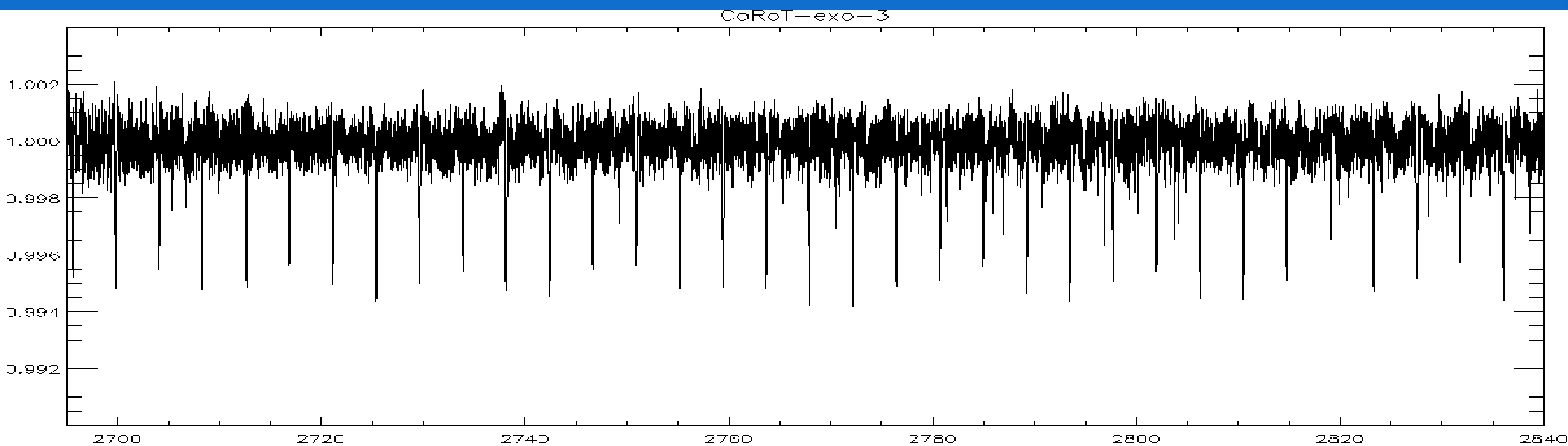
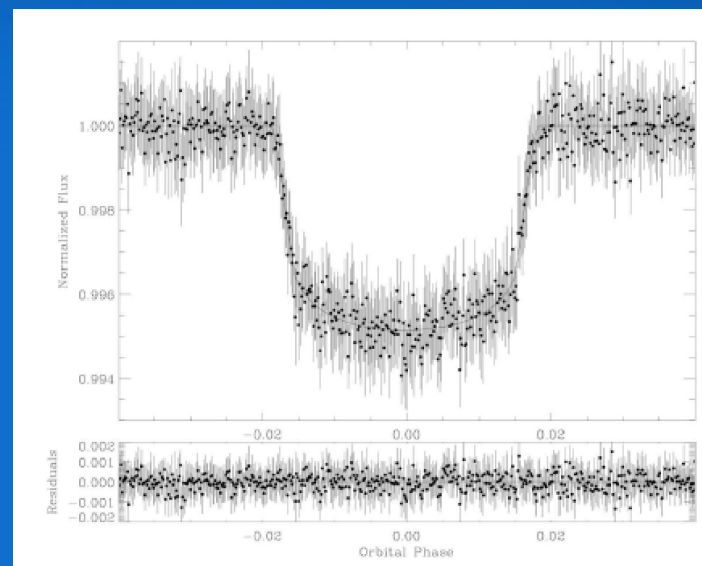




The heaviest planet or the less massive star?

CoRoT-exo-3b

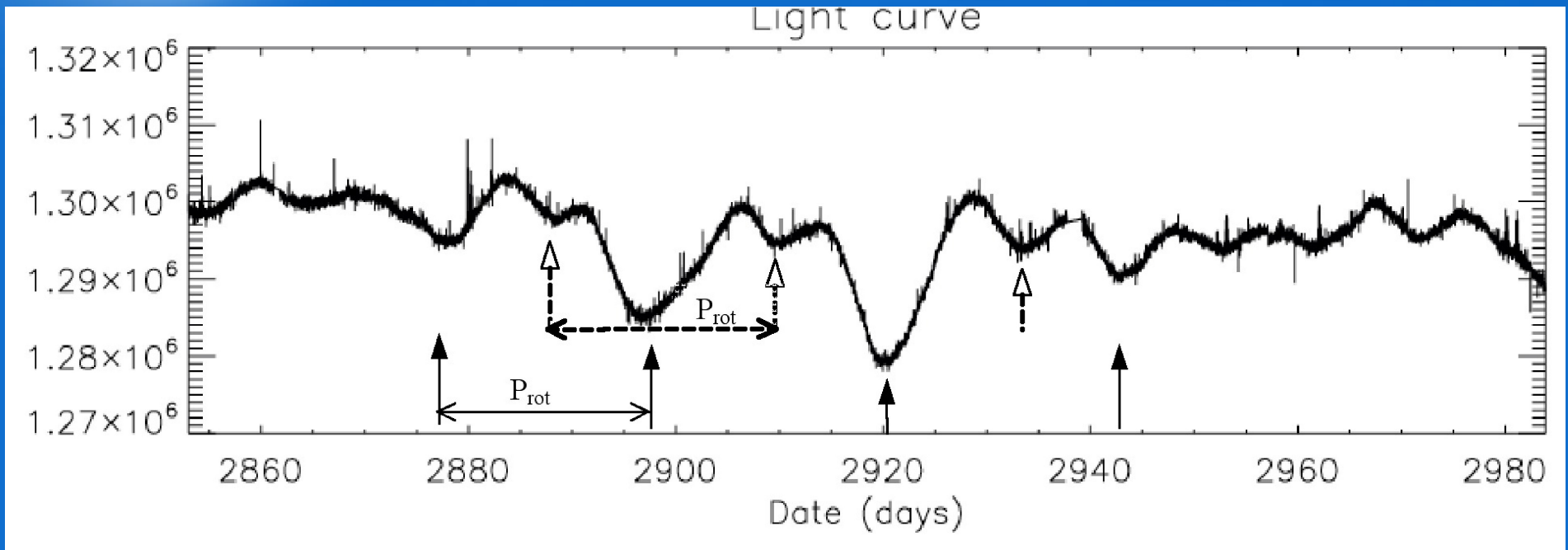
34 transits
Period 4.26 d
Radius: 1.01
Mass: 21.66
Prot ~ 4 d



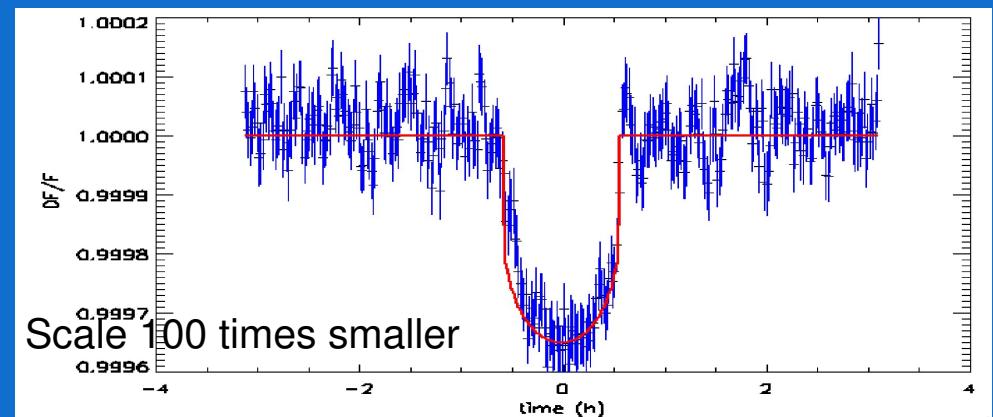


The smallest one

CoRoT-exo_7b



~ 170 transits
Period 0.85 d
Protation *: 23 d





What is it made of ?

Period: $P = 0.8536 \text{ d}$ (20.5 h)

→ $a = 0.017 \text{ AU} = 2.8 R_{\square}$

Radius: $R_{pl} = 1.74 R_{\oplus} \pm .13$

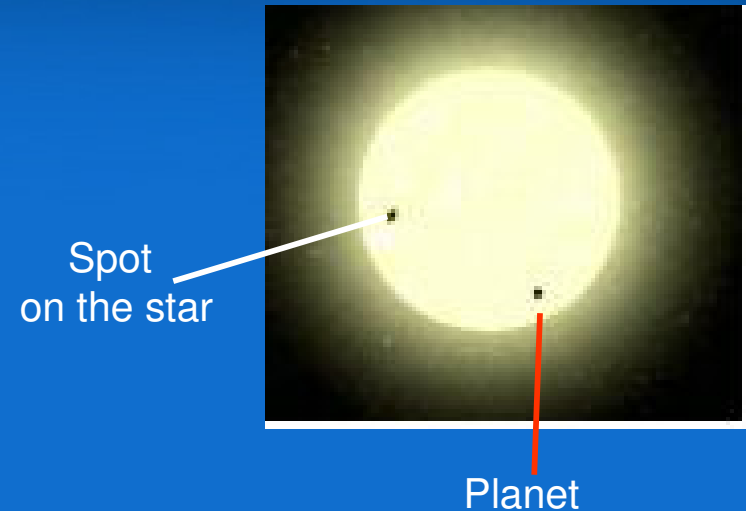
Temperature: **between 1100 et 2000 K** depending on albedo

Structure ?

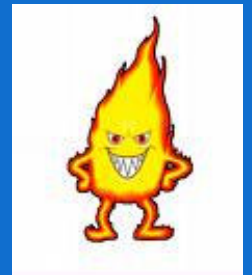
rocky : if $M > 6 M_{\oplus}$
solid or liquid lava ?

ocean-planet if $M < 5 M_{\oplus}$
then super-critical water

Slightly elongated by the tidal forces (1%)



pretty hot !





Many more pulsating stars, and many more planet candidates

Probably 4 more years of operation....