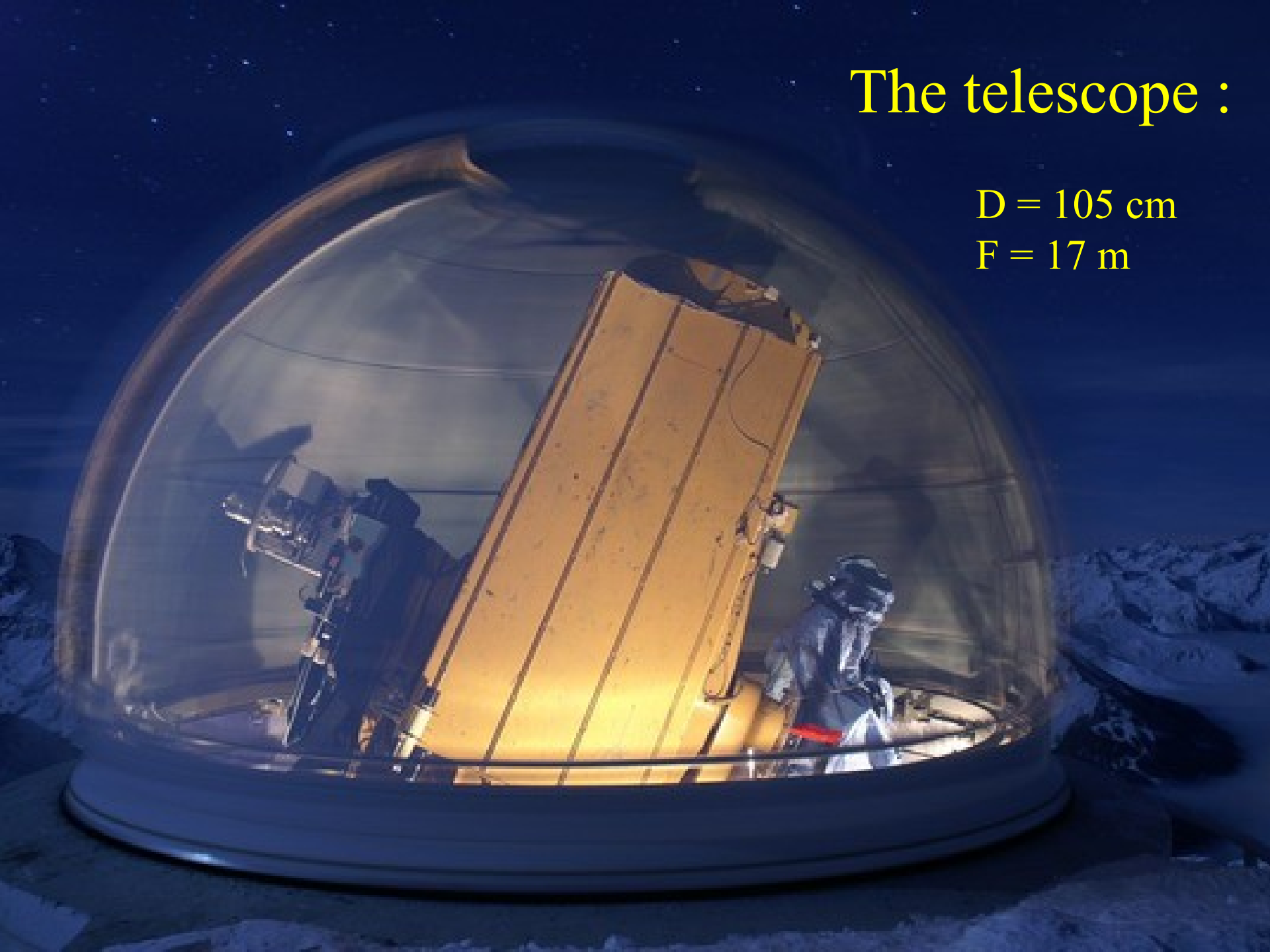
T1M : *Station de Planétologie des Pyrénées*

a new astrometrical telescope ?

François COLAS

IMCCE - Observatoire de Paris

O planeto – November 14th


The telescope :
D = 105 cm
F = 17 m

Telescope Status

The telescope is used for planetary studies, now mainly on asteroids and comets.
It belongs to a small team of Paris Observatory (IMCCE – LESIA). So it is well adapted to subjects needing long observations runs or a massive mobilisation for a transient event (New comet, NEO, ..)

The instrumentation was made to use the good seeing conditions at Pic du Midi but with a small field of view. It is possible to use it for astrometry but it will never be excellent.

Martian satellites

Mars, Phobos et Deimos (T1M, Pic du Midi, sep 2003)

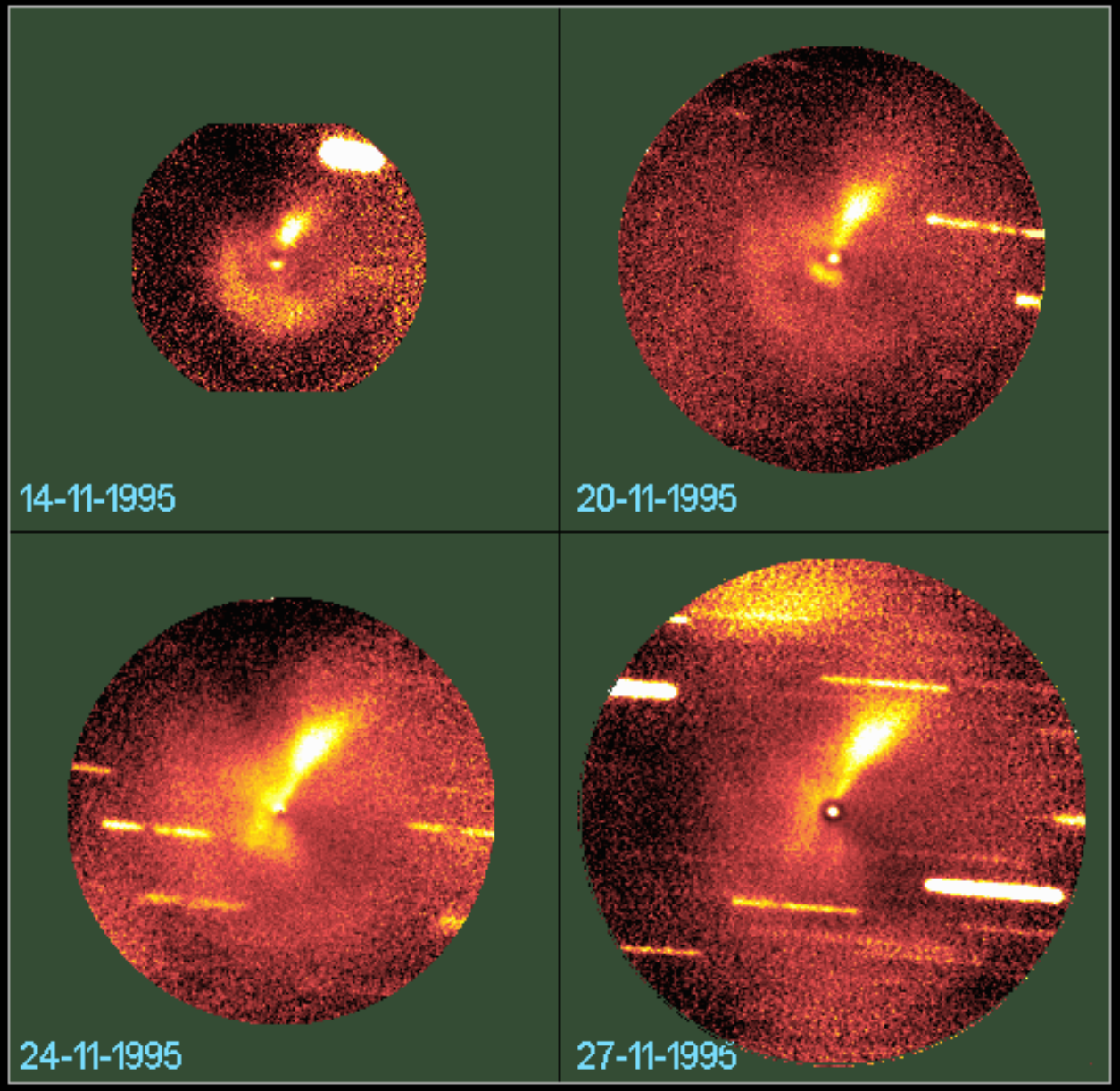
Uranian satellites

Uranus, Miranda, Ariel, Umbriel, Titania, Oberon

(T1M, Pic du Midi, july 2003)

(THX 7863, prime focus)

Comète 29 P / SCHWASSMANN-WACHMANN 1 durant un sursaut



distance
à la Terre :
~ 6.4 UA

S2P

Instrumentation

ANDOR camera based on the CCD E2V 2Kx2K

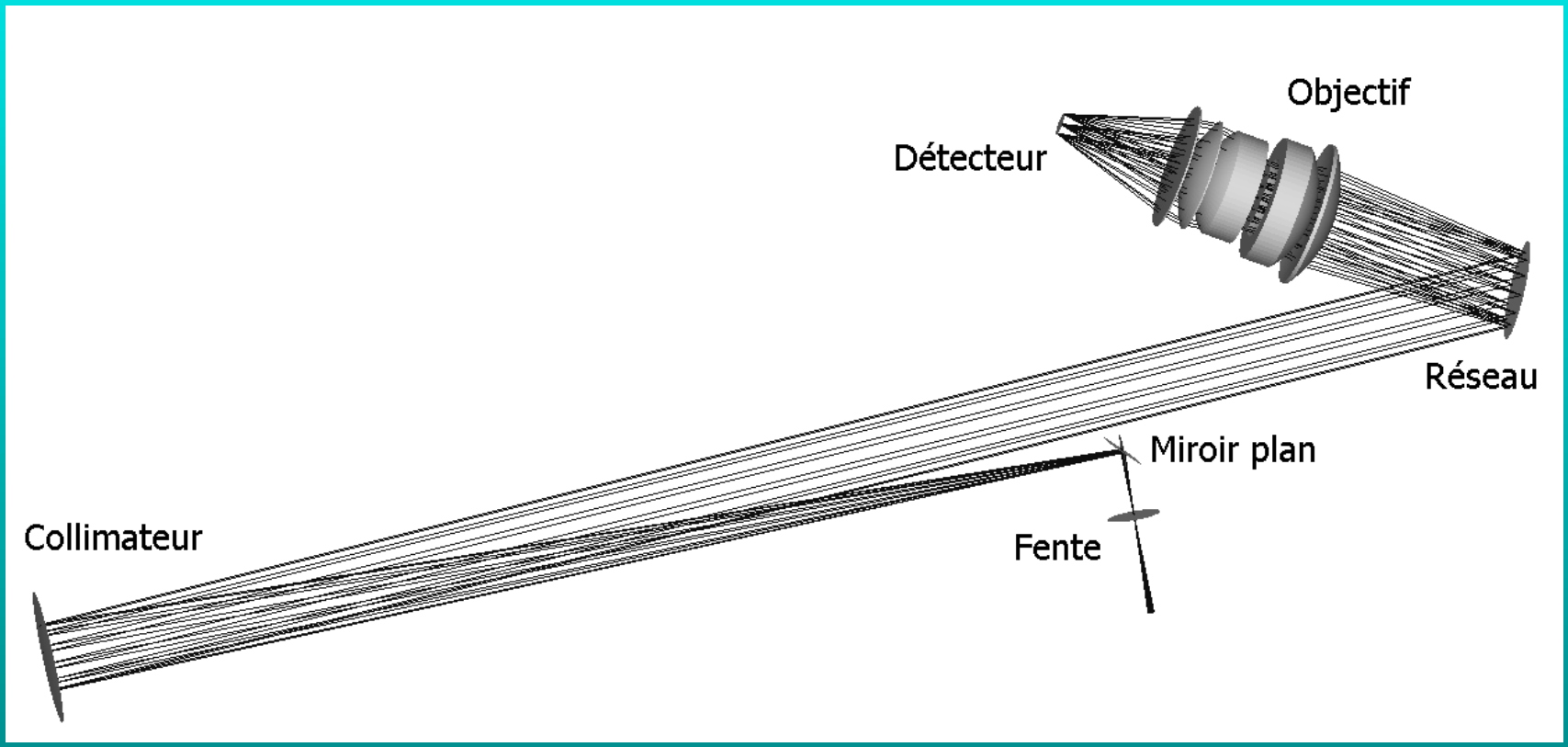
Low read out noise (3e-) for fast moving asteroids
At cassegrain focus the field of view will be of 8 arc min.

Focal reducer PALOMBE (F/5) field = 20 arcmin => 50 reference stars

Spectro PALOMBE R = 100

Spectrometer PICASSO

PIC *du midi* ***A****steroids* ***S****pectroscopic* ***S****urvey* ***O****bservatory*



R = 100

m = 17 with 30 min exposure

Scientific programs

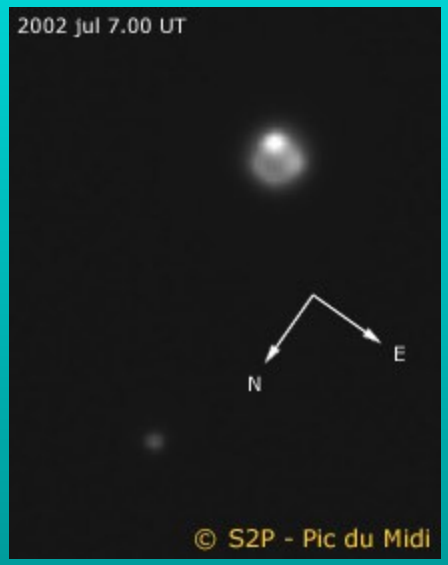
Stellar occultation prediction

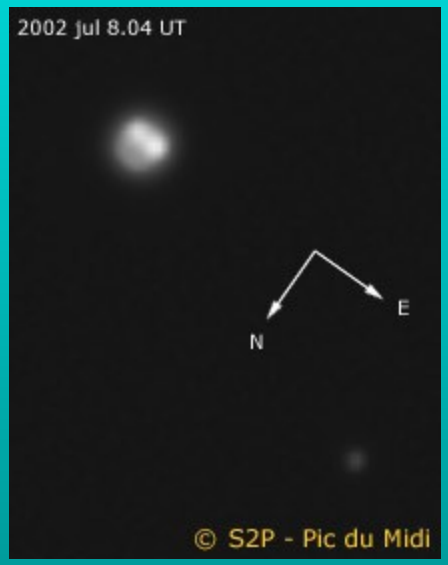
Stellar occultations by solar system objects are unique event the measure sizes with a kilometer accuracy or to study atmospheres.
The problem is the accuracy of the predictions especially for TNOs.

Team :

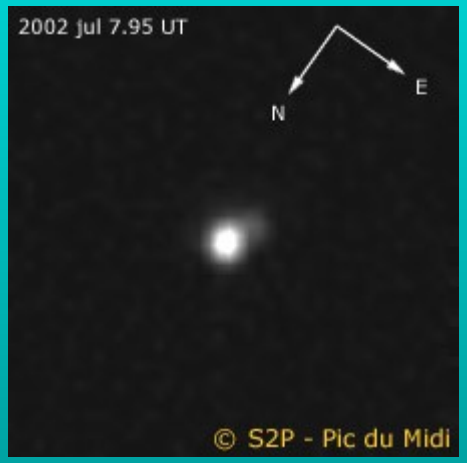
F.Colas, B.Sicardy, J.Lecacheux, W.Thuillot
A.Doressoundiram, F.Roques, T.Wideman

Neptune and Pluto





Neptune, Triton
(THX 7863, prime focus)



Pluto, Charon
(THX 7863, prime focus)

Asteroids mass

S.Mouret (2006) showed that with GAIA measurements it will be possible to determine asteroid mass by mutual perturbations. The number of measurements depend on the number of events during GAIA mission. With ground base observations we can measure more masses.

Team

S.Mouret, D.Hestroffer, F.Colas, W.thuillot

Reference system

Extension of GAIA astrometry to faint objects (m>20), it will used to connect refernces frames.

The measurement of GAIA position will be important. We are making tests with WMAP a satellite at the same L2 point.

Team

J.Souchay, S.Bouquillon, F.Taris, M.Birlan

- **NEO**

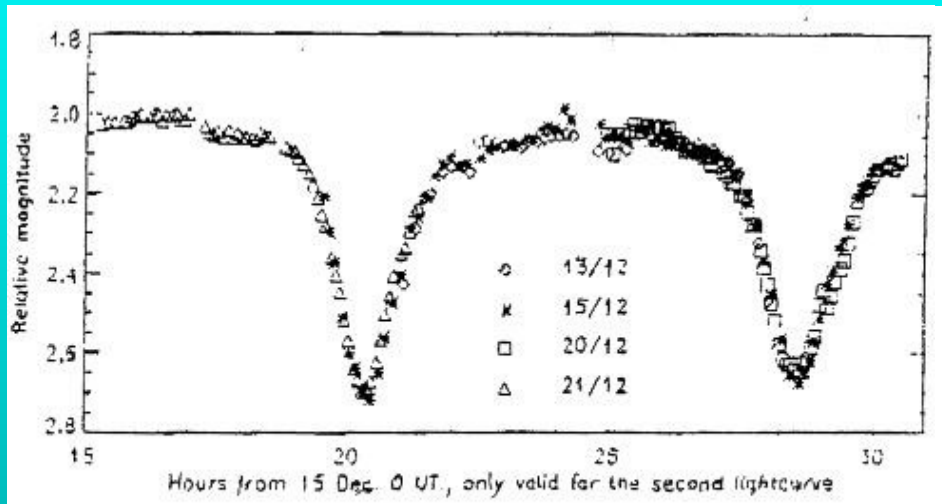
Thuillot (2002) showed that the accuracy of NEO orbits mainly depend on the accuracy of the last measurements.

With this telescope we hope to have a gain of two orders for astrometric reduction.

Team

J.Vaubaillon, W. Thuillot, F. Colas, D.Hestroffer, M.Birlan
EURONEAR,

90 ANTIOPE



Composite lightcurve of 90 Antiope in December 1996
(Hansen et al., 1997, Minor Planet Bull., 24, 17)

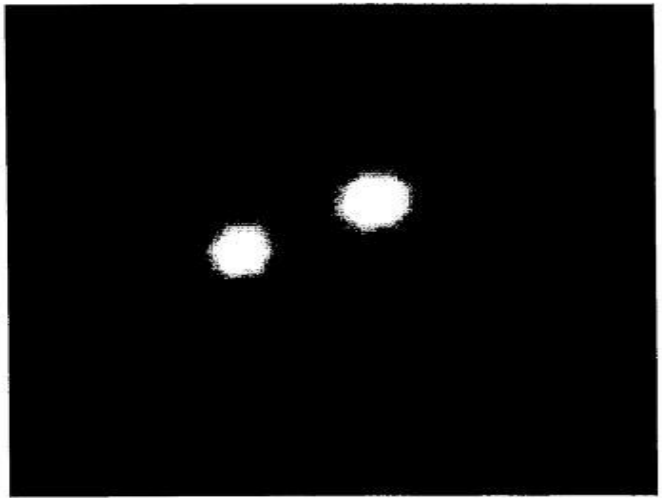
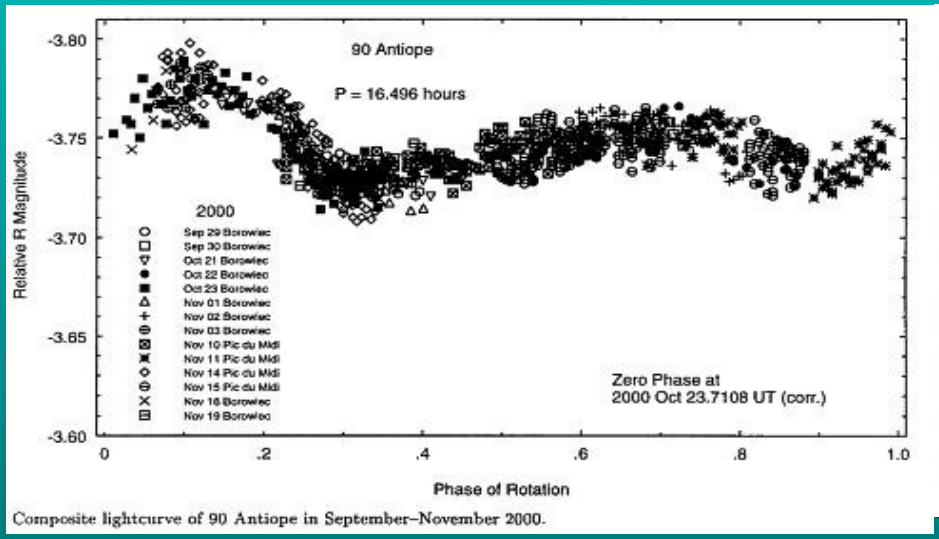
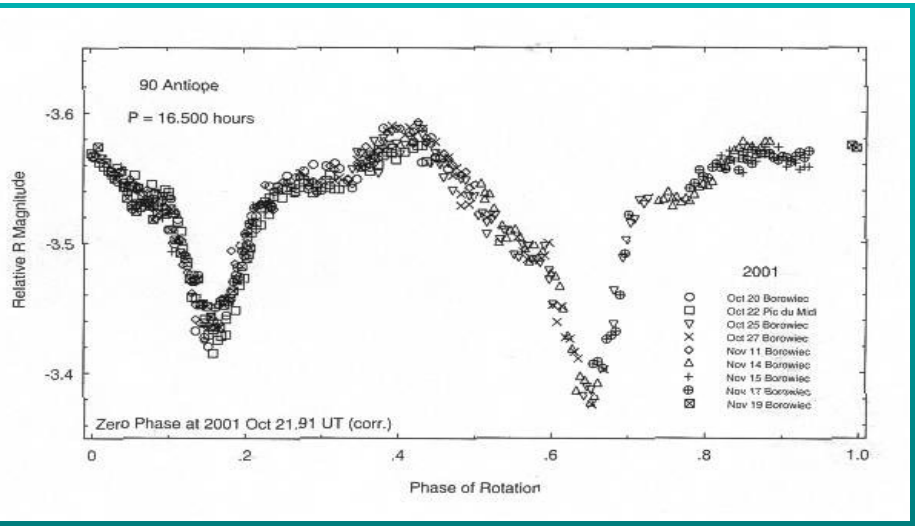


Image of double asteroid 90 Antiope
(Merline et al., http://www.boulder.swri.edu/~merline/press/)



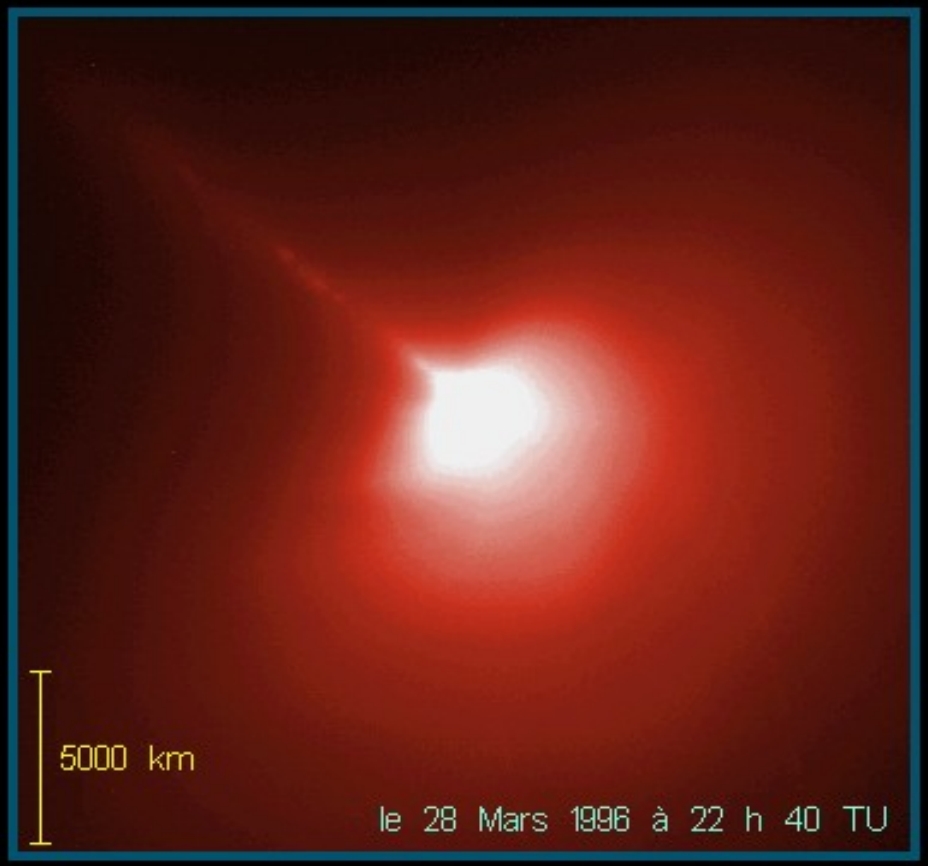
Composite lightcurve of 90 Antiope in September–November 2000.

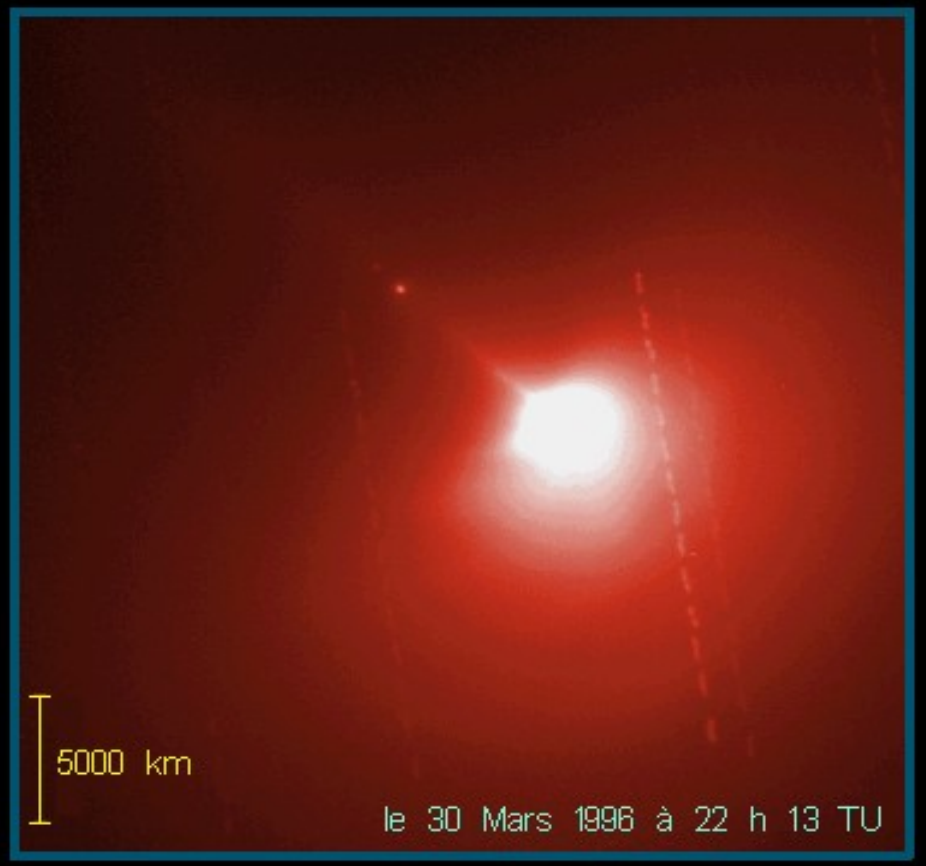


COMETS ....

Comète HYAKUTAKE 1996 B2

EVOLUTION RAPIDE DE PETITS FRAGMENTS SÉPARÉS DU NOYAU



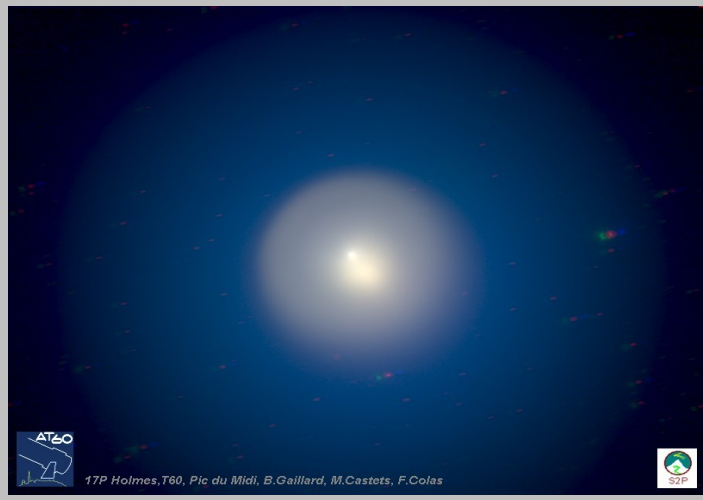


Observatoire du Pic-du-Midi , télescope T1m

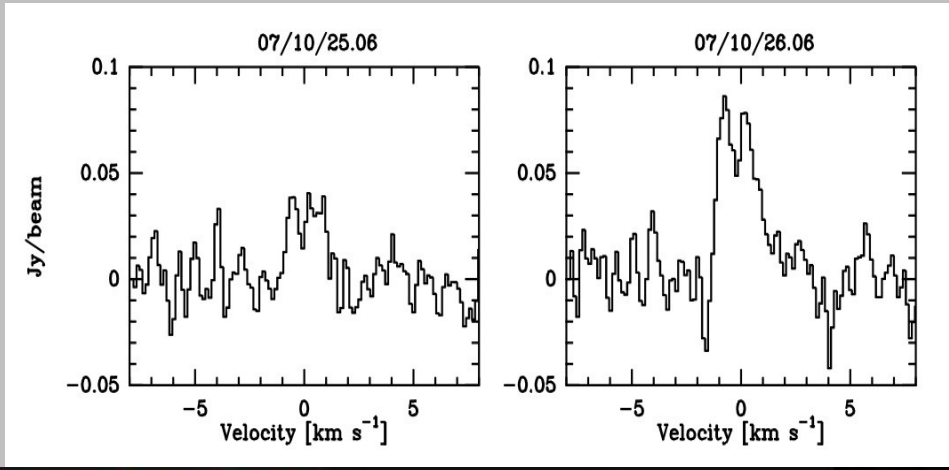
S2P

Comet HOLMES

C2



Nancay



IRAM