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C2PU: 1-Meter Telescopes for the GAIA-FUN

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Presentation

C2PU stands in french for “*Centre Pédagogique Planète Univers*” (Planet and Universe Pedagogic Center). It is a project both for pedagogic and research purposes. It relies on the renewal of two 1-meter diameter telescopes. These two telescopes were earlier coupled as part of an interferometric instrument called SOIRDETE (for “*Synthèse d'Ouverture en Infra Rouge avec DEux Telescopes*”), described in Rabbia et al. 1990.

These two telescopes are located in southern France, 50 km away from the city of Nice, on the so-called “*Plateau de Calern*”. The coordinates are 6° 55' 22" East in longitude, 43° 45' 14" North in latitude and 1261 m in elevation. The average number of clear nights per year is 200 and the sky background level ranges from 20.7 to 21 magnitudes per square arc-seconds.

The project is supported by the “Observatoire de la Côte d'Azur” (OCA), the University of Nice Sophia-Antipolis (UNS) and the “Collège de France” (CdF). The two Cassegrain telescopes are planned to be renewed in two phases. The first one which has begun in September 2010 involves the shaping and polishing of a 1-meter primary mirror for the East Telescope (E-Tel), out of a Zerodur® blank provided by OCA. This phase should end late 2011. During this polishing operation by D. Vernet from CdF, the refurbishing of the mechanical structure of the telescope is undertaken. In parallel, we are designing the hardware and software for the remote control of E-Tel through Internet. The second phase will begin in 2012 and will concern the second 1-meter telescope, the West-telescope (W-Tel).

The E-Tel is planned to have two different focus configurations: an F/3 prime focus for wide field imaging, and a Cassegrain F/12.5 focus. Switching from one configuration to the other will only consist in plugging or unplugging an opto-mechanical module. The telescope will be driven by an automatic controller, accessible through an internet interface, to allow for remote observations. The F/3 focus will be equipped with a SBIG STX-16803 CCD camera. This will lead to a pixel scale of 0.6"/pix and a 40×40 arcmin field of view. The 20th magnitude is expected to be reachable in a 1 min exposure. This configuration will be dedicated to wide field imagery and transit photometric surveys. The F/12.5 focus will receive a SBIG ST8XME CCD camera. This will provide for a 3.8×2.5 arcmin field of view, with a pixel scale of 0.15 arcsec/pix. Magnitude 17 is expected to be reachable in 1 minute exposure. This configuration will be used for spectroscopy and/or polarimetry. The characteristics of the spectrometer and of the polarimeter are currently under discussion.

The W-Tel with its F/35 “*coudé*” focus should be available late 2012. The focal image will be delivered on an optical bench, at a fixed point, regardless of the position of the astronomical target. On this optical bench, all kind of focal instrumentation will be welcomed, such as a deformable mirror and a wave front sensor for an adaptive optic system, a differential speckle interferometer, a spectrometer or a polarimeter. With a SBIG ST8XME CCD camera, this

configuration would lead to a 1.3×1 arcmin field of view, with a pixel scale of 0.05 arcsec/pix. Magnitude 15 should be reachable in 1 minute exposure.

The observation will be performed essentially by supervised master students, but in case of alert during a non pedagogic period, dedicated staff will be reachable for an in situ observation and/or remote session assistance.

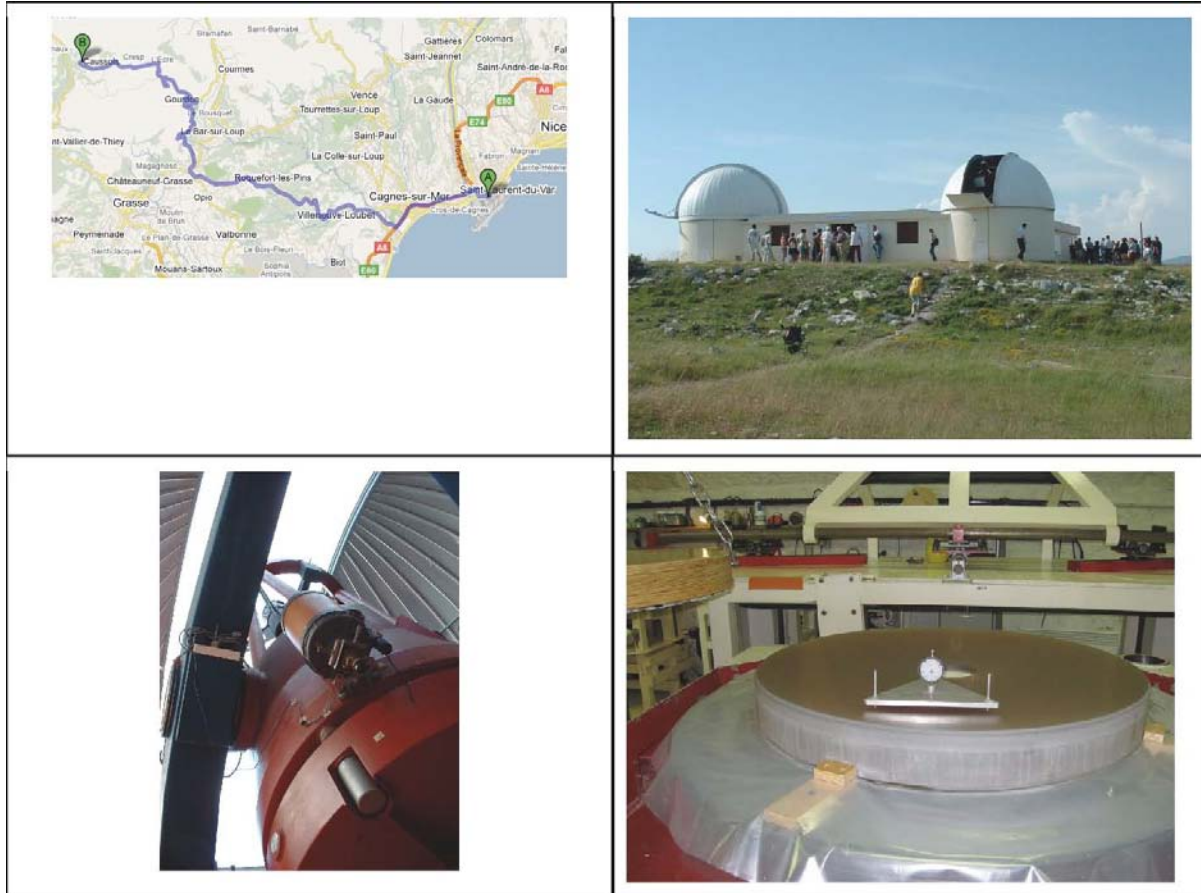


Fig. 1 – from up left to down right: a) The roadmap from Nice International Airport to “Plateau de Calern”, b) the two C2PU domes, c) East telescope (E-Tel), d) polishing and curvature control of the 1-meter Zerodur® blank.

Table 1 – Summary of the C2PU characteristics and receptors

Instrument	1	2	3
Name	T_E_F3=GROUCHO	T_E_F12=HARPO	T_W_F35=ZEPP0
Refractor/Reflector	reflector	reflector	reflector
Focal length(m)	3	12.5	35
Diameter (m)	1	1	1
Comments	GROUCHO and/or HARPO will be remotely accessible		
Receptor			
Type/name	SBIG STX-16803	SBIG ST8XME	SBIG ST8XME
Pixel size (arcsec/pix)	0.6"/pix	0.15"/pix	0.05"/pix
Field Of View (arcmin)	40×40'	3.8×2.5'	1×3.1'
Limiting magnitude	20 in 1 minute exposure	17 in 1 minute exposure	15 in 1 minute exposure

Conclusion

C2PU will offer as soon as late 2011 an observation facility, perfectly suited for GAIA-FUN. Indeed, it will allow for both an easy follow-up of moving object through its wide field F/3 focus, and efficient physical parameters measurements through a range of focal instruments, to be fitted to the F/12.5 and F/35 focuses. The remote control through Internet and the supervised student manpower will allow for a fast reactivity and extensive time coverage.

References

Rabbia Y., Mékarnia D., Gay J. :1990 Infrared interferometry at Observatoire de la Côte d'Azur, France, in *Infrared Technology XVI; Proceedings of the Meeting, San Diego, CA, July 11-13, 1990 (A92-21426 07-35)*. Bellingham, WA, Society of Photo-Optical Instrumentation Engineers, p. 172-182.

