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## The PAU (BAO) Survey

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Baryon Acoustic Oscillations (BAO) provide a “standard ruler” of known physical length, making it one of the most promising probes of the nature of dark energy. Contrary to usual assumptions, it is possible to obtain photometric redshifts with enough precision to measure BAO along the line of sight. We show that  $\sigma_z \sim 0.003(1+z)$  is sufficient: a much better precision will produce an oversampling of the BAO peak without a significant improvement on its detection, while a much worse precision will result in the effective loss of the radial information. This precision in redshift can be achieved for bright, red galaxies, featuring a prominent 4000 Å break, by using a filter system comprising about 40 filters, each with a width close to 100 Å, covering the wavelength range from 4000 Å to 8000 Å, supplemented by two broad-band filters similar to the SDSS u and z bands. We describe the practical implementation of this idea, a new galaxy survey project, PAU, to be carried out with a telescope/camera combination with an etendue about 20 m<sup>2</sup> deg<sup>2</sup>, equivalent to a 2 m telescope equipped with a 6 deg<sup>2</sup>-FoV camera, and covering 8000 deg<sup>2</sup> in the sky in four years. We expect to measure positions and redshifts for over 14 million red, early-type galaxies with  $L > L^*$  and  $I_{AB} < 22.5$  in the redshift interval  $0.1 < z < 1$ , with a precision  $\sigma_z < 0.003(1+z)$ . This population has a number density  $n > 10^3 \text{ Mpc}^3/h^3$  galaxies within the  $11 (\text{Gpc}/h)^3$  volume to be sampled by our survey, ensuring that the error in the determination of the BAO scale is not limited by shot-noise. By itself, such a survey will deliver precisions of order 5% in the dark-energy equation of state parameter  $w$ , if assumed constant, and can determine its time derivative when combined with future CMB measurements. In addition, PAU will yield high-quality redshift and low-resolution spectroscopy for hundreds of millions of other galaxies, including a very significant high-redshift population. The data set produced by this survey will have a unique legacy value, allowing a wide range of astrophysical studies.

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**Mardi 24 juin 2008 à 15 heures**

**Salle André Berthelot, bât. 141**

Le café sera servi 15 minutes avant

NB : *La présentation d'une carte d'identité ou d'un passeport est exigée à l'entrée du centre. Tous les auditeurs extérieurs sont priés de prévenir à l'avance de leur visite Emilie Chancrin, tél. 01 69 08 23 50 (U.E. : délai de 24 h, hors U.E. : délai de 4 jours).*