LSST-France: activité scientifique

DESC (Dark Energy Science Collaboration) et autres

Membres français de LSST

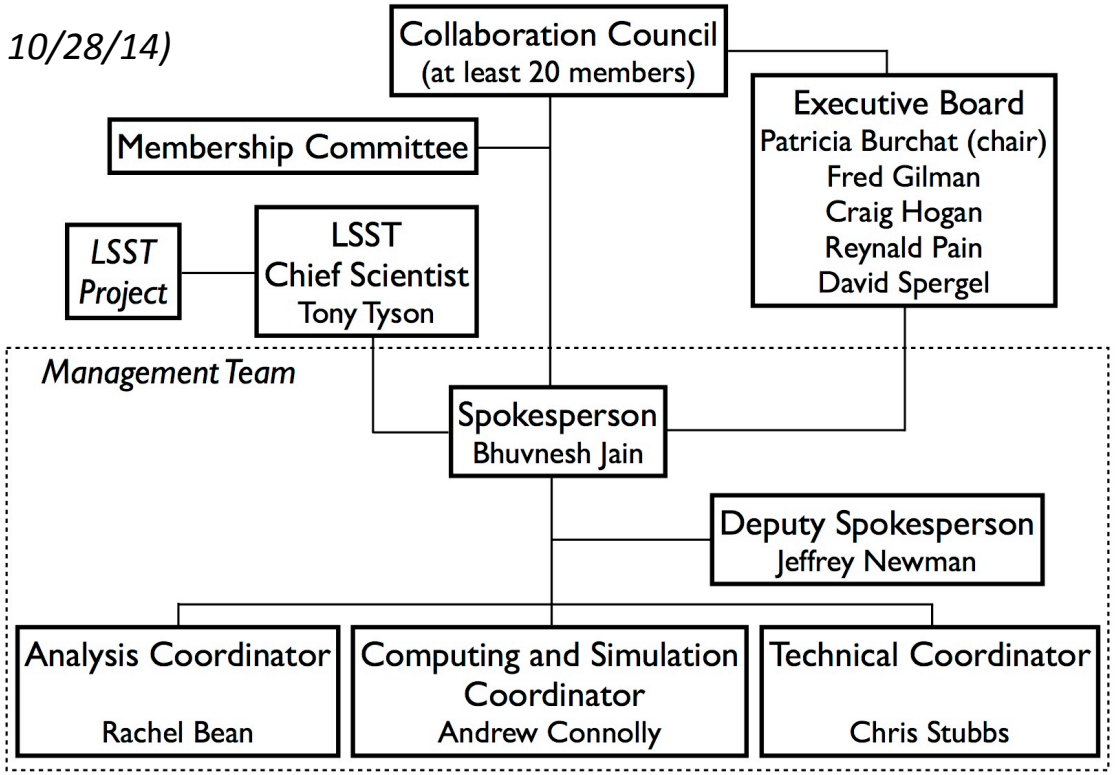
- 50 scientifiques de l'IN2P3 impliqués (+45 tickets à venir). **~ 8-10 FTE** à ce jour
- Transferts d'activité de **> 5 FTE** **prévisibles sur les 5 ans à venir** (de Planck, SNLS…)
- Membership committee
  - Alexandra Abate
  - **Éric Aubourg**
  - Benjamin Joachimi
  - Simon Krughoff
  - Anja von der Linden
  - Andrei Nomerotski (chair)
- Full members de DESC (lancé en juin 2012): 24 en France / 153 soit environ 16%. 34 contributeurs.

- Document de référence : white paper arXiv:1211.0310 (23 signatures France/200)
- Tâches DESC planifiées sur 3 ans
- 2 meetings pléniers/an: le prochain 27-29 octobre à Chicago (Argonne lab)

08/04/2015

Organisation DESC

- Sposkesperson: **Rachel Bean** (élue en février 2015)
- Conseil de DESC
  - Chair: *Phil Marshall (elected 10/28/14)*
  - **Pierre Antilogus**
  - **Dominique Boutigny**
  - Sarah Bridle
  - Pat Burchat
  - Will Dawson
  - Eric Gawiser
  - Katrin Heitmann
  - Alina Kiessling
  - Alex Kim
  - Rachel Mandelbaum
  - Phil Marshall
  - Andrei Nomerotski
  - John Peterson
  - Eduardo Rozo
  - Michael Strauss



- Il y a aussi une junior DESC organization (positions non permanentes)

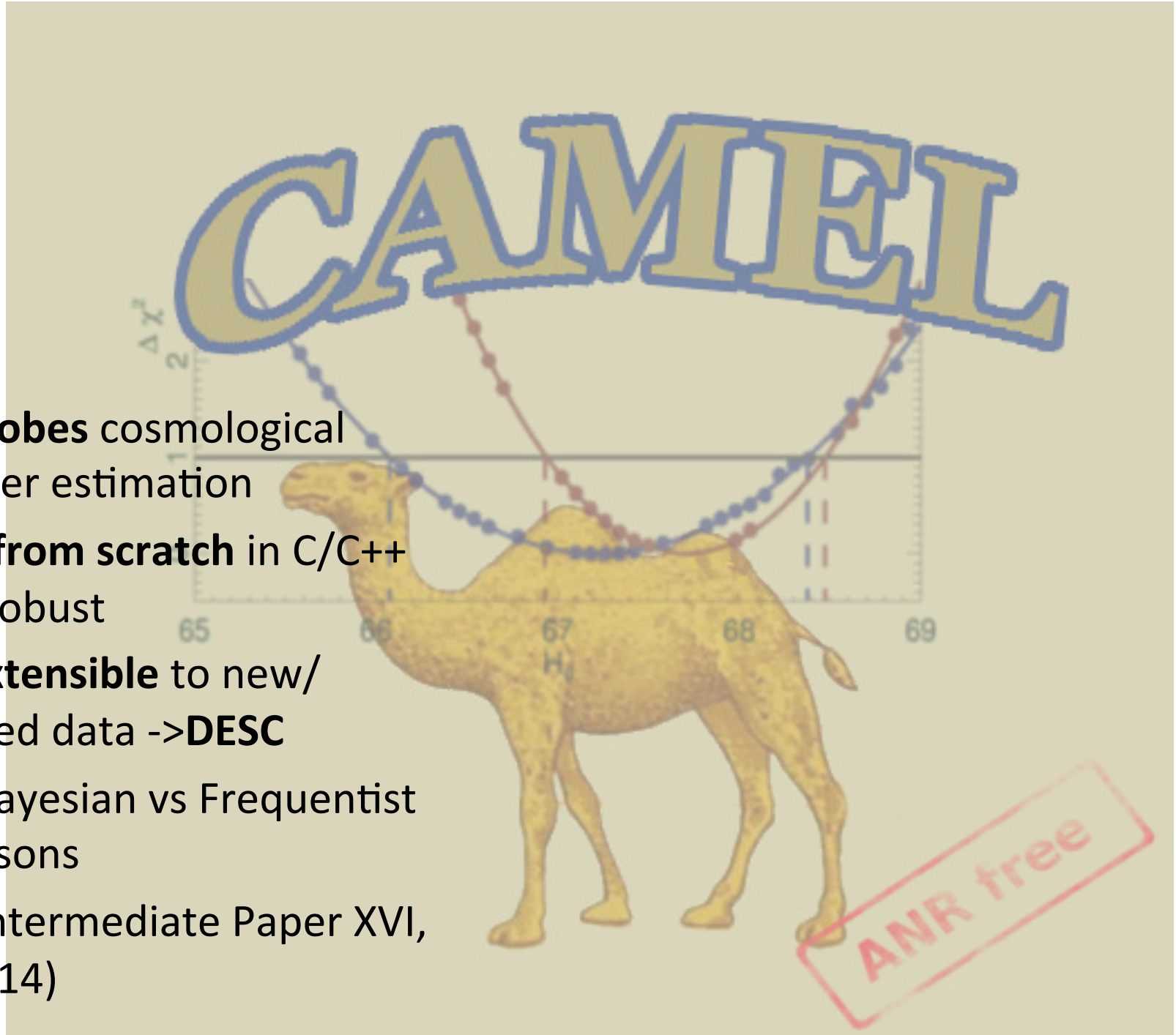
DESC Full Membership

- The transition from Membership to Full Membership is based on a written proposal (a page or two) describing the specific contributions the scientist is proposing to make;; these could be tasks outlined in the DESC White Paper, or tasks that are argued to be important for achieving the science goals of the DESC. *[*** The length of the proposal has been reduced to "a page or two" from "a few pages" specified in the White Paper.]*
- **Criteria**
- The criteria for joining as a Full Member are:
  (i) the proposed level of commitment that is relevant to the DESC, generally expected to be a significant fraction of research time over a period of several years;; *[*** In the White Paper, the fraction was specified as at least 30%;; this quantitative requirement has been dropped.]*
  (ii) the importance of the proposed task(s);; and
  (iii) the need for more effort on the proposed tasks within the DESC.

Implication française dans la préparation scientifique de LSST

Au sens large: calibration, calcul, analyse, simulations, combinaisons

- **Management**
  - Gouvernance de DESC
- **SN (LPNHE, CPPM, LPCC – 10 chercheurs)**
  - Strategie d'observation ***-> Contributions to the survey cadencing group***
  - Synergies avec IR (EUCLID) ***-> Paper in preparation about the joint survey LSST-EUCLID***
  - Amélioration de la technique de soustraction d'image
- **Lensing (APC et LAL – 3 chercheurs)**
  - Cosmic magnification
  - Mesure de la masse des amas
  - Algorithmes d'analyse Weak lensing
- **Grandes structures incl. BAO (APC, LAL, LPSC, LUPM – 14 chercheurs)**
  - Simulation ***-> Paper in preparation about the precision on BAO scale determination***
- **Amas de galaxies (APC -1 chercheur)**
  - Techniques de détection et de détermination de masse
- **Combinaison de sondes (LAL, CPPM – 4 chercheurs)**
  - Combiner CMB+LSST -> neutrino mass contraint **-> CAMEL: Stéphane Plaszczinsky**
- **Tâches transverses (APC, LAL, LPNHE, LPSC - 12 scientists)**
  - Calibration photométrique
  - Redshifts photométriques ***-> impact of the filter passband shapes…***
  - Observations complémentaires (ESO, VISTA…): follow-up
- **Calcul**
  - Data management
  - Data challenges

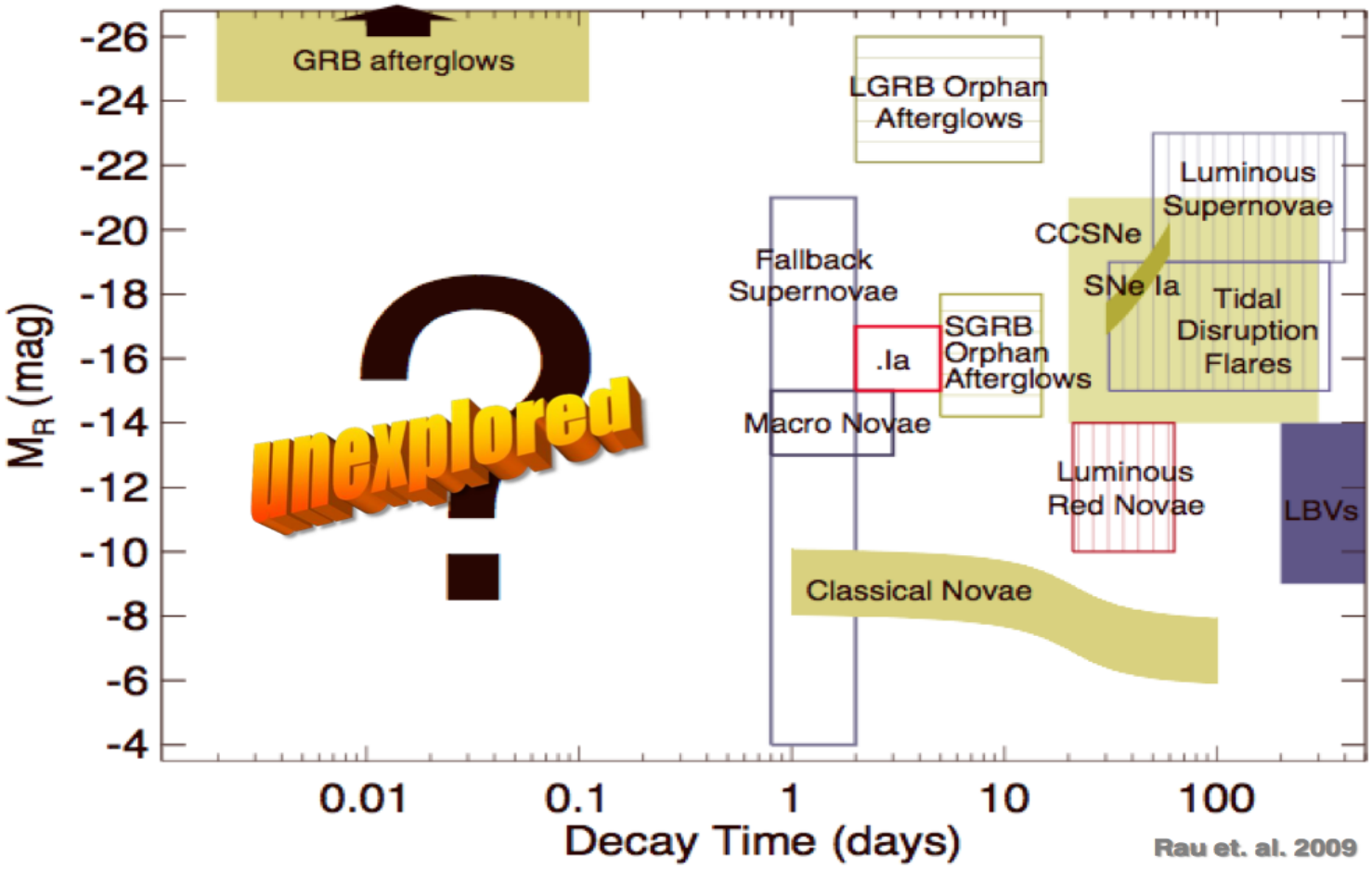


- **multi-probes** cosmological parameter estimation
- **written from scratch** in C/C++ clean& robust
- **easily extensible** to new/ forecasted data ->**DESC**
- allows Bayesian vs Frequentist comparisons
- Planck Intermediate Paper XVI, A&A (2014)

Au delà de DESC

- Physique stellaire (LSST+GAIA) -> LUPM ?
- Transients
  - Actuellement, un seul français dans la collaboration transients (par ailleurs très peu active)
    - -> A développer? (envisageable avec nouveau postdoc)
  - Matière noire: Microlensing, scintillation
  - Etoiles variables (lien cosmo: mesures de distances)
  - Astéroïdes
  - Planètes extra-solaires
  - Alertes ?
- Physique des galaxies, AGNs

Optical Transients : Mag vs time



Suppléments

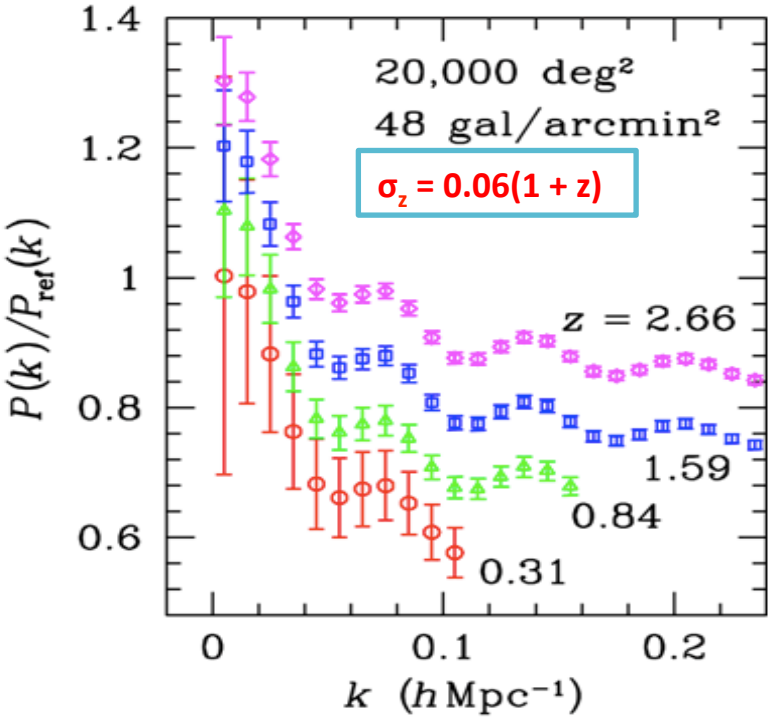
LSST Scientific preparation

- photometric redshift

Simulation program developped in France

- **Start** with a cosmological model
- Simulation of a catalog of galaxies
- Simulation of the photons' transit
- Simulation of the LSST response
- Estimate the photo-z's
- **Extract** the cosmological parameters from 3D map
  - Estimate the reconstruction precision
  - Feedback on the filter passband specs
  - Tune analysis

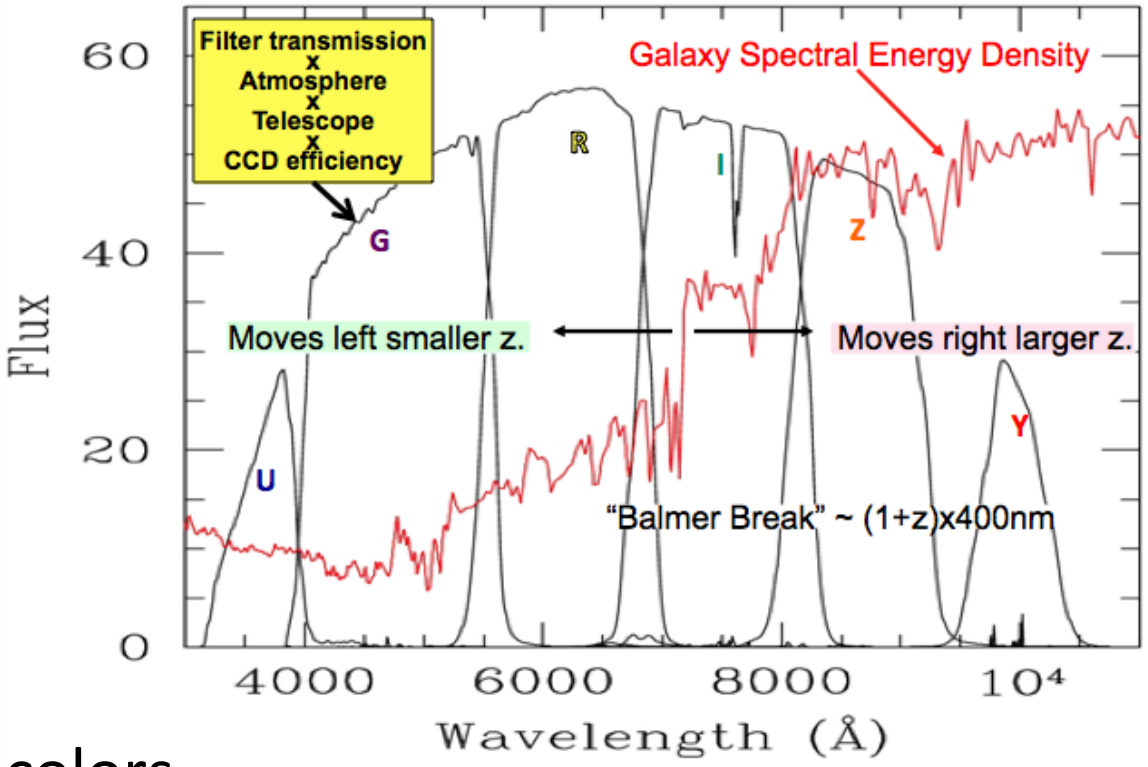
BAO standard ruler: LSST expectations



Photometric redshift

A critical issue for cosmology with LSST

- 10^9 galaxies *cannot* be spectroscopically measured



Measure z with only 6 colors ugrizy

- Simultaneous fit of galaxy type, reddening and z
- Neural network technique tuned with simulation
- A&A publication, 1rst paper approved by LSST editing board