# &

# LSST-France scientific coordination

Emmanuel Gangler, Cécile Renault,
Jérémy Neveu

# LSST science

- **LSST is a world-wide project !**
  - Around *900 scientists* expected to have LSST data rights
  - ~450 from US
  - ~300 *from Europe* (9 countries)

- **9 science collaborations** (numbers from nov. 2016)
  - Galaxies (46 members)
  - Stars, Milky Way, and Local Volume (118 members)
  - Solar System (N/A)
  - Dark Energy (565 members)
  - (Strong lensing)
  - Active Galactic Nuclei (36 members)
  - Transient/Variable stars (>104 members)
  - Informatics and statistics (60 members)
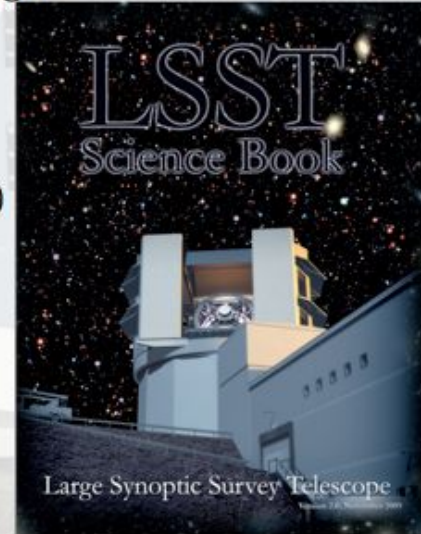
arXiv:09@12.0201

Those numbers are steadily growing !
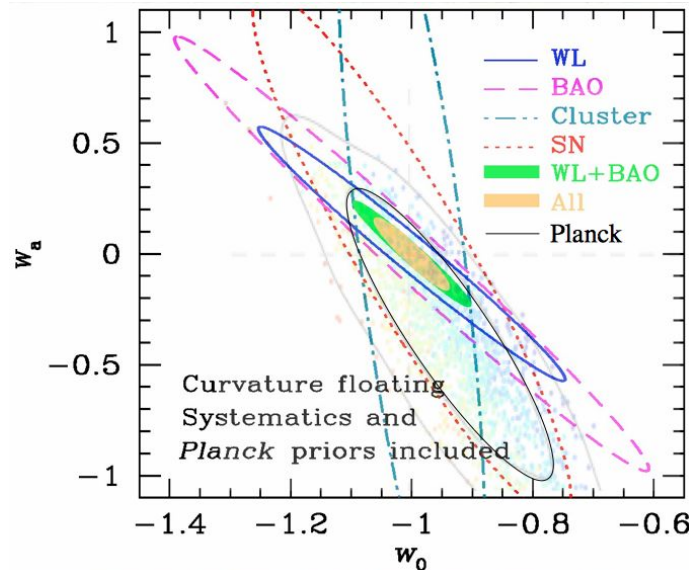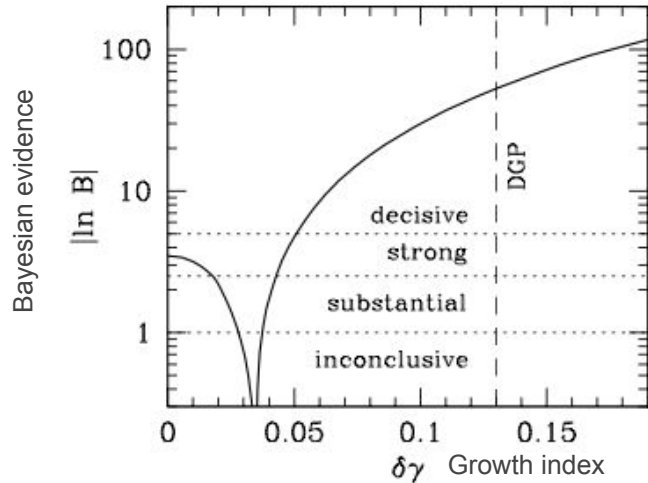
E.Gang

# Science to test Λ and beyond
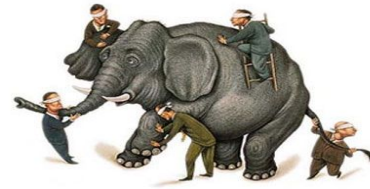
Origins of cosmic acceleration could come from varied modifications to Einstein's equations

Deviations from GR?

$$G_{\mu\nu} \;=\; 8\pi G T_{\mu\nu}$$

Dark Energy evolving with z?
Dark sector interactions?
Anisotropic clustering?



LSST relies on probe combination

=> need for a coordinated effort :
**DESC**

# LSST Dark Energy Science Collaboration (DESC)

Formed in June 2012 to bring together scientists to prepare for and carry out cosmological analyses with LSST data

*Full member locations*



Covers all Dark Energy probes of interest for LSST
Members with astrophysics and particle physics background

605 members; 173 "Full members"
    Non US members : 70 FR (IN2P3),
                    61 UK,
                    31 others (CA, CH, CL, CN, CZ, DE, ES, JP, IT, SE, RS)
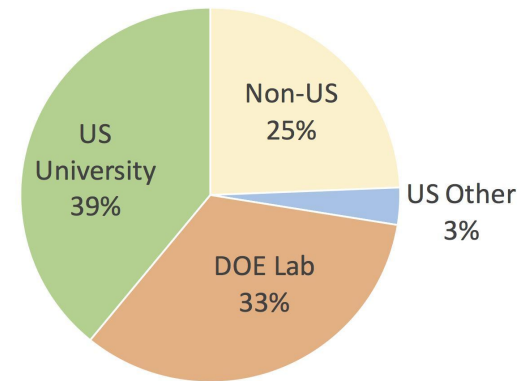
[March 15th 2017, based on institutional mail]

Useful refs: LSST  science book (arXiv:0912.0201)
    Public web site http://www.lsst-desc.org
    DESC  whitepaper arXiv:1211.0310

E.Gangler, C. Renault, J. Neveu, LSST-France march 21th 2017

# How do I join and get involved?

Once your Institute is a member of LSST

1) Join LSST as a PI or JR member
   ○ IN2P3 is the interface between LSSTc and other French parties
2) *DESC Members:* work they pursue is relevant to DESC
   ○ Access to DESC internal documentation and mailing lists
   ○ => Make sure all our students and post-docs are DESC members
3) *DESC Full* (or voting) *Members*: should commit time for tasks
   important to achieve the science goals of DESC
   ○ Full access to DESC resources and data product
   ○ Threshold to Full Membership acceptance rises with times
   ○ => Make sure our permanent staff becomes Full Members

# Junior DESC Organization (JuDO)

**Activities at DESC week**

JuDO Lighning talks

Career Panel + Pizza Social

Poster Session

Spokesperson Interviews with JuDO

**If you haven't already:**

- Sign up for our mailing list:
  - lsst-desc-earlycareer
- Sign up for Slack: desc-judo
- Apply for Full Membership.

Also checkout the DESC job center.



See you at the next JuDO events!

Concerns? Get in touch with your co-leads: Humna Awan, Chris Morrison

# Publication Policy

Publication board in place

    Role : implementing the DESC Publication Policy

Publication Policy

    A new status : **Builder.** (implementation TBD)

- Key papers : analyses identified as core goals of DESC
  Builders are automatically co-authors
  Other members can be co-authors if significant contribution
      (to be evaluated by WG conveners)
- Standard papers : other analyses
  Builders can be co-authors if their work enabled the paper
  Members can be co-authors if significant contribution
      (to be evaluated by Primary Authors and WG conveners)

# DESC work organized in 12 Working Groups

| Spokesperson | Rachel Bean (til July 17) |
|---|---|
| Deputy Spokesperson | Jeffrey Newman |
| Collaboration Council Chair | Ian Dell'Antonio |

| French member |
|---|
| Other non-US member |

**Analysis Working Groups**
*Coordinator: Rachel Mandelbaum*

| Working Group | Conveners |
|---|---|
| Weak Lensing | Michael Schneider |
| | Joe Zuntz |
| Large Scale Structure | David Alonso |
| | Anze Slosar |
| Supernovae | Saurabh Jha |
| | Renée Hlozek |
| Clusters | Ian Dell'Antonio |
| | Anja von der Linen |
| Strong Lensing | Chris Fassnacht |
| | Phil Marshall |
| Theory and Joint Probes | Jonathan Blazek |
| | Elisabeth Krause |
| Photometric Redshifts | Ofer Lahav |
| | Sam Schmidt |

**Computing and Simulation Working Groups**
*Coordinator: Andrew Connolly*

| Working Group | Convener |
|---|---|
| Cosmological Simultions | Katrin Heitmann |
| | Simon Krughoff |
| Survey Simulations | John Peterson |
| | Chris Walter |
| Computing Infrastructure | Scott Dodelson |
| | Richard Dubois |

**Technical Working Groups**
*Coordinator: Aaron Roodman*

| Working Group | Convener |
|---|---|
| Sensor Anomalies | Pierre Astier |
| | Andrei Nomerotski |
| Photometric Calibration | Eli Rykoff |
| | Nicolas Regnault |

French presence also in:

Advisory Board
Dominique Boutigny

Collaboration Council
Eric Aubourg
Nicolas Regnault

Publication Committee
Pierre Astier

Membership Committee
Eric Aubourg

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| **Analysis Working Groups** | |
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| **Working Group** | **Conveners** |

| **Computing and Simulation Working Groups** | |
|---|---|
| *Coordinator: Andrew Connolly* | |
| **Working Group** | **Convener** |

Boutigny

uncil
urg
egnault

Remark:
    A small number of recognized people share strategic positions

Objective:
    Grow in recognition within DESC
    in order to have a more French people able to occupy those positions
        therefore a larger impact as a community

mittee
er

| Strong Lensing | Chris Fassnacht |
|---|---|
| | Phil Marshall |
| Theory and Joint Probes | Jonathan Blazek |
| | Elisabeth Krause |
| Photometric Redshifts | Ofer Lahav |
| | Sam Schmidt |

*Coordinator: Aaron Roodman*

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mmittee
Eric Aubourg

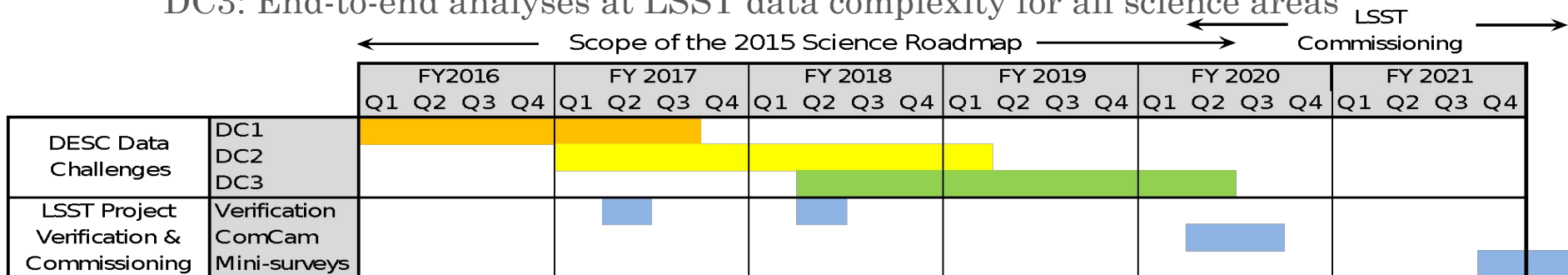# DESC Planning: 2015 DESC Science Roadmap (SRM)

Find at http://lsst-desc.org/sites/default/files/DESC_SRM_V1.pdf

Focused on tasks to build and rigorously test the analysis pipeline to ensure meets requirements to analyze LSST-level data

3 sequential Data Challenges (DC1-3) of increasing complexity & integration
    DC3: End-to-end analyses at LSST data complexity for all science areas

# DESC Planning: 2015 DESC Science Roadmap (SRM)

Find at http://lsst-desc.org/sites/default/files/DESC_SRM_V1.pdf

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req...

3 s...........ion
............eas    LSST
                      Commissioning

**Remarks:**

1) Roadmap largely based on simulations
   Alternate approach : qualify pipeline on real (pixel) data
   -> reprocessing effort !

2) Schedule/goals may be revisited in 2017

| | | FY2016 | | | | FY 2017 | | | | FY 2018 | | | | FY 2019 | | | | FY 2020 | | | | FY 2021 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| DESC Data Challenges | DC1 | | | | | | | | | | | | | | | | | | | | | | | | |
| | DC2 | | | | | | | | | | | | | | | | | | | | | | | | |
| | DC3 | | | | | | | | | | | | | | | | | | | | | | | | |
| LSST Project Verification & Commissioning | Verification | | | | | | | | | | | | | | | | | | | | | | | | |
| | ComCam | | | | | | | | | | | | | | | | | | | | | | | | |
| | Mini-surveys | | | | | | | | | | | | | | | | | | | | | | | | |

# Looking for ways to contribute? Here are some ways you can!

| | |
|---|---|
| **Weak lensing**  237 people | • Get going on the HSC mass mapping project, as it will be both directly relevant for the pipeline and mass mapping groups, |
| **Large Scale Structure**  199 people | • Complete the 2-point correlation function validation project. Building the likelihood code and then testing, from sims to observables to parameters, then test on real data. |
| **Clusters** ⭐  160 people | • Set simulation requirements for LSST cluster cosmology with the CS WG-halo mass function predictions, cluster properties, and projected lensing maps.  • Set the timeline, with Project DM, of cluster-relevant DM stack capabilities |
| **Strong lensing**  70 people | • Undertaking the DC1 time delay challenge |
| **Supernovae** ⭐  127 people | • Working on SN3.1 and SN3.2, and creating a supernova-cosmology focused observing-strategy paper |
| **Theory/Joint Probes** ⭐  150 people | • Helping working groups become familiar with Core Cosmology Library and using it to build likelihoods.  • Working on CX5 - impact and mitigation of key astrophysical systematics, in collaboration with Cosmo Simulations WG |

R. Bean introduction DESC@SLAC 2017

⭐ : French talk DESC@SLAC 2017

# Looking for ways to contribute? Here are some ways you can!

| | |
|---|---|
| **Photometric redshifts** ⭐<br><br>169 people | • Liaison(s) to Cosmo Sims/Survey Sims in making sure that DC2 datasets meet photo-z needs<br>• Lead development of realistic incompleteness models for spectroscopic training sets<br>• Lead the investigation into blending effects on photo-z |
| **Cosmological Simulations**<br>162 people | • Put together a full workflow plan for generating a Proto- DC2 dataset<br>• Inputs into SRM key tasks updates to reflect lessons learned. |
| **Survey Simulations**<br>56 people | • Validation and study of images in Twinkles and Phosim DC1 deep<br>• Kickstarting the DC2 planning with discussion of interfaces to the cosmological simulations |
| **Computing Infrastructure**<br><br>208 people | • Working with Survey Simulations on DC2 planning<br>• Building a framework using weak lensing as the focus (continuing from Hack Week) but to build tools useful to full collaboration |
| **Photometric Calibration** ⭐<br><br>44 people | • How we can independently verify Gaia photometry, and best make use of it for our rigid survey calibration. |
| **Sensor Anomalies** ⭐<br>86 people | • Analyzing the (overwhelming) data from the newly assembled science raft prototypes and production sensors. |

R. Bean introduction DESC@SLAC 2017

⭐ : French talk DESC@SLAC 2017

**Looking for ways to contribute? Here are some ways you can!**

| Photometric redshifts ⭐ 169 members | • Liaison(s) to Cosmo Sims/Survey Sims in making sure that DC2 datasets meet photo-z needs |
|---|---|

**Remark:**

    Contributing is great …

    … in France, we can also have our own assessments of what is relevant and needed

    … and push corresponding effort within DESC ecosystem

        => How to do this efficiently as a team ?

| | from Hack Week) but to build tools useful to full collaboration |
|---|---|
| Photometric Calibration ⭐ 44 members | • How we can independently verify Gaia photometry, and best make use of it for our rigid survey calibration. |
| Sensor Anomalies ⭐ 86 members | • Analyzing the (overwhelming) data from the newly assembled science raft prototypes and production sensors. |

R. Bean introduction DESC@SLAC 2017

⭐ : French talk DESC@SLAC 2017

# DESC Spotlights Recent Results!

From DESC week WG lightning summary

## Clusters

Linked output of obs_cfht from reprocessing task force with preliminary clusters pipeline to make mass estimates for clusters.

Peak at 3.7 10^14 (red)
Mean is 5.3 10^14 (black)

MACSJ2243.3-0935
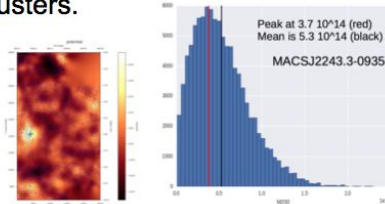
Generate mapping between true reduced shear and DM shear measured in cluster environment

Figures from Nicolas Chotard

## Photometric Correction

- **Atmospheric transmission**
  - Comparison of atmospheric transmission codes
  - Effects on broadband magnitudes
- **Survey uniformity**
  - Explore how GAIA can help constraining survey uniformity
  - How LSST - ubercal can independentely verify GAIA photometry.

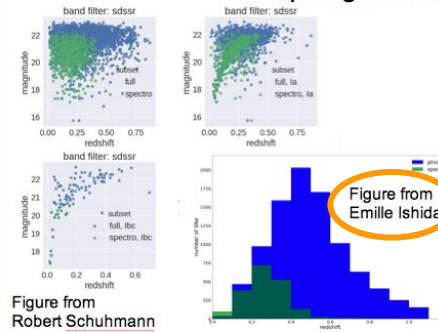## Supernovae

Cadence study Hack Session:
paper out in ~2 months
https://github.com/LSSTDESC/SNCadence

Cadence studies

Figure from Phillipe Gris

Figure from Emille Ishida

Figure from Robert Schuhmann

Photometric Classification
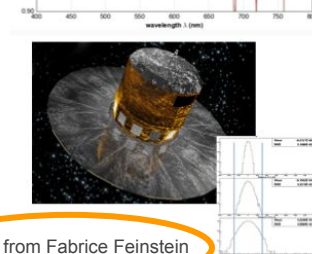
Figure from Fabrice Feinstein

E.Gangler, C. Renault, J. Neveu,
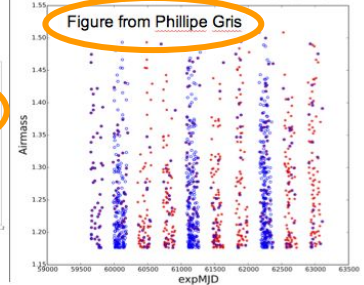
# Etape 1 : constitution d'un groupe de réflexion

Avec Pierre Astier (LPNHE), Eric Aubourg (APC), Johann Cohen-Tanugi (LUPM), Céline Combet (LPSC), Fabrice Feinstein (CPPM), Philippe Gris (LPC), Stéphane Plaszczynski (LAL) et Cécile Roucelle (APC)

**Conclusions :**

· Pertinence d'une coordination scientifique favorablement reçue en général

· Attentes et besoins exprimés recouvrent un spectre assez large :

- Globalement attente des groupes français forte pour une **animation scientifique interne plus soutenue** et plus formalisée. Par exemple, une réunion mensuelle, une circulation plus efficace des informations, en particulier en directions des nouveaux venus dans LSST-France;

- **Stratégie scientifique commune** serait la bienvenue, pour les demandes ANR, ERC, et pour éviter des doublons potentiels sur les stages, les thèses, etc...

- Inversement, **plus difficile de faire émerger un ensemble de propositions consensuelles**
  - sur la stratégie à adopter pour se positionner collectivement sur des analyses où LSST-France prendrait un leadership visible et incontestable au sein de DESC
  - sur la manière, plus généralement, de garantir le retour scientifique attendu par l'IN2P3.

L'importance de la question ne fait pas débat, et le groupe de réflexion arrive à la conclusion que la façon de répondre à cette question sera le chantier principal de la coordination scientifique.

# Cahier des charges de la coordination scientifique

- ## Coordination auprès de l'IN2P3

  rôle de relai auprès du coordinateur LSST-France

  production de notes internes

  rendre compte de la visibilité globale de LSST-France dans les SWG

- ## Animation scientifique interne

  cohésion scientifique au sein de LSST-France

  aide aux nouveaux venus à s'orienter dans l'organisation de DESC et dans la participation française

  réunions de type "hack-day(s)" au cc-in2p3

- ## Réactivité et veille technologique

  veille scientifique au sein de DESC, relayée naturellement par les membres français actifs de chaque SWG
  exemple : articulation sujets de science / calcul —> grande importance pour LSST-France, mais en // des WG

- ## Stratégie et leadership

  groupe de réflexion a exploré plusieurs manière d'aborder la question, sans toutefois parvenir à un consensus

  groupe de réflexion a tenu à proposer un état des lieux des activités scientifiques en cours

  si une vision organisée des priorités s'impose dans LSST-France, il faudra la rendre visible et lisible dans
  DESC, ce qui n'est pas une tâche aisée, dans la mesure où l'organigramme français est sans objet dans
  l'organisation de DESC

# Etape 2 : nomination d'une cellule d'animation/ coordination scientifique

**Mission :** *répondre aux besoins de la communauté IN2P3 concernant les activités scientifiques liées à LSST, dans une approche nationale et inter-laboratoires*

**Qui :** Emmanuel Gangler (LPC), Jérémy Neveu (LAL), Cécile Renault (LPSC)

**Mandat de 2 ans**

**En pratique, pour commencer :**
*assurer et formaliser l'animation scientifique interne*
—> organisation d'une visioconf mensuelle, dès avril 2107, typiquement 2 sujets de physique, prendre le temps / journées LSST, bienvenue aux jeunes & nouveaux arrivants
*faire émerger une vision nationale des activités qui puisse servir de point de référence pour établir une stratégie*
—> tableau de bord des activités : résultats du sondage (cf suite par Jérémy)

# Le sondage

Envoyé le lundi 6 mars 2017 sur [lsst-l@in2p3.fr](mailto:lsst-l@in2p3.fr)
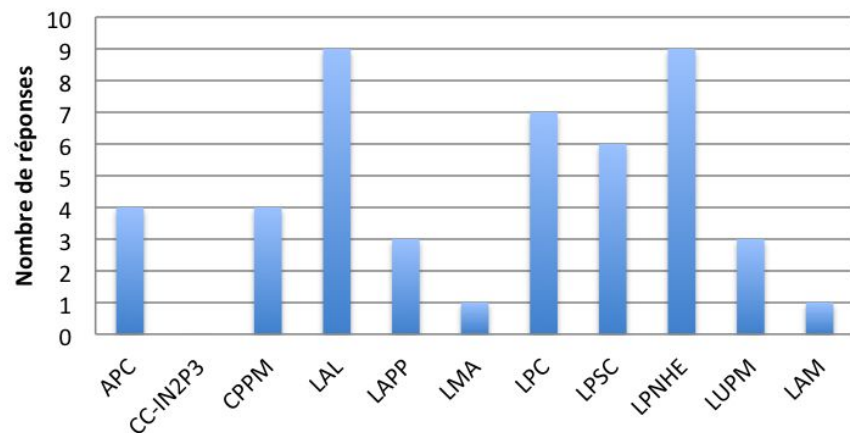
Adressé à tous

47 réponses complètes
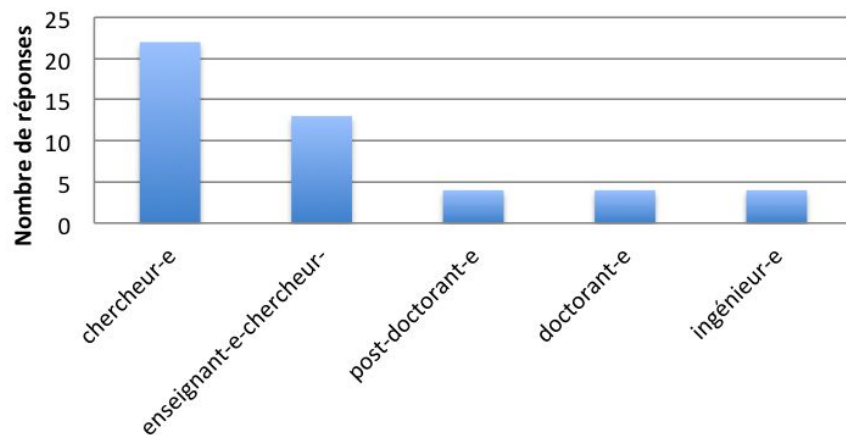
10 minutes en moyenne pour répondre

Premier dépouillement rapide (à affiner dans le futur)

# Qui sommes nous ?



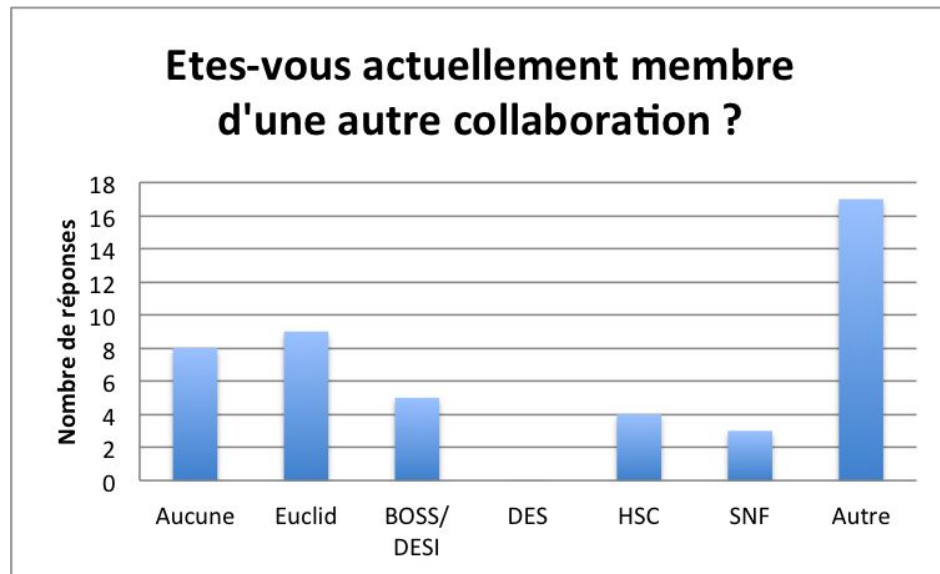Quel est votre laboratoire ?



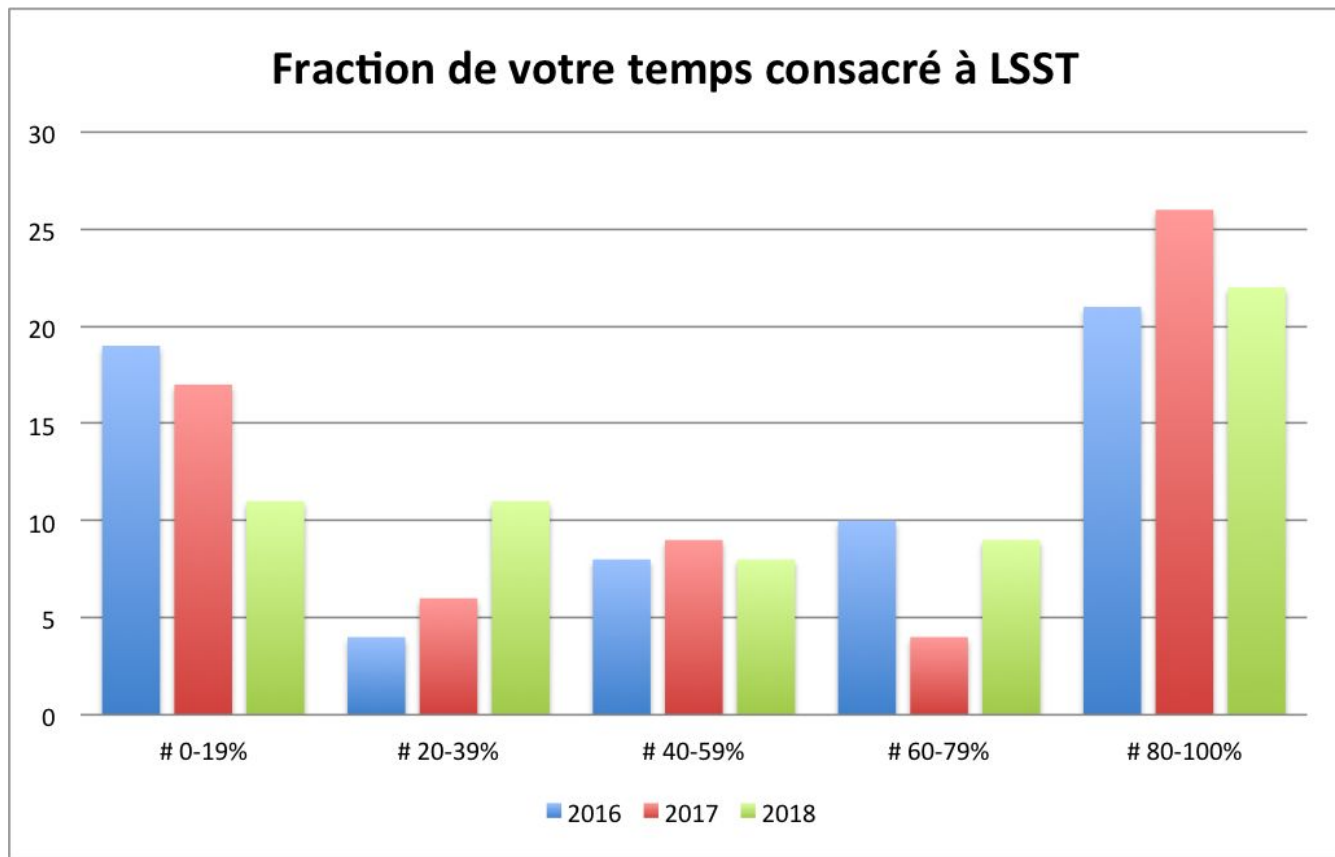Quel est votre statut ?

# Qui sommes nous ?

De nombreuses interconnections

avec d'autres projets

(cosmologiques ou autres)

# Activités dans LSST

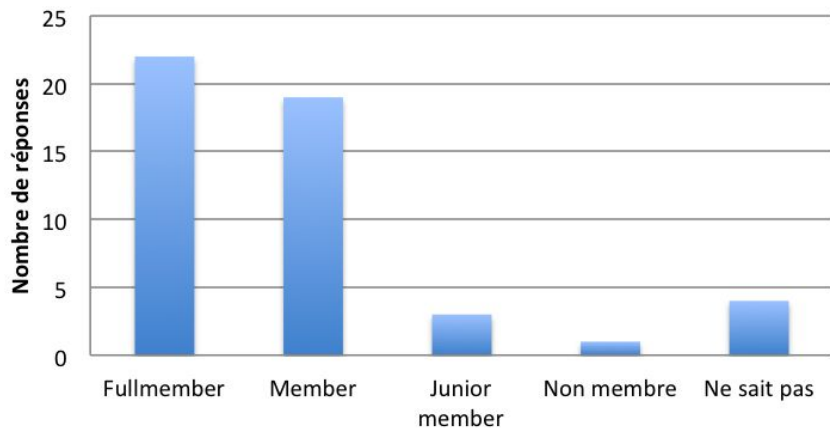Des membres très impliqués, avec une prévision d'augmentation



**Fraction de votre temps consacré à LSST**

Categories: # 0-19%, # 20-39%, # 40-59%, # 60-79%, # 80-100%

Legend: 2016, 2017, 2018

# Activités dans LSST

- Tous les profils sur DESC, Caméra et cosmo hors LSST/DESC

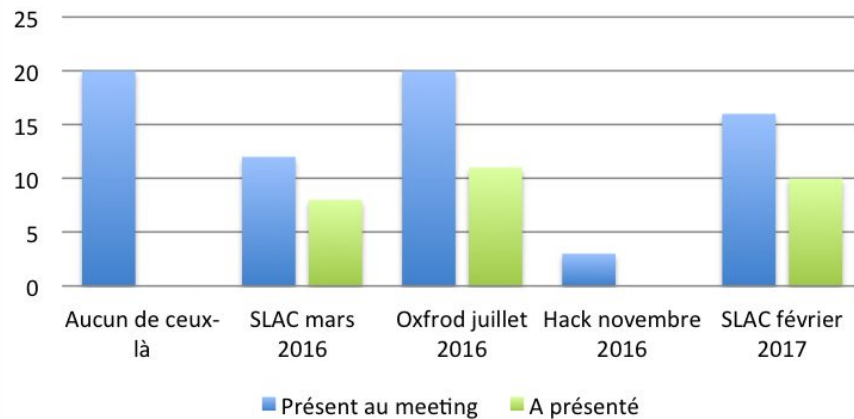- Plutôt des implications partielles sur Calcul et LSST hors DESC



Répartition du temps de travail
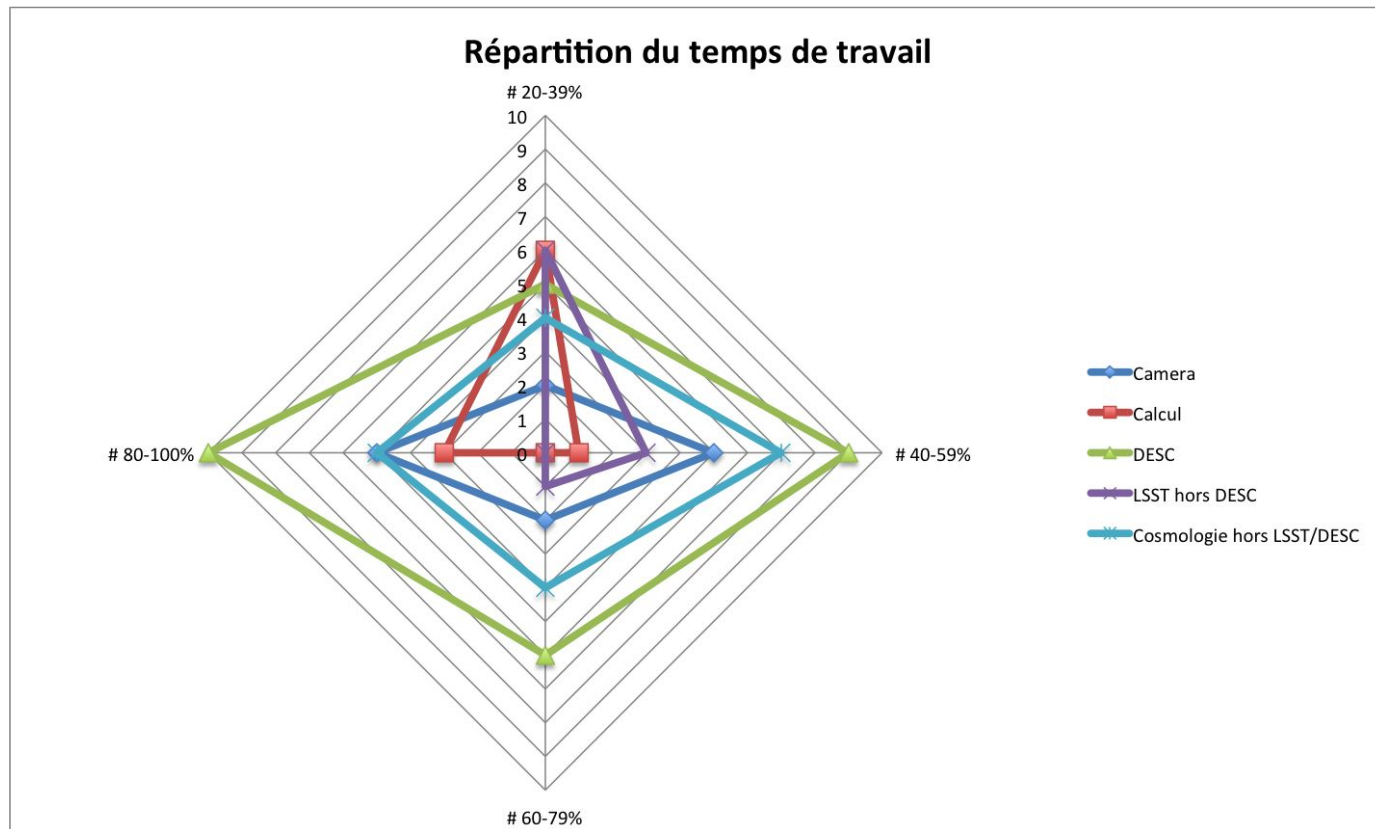
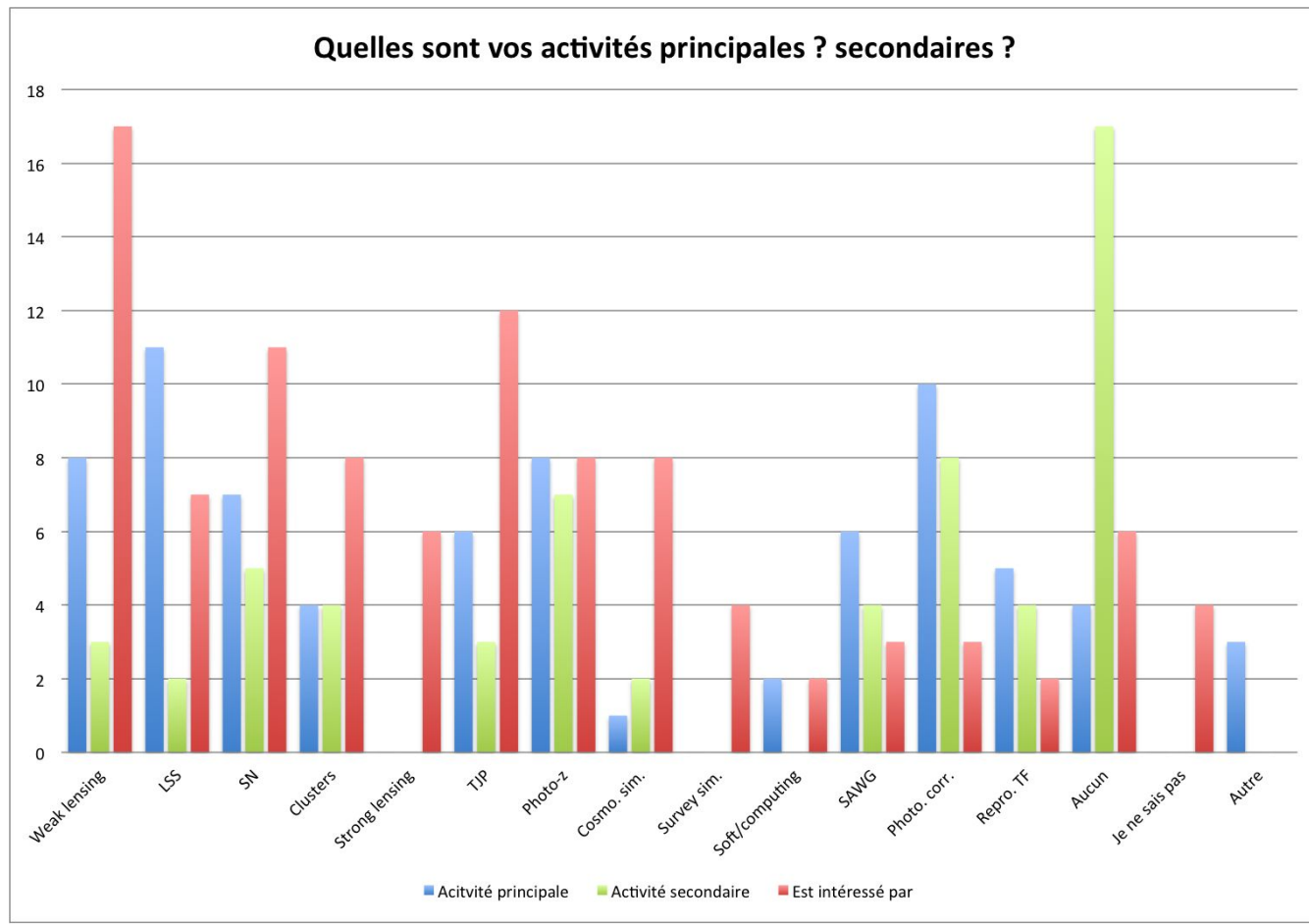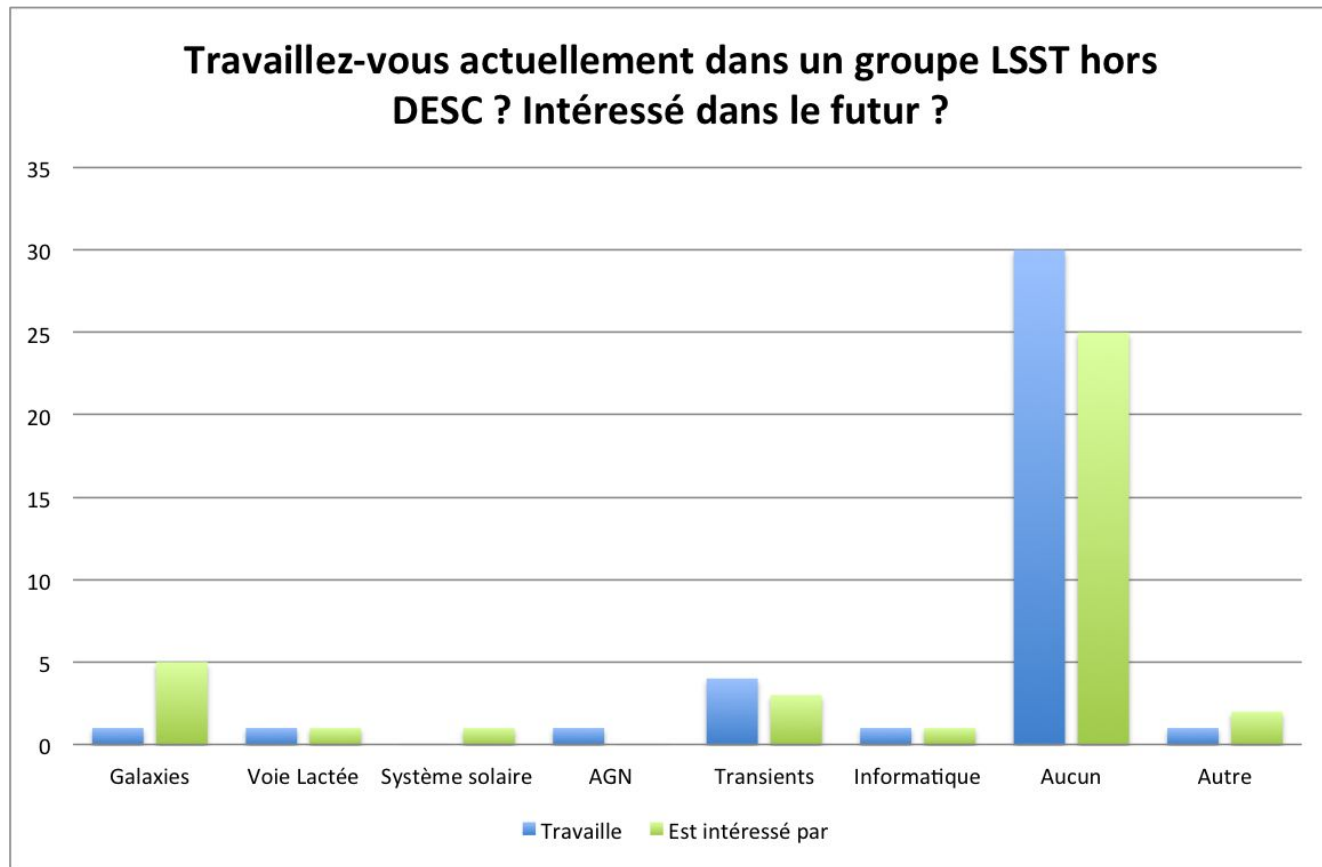# Activités DESC

# Activités DESC

- Activités principales : LSS, photo corr., WL, photo-z

- Activités secondaires : aucune (!), photo corr., photo-z

- Intérêt : WL, TJP, SN

**Quelles sont vos activités principales ? secondaires ?**



Légende : Acitvité principale (bleu) — Activité secondaire (vert) — Est intéressé par (rouge)

# Activités hors DESC

- Activités hors DESC actuelles : aucune (!), transients

- Intérêt futur : aucun (!), galaxies, transients

**Travaillez-vous actuellement dans un groupe LSST hors DESC ? Intéressé dans le futur ?**



Chart x-axis categories: Galaxies, Voie Lactée, Système solaire, AGN, Transients, Informatique, Aucun, Autre

Legend: ■ Travaille  ■ Est intéressé par

# Résumé

- Un panorama rapide des activités LSST/DESC actuel et des intention futures

- Une analyse plus fine est nécessaire

- Prendre conscience de nos forces et envies pour parler du futur de LSST en France