Préparation scientifique de LSST

Sociologie (en France)

- 46 scientifiques IN2P3 avec des participations inégales mais en développement
- Certains d'entre eux, actifs dans d'autres collaborations (Planck, SNLS...) transféreront progressivement leur activité sur LSST
  - Le budget science devrait normalement suivre
- Distribution d'âge et de grade implique une nécessité de participation de scientifiques jeunes (voir le calendrier)
  - Chasse aux thésards, postdocs et CR/MCF

- Pour le moment, les choses avancent par à-coups.
- Un plan à 3 ans a été défini pour chaque tâche, dans le cadre du DESC
- Un meeting LSST-europe est prévu à Oxford en septembre

DESC = Dark Energy Science Collaboration

- **Mise en place en juin 2011 (Philadelphie) à la demande de la DOE**
  - ouverte aux scientifiques financés par la DOE et la NSF
  - et aux scientifiques de l'IN2P3 impliqués dans LSST (46 à ce jour)
- LSST « Science Working Groups » en rapport avec l'énergie noire dissous dans cette structure
  - **Objectif**: structuration des travaux scientifiques sur l'énergie noire. Cosmologie multi-sonde : combinaisons des différents indicateurs avec des incertitudes systématiques independantes
    - -> 1er objectif scientifique de LSST
    - Préparation analyses sur la base de l'expertise des participants
    - Structure de type physique des particules: *détecteur, calibration, analyse, science.*
    - Produira des softs « propriétaires »
      - rappel delivrable LSST: images et catalogues processés niveau 2
    - 1ère année de prise de données (commissioning) propriétaire
  - **Critères d'admission**: avoir une activité mesurable soit dans DESC-LSST, soit dans le domaine de l'énergie noire d'une manip précurseur (DES, BOSS...)
  - Actuellement **environ 200 membres** (meeting SLAC de janvier 2013)
  - 12 (mais jusqu'à au moins 25 éligibles) physiciens français IN2P3 inscrits dans 11 groupes de travail
  - **1 représentant français** au board: R. Pain
  - **Livre blanc**: 23 signataires français, intégrés aux groupes de travail pour la plupart
    - description activité DESC à 3 ans
    - document de référence pour toute demande de support à l'activité scientifique LSST aux USA
    - Aussi pour les demandes ANR en France
    - Participation française engagée sur: SN, BAO, magnification lensing, photo-z

Préparation scientifique

- **SN (LPNHE, CPPM, LPCC – 10 scientists)**
  - observing strategies
  - Synergies with IR observations (EUCLID)
  - Imroving image subtraction technique
- **Weak lensing (APC – 3 scientists)**
  - Cosmic magnification
  - Cluster mass measurements
  - Weak lensing analysis algorithm
- **Large scale structures incl. BAO (APC, LAL, LPSC – 9 scientists)**
  - Simulation
- **Galaxy clusters (APC -1 scientist)**
  - Detection and mass determination techniques
- **Combination of probes (LAL, CPPM – 4 scientists)**
  - Combine CMB+LSST -> neutrino mass contraint
  - Statistical analysis (compare bayesian/frequentist...)
- **Transverse tasks (APC, LAL, LPNHE, LPSC - 12 scientists)**
  - Photometric calibration
  - Determination of redshifts through photometry
  - Complementary observations: follow-up

Task section in WP	Task group	Task ID	Group code	Task title	Institution	Investigator
					SLAC/Stanford	S. Kahn (C. Chang), P. Burchat
					Purdue	I. Shipsey, W. Cui (G. Li, B. Xin)
					LLNL	B. MacIntosh
					UC Davis	J. Jee, T. Tyson
				Estimate importance of PSF effects of currently-unknown	U Penn	M. Jarvis
5.1.1	Weak lensing	H-1	WL	size	UIUC	J. Thaler (Z. Ma)
					SLAC	G. Dubois-Felsmann (D. Bard)
				Place requirements on data management algorithms that	Purdue	W. Cui (G. Li)
5.1.1	Weak lensing	H-2	WL	impact weak lensing analysis	U Penn	M. Jarvis
					SLAC/Stanford	S. Kahn (D. Bard), P. Burchat
					CMU	R. Mandelbaum
					Purdue	J. Peterson
					U. Washington	L. Rosenberg, M. Morales
5.1.1	Weak lensing	H-3	WL	Plan ImSim simulations to test WL analysis	LBNL	P. Nugent
					Princeton	R. Lupton (J. Bosch)
				Multi-epoch data processing algorithm and optimal dithering	UC Davis	J. Jee, T. Tyson, (P. Gee)
5.1.1	Weak lensing	H-4	WL	strategy	U. Washington	L. Rosenberg, M. Morales
					BNL	M. May
					U. Penn	B. Jain
					OSU	K. Honscheid (E. Huff)
				Develop non-canonical WL statistics which have the potential	**APC/U Paris**	**J. Bartlett, E. Aubourg (G. Blanc, A. Boucaud, C. Roucelle)**
5.1.1	Weak lensing	LT-1	WL	to improve dark energy constraints	U. Washington	L. Rosenberg, M. Morales
					OSU	K. Honscheid (P. Melchior)
					CMU	R. Mandelbaum
					U. Penn	M. Jarvis, B. Jain
					U. Arizona	E. Cheu, K. Johns (A. Abate)
				Extend WL data analysis methods from Stage III surveys to	U. Washington	L. Rosenberg, M. Morales
5.1.1	Weak lensing	LT-2	WL	LSST	UIUC	J. Thaler (Z. Ma)
				Tools to estimate, mitigate, and remove key known potential	CMU	Ho
				systematics, more specifically sky brightness, stellar density	**LAL**	**Moniez, Ansari**
5.1.2	LSS	H-1	LSS	obscuration and contamination, extinction, seeing	UC Davis	Wittman, Tyson (Thorman)
					UC Davis	Jee, Tyson, Wittman (Gee)
				Analyze image simulations of multiple contiguous LSST	Rutgers	Gawiser, Kurczynski
5.1.2	LSS	H-2	LSS	pointings	U. Washington	L. Jones
					Illinois	Brunner
					CMU	Ho
5.1.2	LSS	H-3	LSS	Setting requirements on systematics	NAOC	Zhan
					UC Irvine	Kirkby
5.1.2	LSS	LT-1	LSS	Scalable optimal LSS analysis software	CMU	Ho

5.1.3	Supernovae	H-1	SN	Optimize analysis methods and quantify the error budget of photometric redshift and classification of SNe and their host galaxies	Penn Oklahoma LBNL Wayne State Argonne Chicago SLAC	Gladney, Sako Y. Wang Nugent Cinabro Kuhlmann (Kovaks, Spinka, Biswas), Kessler, Reil
5.1.3	Supernovae	H-2	SN	Design an end-to-end analysis pipeline that starts with survey properties and finishes with cosmology projections	**LPNHE/IN2P3** **CPPM/IN2P3** LBNL UW	**Astier, Guy** **Fouchez** A. Kim Connolly
5.1.3	Supernovae	H-3	SN	Supernova realizer for simulations	**LPC/IN2P3** Harvard Oklahoma Rutgers	**Gangler** Kirshner Y. Wang Jha
5.1.3	Supernovae	LT-1	SN	Develop theoretical/numerical/empirical SN models to better describe or improve the distance indicator	U. Pittsburgh LBNL	Wood-Vasey Thomas, Perlmutter, Aldering
5.1.4	Clusters	H-1	Cl	Optimized methods for absolute cluster mass calibration	UIUC Stanford/SLAC UC Davis UC Berkeley Ohio Chicago UC Santa Cruz **APC/U. Paris** Brown Ohio	Ricker Allen, Burchat, Burke (Morris, Applegate, von der Linden) Bradac, Jee (Kelly) Clowe (Mantz) T. Jeltema **Bartlett** I. Dell'Antonio Clowe
5.1.4	Clusters	H-2	Cl	Extending shear calibration programs into the cluster regime	Purdue Stanford/SLAC UC Berkeley	J. Peterson (E. Peng, A. Morandi) Allen, Burchat, Burke, (Applegate, von der Linden)(Kelly) Jeltema
5.1.4	Clusters	H-3	Cl	The impact of photometric redshift uncertainties on cluster mass calibration	UC Santa Cruz **APC/ U. Paris** Stanford/SLAC	**Bartlett** Burke
5.1.4	Clusters	LT-1	Cl	Optimizing magnification-based cluster mass calibration	**APC/Paris**	**Bartlett**
5.1.5	Strong lensing	H-1	SL	Lens External Mass Distribution Characterization	UC Davis UCSB KIPAC	Fassnacht Treu P. Marshall
5.1.5	Strong lensing	H-2	SL	Automated lens candidate detection in the LSST catalogs and images	UCSB KIPAC UC Davis KIPAC UCSB	Treu P. Marshall Fassnacht Marshall Treu
5.1.5	Strong lensing	H-3	SL	Time delay estimation	FNAL	Finley
5.1.5	Strong lensing	LT-1	SL	Explore multiple source plane cosmography as a competitive DE probe	UC Davis LBNL	Bradac Linder

					Cornell U.	Bean
					LBNL	Linder
	Theory and joint				KIPAC	P. Marshall
5.1.6	probes	H-1	TJP	Dark energy analysis pipeline	Princeton	Spergel
					UC Davis	Tyson (Schneider, also LLNL)
	Theory and joint			Exploring LSST DE science capability - Galaxy modeling	U. Pittsburgh	Zentner
5.1.6	probes	H-2	TJP	(theoretical systematics)	Berkeley/LBNL	Seljak
	Theory and joint				Cornell U.	Bean
5.1.6	probes	H-3	TJP	Understanding statistics over very large scales	JPL	Rhodes (Raccinelli)
	Theory and joint					
5.1.6	probes	H-4	TJP	Exploring LSST DE science capability - Photo-z	NAO China	Zhan
					Illinois	Brunner
					JHU	Menard
					U. Pittsburgh	Newman
	Photometric				UC Davis	Wittman (Schmidt)
5.1.7	Redshifts	H-1	Phz	Calibration strategies	KIPAC/SLAC	Wechsler
					Illinois	Brunner
					Arizona	Cheu, Johns (Abate)
					LAL	**Moniez, Ansari**
	Photometric			Produce realistic tools to test strategies and impact on	UC Davis	Wittman, Tyson (Schmidt, Thorman)
5.1.7	Redshifts	H-2	Phz	science measurements	KIPAC/SLAC	Wechsler
					LBNL	R. Cahn
	Photometric				JHU	Menard
5.1.7	Redshifts	H-3	Phz	Testing cross-correlation techniques	U. Pittsburgh	Newman
	Photometric					
5.1.7	Redshifts	LT-1	Phz	Optimal methods of storing and using p(z) information	Illinois	Brunner
					UC Davis	T. Tyson
	Cross-working				CMU	R. Mandelbaum
5.1.8	group tasks	H-1	CWG	Metrics for automated data quality assessment	LBNL	R. Cahn
	Cross-working			Full sky simulations of galaxy density and color systematics	Rutgers	Gawiser, Kurczynski
5.1.8	group tasks	H-2	CWG	using the LSST operations simulator	U. Washington	L. Jones (Yoachim)
	Cross-working			Develop tools to detect, mitigate, and remove unknown	CMU	Ho
5.1.8	group tasks	H-3	CWG	systematics	UC Davis	Tyson (Thorman)
					Princeton	R. Lupton (J. Bosch)
					U. Arizona	E. Cheu, K. Johns (A. Abate)
					Brown	I. Dell'Antonio
					UC Irvine	D. Kirkby
	Cross-working				UC Santa Cruz	T. Jeltema
5.1.8	group tasks	H-4	CWG	Deblending for weak lensing and cluster cosmology	SLAC	R. Schindler
					Cornell	R. Bean
					JPL	O. Dore
	Cross-working			Enhancing LSST DE science with external CMB and galaxy	UC Davis	L. Knox
5.1.8	group tasks	LT-1	CWG	lensing datasets	Princeton	D. Spergel
	Cross-working			Enhancing LSST DE science with external galaxy cluster		
5.1.8	group tasks	LT-2	CWG	datasets	KIPAC/SLAC	Allen
	Cross-working			Enhancing LSST DE science with external spectroscopic		
5.1.8	group tasks	LT-3	CWG	datasets	LBNL	P. McDonald
					LPNHE/IN2P3	**Astier, Guy**
	Cross-working				Harvard	Kirshner
5.1.8	group tasks	LT-4	CWG	Enhancing LSST DE science with external supernova datasets	LBNL	Aldering, Roe (Suzuki)

					ANL	Habib, Heitmann, Kovacs (Pope)
	Cosmological				**LAL**	**Moniez, Ansari**
5.2.1	simulation	H-1	CoSim	Simulations for mock catalog generation	CMU	Croft, DiMatteo, Trac
					ANL	Habib, Heitmann (Pope)
					JPL	Rhodes (Kiessling)
	Cosmological				CMU	Croft, DiMatteo, Trac
5.2.1	simulation	H-2	CoSim	Data analysis and Prediction tools	LLNL	MacIntosh (Schneider, also UC Davis)
					FNAL	Gnedin
					ANL	Habib, Heitmann (Pope)
					JPL	Rhodes? (Kiessling)
					UIUC	Ricker
					CMU	Croft, DiMatteo, Trac, Ho
					Yale	Padmanabhan
	Cosmological				UC Irvine	Kirkby
5.2.1	simulation	H-3	CoSim	Astrophysical systematics	LBNL	Nugent
					UC Berkeley	Cohn, White
					U. Washington	Connolly, Krughoff
					ANL	Habib, Heitmann, Kovacs
					UIUC	Ricker
					KIPAC/SLAC	R. Wechsler
	Catalog			Mock catalogs that trace astrophysical properties that impact	CMU	Croft, DiMatteo, Trac
5.2.2	improvements	H-1	CatSim	the DESC	LLNL	MacIntosh (Schneider, also UC Davis)
					UC Berkeley	Cohn, White
					U. Washington	Connolly
	Catalog				ANL	Kovacs
5.2.2	improvements	H-2	CatSim	Validation of the mock catalogs	KIPAC/SLAC	R. Wechsler
	Catalog					
5.2.2	improvements	H-3	CatSim	The implementation of errors within the source catalogs	U. Washington	Connolly
					Purdue	J. Peterson (E. Peng)
5.2.3	Photon simulator	H-1	PhoSim	Photon simulation usability improvements	SLAC	R. Dubois
					Purdue	J. Peterson (E. Peng)
5.2.3	Photon simulator	H-2	PhoSim	Photon simulation fidelity improvements	SLAC	S. Kahn, A. Rasmussen
					Purdue	J. Peterson (E. Peng)
					U. Washington	Connolly
5.2.3	Photon simulator	H-3	PhoSim	Photon simulation validation	SLAC	S. Kahn
					Purdue	J. Peterson (E. Peng)
	Software				U. Washington	Krughoff
5.3	framework	H-1	SW	End-to-end simulator capable of running at small scales	Fermilab	Dodelson/Gottschalk/Kowalkowski group/Gorzoglio
					U. Washington	Connolly
					Fermilab	Dodelson/Gottschalk/Kowalkowski group
	Software				SLAC	Dubois
5.3	framework	H-2	SW	Requirements for software framework	BNL	May, Wenaus, Ernst
					Fermilab	Dodelson/Gottschalk/Kowalkowski group
	Software				SLAC	Dubois
5.3	framework	H-3	SW	Level 3 software framework	BNL	May, Wenaus, Ernst
					Fermilab	Dodelson/Gottschalk/Kowalkowski group
	Software				SLAC	Dubois
5.3	framework	H-4	SW	Repository for code and data	BNL	May, Wenaus, Ernst

					SLAC	R. Dubois, G. Dubois-Felsmann
					Purdue	J. Peterson
					Fermilab	Gottschalk/Kowalkowski
5.4	Computing model	H-1	CM	Defining and updating computing models	BNL	May, Wenaus, Ernst
					SLAC	R. Dubois
					Fermilab	Gottschalk/Kowalkowski
5.4	Computing model	H-2	CM	Providing computing resources to the working groups	BNL	May, Wenaus, Ernst
					ANL	Habib, Heitmann
					BNL	May, Wenaus, Ernst
5.4	Computing model	H-3	CM	Providing storage and infrastructure for catalogues	SLAC	Dubois
5.4	Computing model	LT-1	CM	Providing resources for n-body simulations	ANL	Habib, Heitmann
					Purdue	I. Shipsey, W. Cui (B. Xin, G. Li)
5.5.1	Technical coord	H-1	TC	Wavefront sensing analysis and PSFs	LLNL	B. MacIntosh
					U. Pittsburgh	Wood-Vasey
					LBNL	Suzuki
					Harvard	Stubbs
					U. Washington	Jones, Yoachim
					Chicago	Kessler
					SLAC	Gilmore
					Cornell	R. Bean
					APC/U. Paris	**J. Bartlett, E. Aubourg, G. Blanc, A. Boucaud, C. Roucelle**
5.5.1	Technical coord	H-2	TC	Assess survey photometric calibration program	**LPNHE/IN2P3**	**N. Regnault**
					Harvard	C. Stubbs
					LSSTC	C. Claver
					SLAC	A. Rasmussen, S. Kahn, K. Gilmore
5.5.1	Technical coord	H-3	TC	Instrument model development	UC Davis	T. Tyson (A. Bradshaw)
					Wayne State	Cinabro
					Rutgers	Jha
					Argonne	Kuhlmann
					SLAC	Digel
5.5.1	Technical coord	H-4	TC	Cadence and operational simulation	U. Washington	Jones