The LSST Science Collaborations and The Dark Energy Science Collaboration

Sarah Bridle, University of Manchester

1. The LSST Science Collaborations
2. The LSST:UK Science Working Group
3. How to get involved
4. The Dark Energy Science Collaboration

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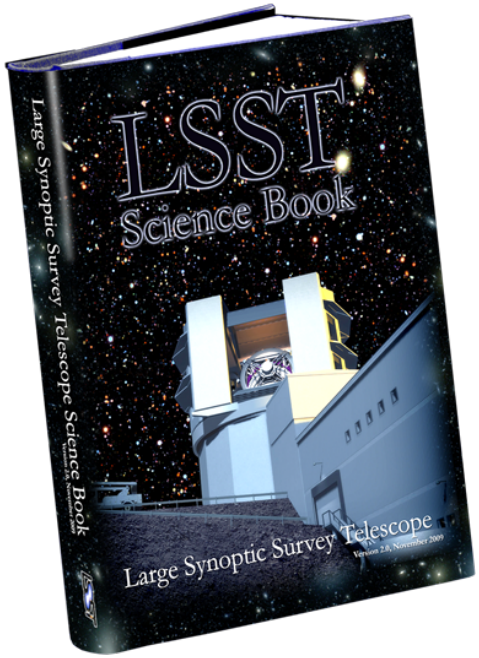
What are the LSST Science Collaborations?

Large Synoptic Survey Telescope

Topical working groups that provide scientifically-motivated feedback to survey design/implementation decisions

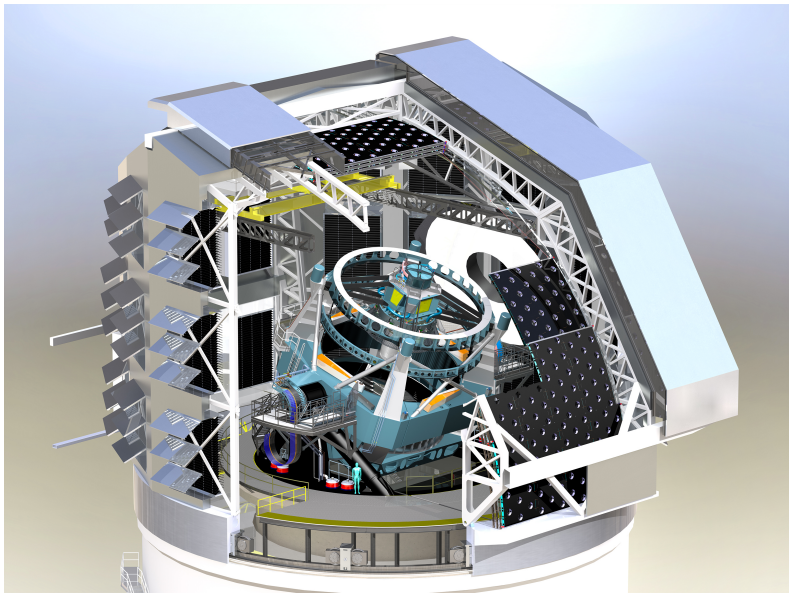
Slide from Lucianne Walkowicz last week at LSST@Europe, Belgrade

Why do the LSST Science Collaborations exist?



Collaborations played big role in making the science case for LSST

Now they help lay ground work for making the best use of LSST



Slide from Lucianne Walkowicz last week at LSST@Europe, Belgrade

Who may belong to a science collaboration?

Anyone with rights to LSST data may apply to be a member of the science collaboration of their choice

Science collaborations manage their own membership (and associated rules)

Slide from Lucianne Walkowicz last week at LSST@Europe, Belgrade

Who may belong to a science collaboration?

Large Synoptic Survey Telescope

Australia
The University of Sydney - ARC CAASTRO
The University of Western Australia (UWA)

Brazil
Laboratorio Interinstitucional de e-Astronomia (LIneA)
Laboratorio Nacional de Astrofisica (LNA)
Rede Nacional de Ensino e Pesquisa (RNP)
Academic Network at Sao Paulo (ANSP)
Americas Pathways (AMPATH)

Canada
University of Toronto (UofT)

Canary Islands
Instituto de Astrofisica de Canarias (IAC)

China
LSST-China Consortium

Chile

Croatia
Ruđer Bošković Institute (RBI)

France
IN2P3

The United States

Germany
Ludwig-Maximilians-Universität (LMU)
Max Planck Institute for Astrophysics (MPA)
Max Planck Institute for Astronomy (MPIA)

Hungary
Eotvos Lorand University (ELTE)
Konkoly Observatory

India
Inter-University Centre for Astronomy and Astrophysics (IUCAA)

Korea
Korea Astronomy and Space Science Institute (KASI)

New Zealand
University of Auckland (UOA)

Serbia
Nano Center

South Africa
The National Research Foundation (NRF)

Switzerland
Eidgenoessische Technische Hochschule Zuerich (Eth Zuerich)

Taiwan
Academia Sinica Institute of Astronomy & Astrophysics (ASIAA)

United Kingdom
Science and Technology Facilities Council (STFC) - UK LSST Consortium

Slide from Lucianne Walkowicz last week at LSST@Europe, Belgrade

There are currently nine science collaborations

Galaxies

Michael Cooper (UC Irvine) & Brant Robertson (UCSC)

Stars, Milky Way & Local Volume

John Bochanski (Rider); John Gizis (U Delaware); Nitya Kallivayalil (U VA)

Solar System

Lynne Jones (UW); David Trilling (NAU)

Dark Energy

Rachel Bean (Cornell);
Jeff Newman (Pitt)

AGN

Niel Brandt (Penn State)

Transients & Variable Stars

Federica Bianco (NYU); Ashish Mahabal (Caltech)

Large-scale Structure

Eric Gawiser (Rutgers); Anže Slosar (BNL)

Strong Lensing

Phil Marshall (KIPAC)

Informatics & Statistics

Tom Loredo (Cornell); Chad Shafer (CMU)

Slide from Lucianne Walkowicz last week at LSST@Europe, Belgrade

Large Synoptic Survey Telescope

(Some) Science Collaboration Activities

- Developing quantitative metrics for evaluating the LSST Observing Strategy, using LSST simulated operations
- Outlining and implementing road maps for the path to LSST science
- Weighing in on deep drilling fields/mini surveys, helping to plan for commissioning
- Meeting to foster working collaborations that bring LSST to fruition

Slide from Lucianne Walkowicz last week at LSST@Europe, Belgrade

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LSST:UK Consortium

LSST:UK

UK participation in the Large Synoptic Survey Telescope

Home
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Welcome to the LSST:UK website

This website provides information about UK participation in the Large Synoptic Survey Telescope (LSST), a next-generation sky survey facility under construction in Chile. The UK astronomical community is delighted to be participating in this exceptional project, which will drive research in all areas of astronomy.

LSST is one of the most ambitious science projects planned for the next decade, and a key part of the astronomical landscape in the 2020s. It will make advances over a large range of science, from potentially hazardous asteroids, through the structure of the Milky Way, to the most distant quasars, and the nature of dark matter and dark energy - all areas where UK astronomers stand poised to make leading contributions.

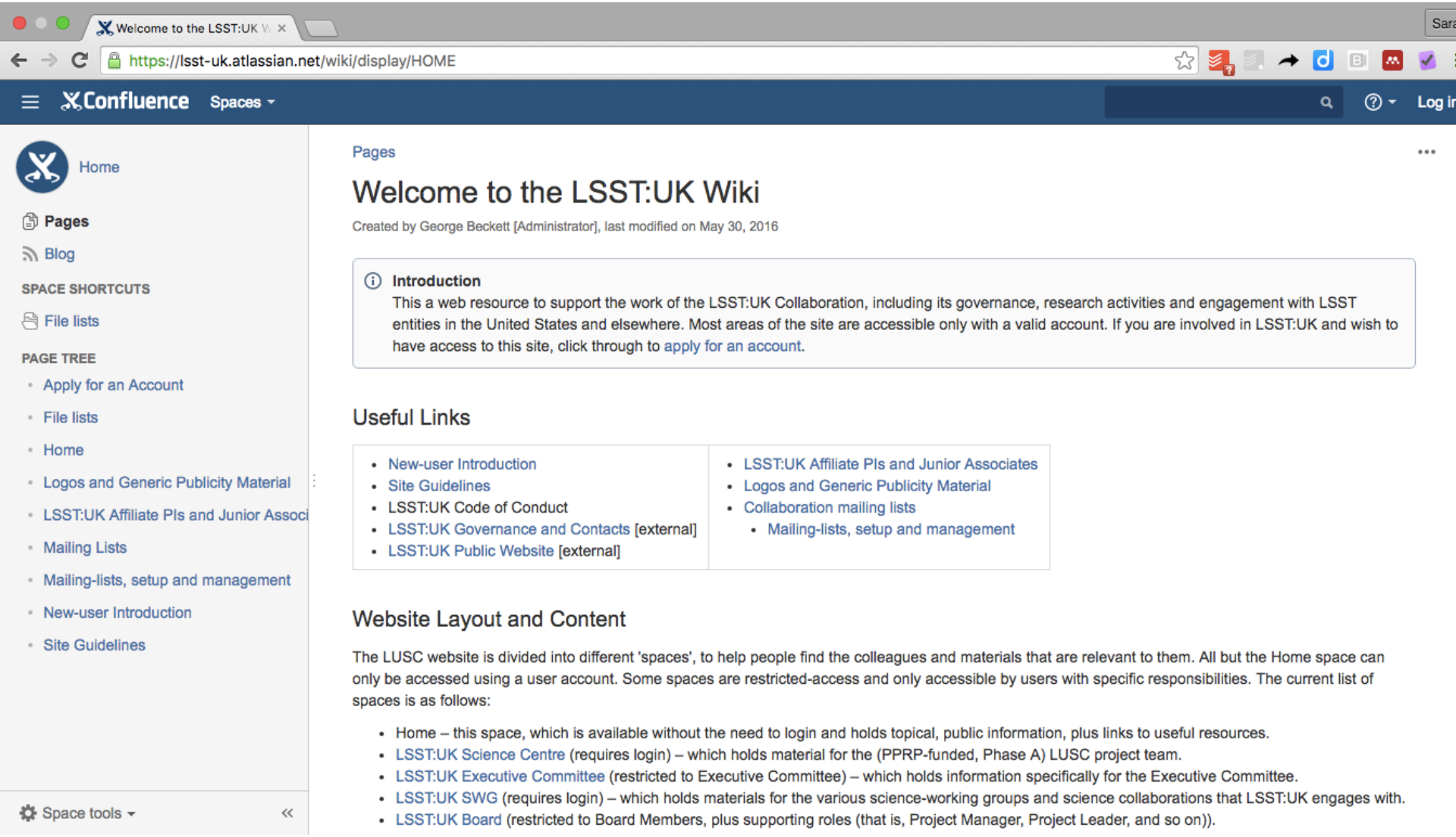
Latest news

06 MAY First LSST:UK Galaxies Workshop to be held in July, in Oxford

13 APR Dark Energy Science Collaboration is coming to UK

15 JAN Astronomical Surveys: The Perspective of a lifetime

Read all news


Welcome to the LSST:UK W
https://lsst-uk.atlassian.net/wiki/display/HOME
Confluence
Spaces
Log in
Home
Pages
Blog
SPACE SHORTCUTS
File lists
PAGE TREE
Apply for an Account
File lists
Home
Logos and Generic Publicity Material
LSST:UK Affiliate PIs and Junior Associ
Mailing Lists
Mailing-lists, setup and management
New-user Introduction
Site Guidelines
Space tools
Pages
Welcome to the LSST:UK Wiki
Created by George Beckett [Administrator], last modified on May 30, 2016
Introduction
This a web resource to support the work of the LSST:UK Collaboration, including its governance, research activities and engagement with LSST entities in the United States and elsewhere. Most areas of the site are accessible only with a valid account. If you are involved in LSST:UK and wish to have access to this site, click through to apply for an account.
Useful Links
New-user Introduction
Site Guidelines
LSST:UK Code of Conduct
LSST:UK Governance and Contacts [external]
LSST:UK Public Website [external]
LSST:UK Affiliate PIs and Junior Associates
Logos and Generic Publicity Material
Collaboration mailing lists
Mailing-lists, setup and management
Website Layout and Content
The LUSC website is divided into different 'spaces', to help people find the colleagues and materials that are relevant to them. All but the Home space can only be accessed using a user account. Some spaces are restricted-access and only accessible by users with specific responsibilities. The current list of spaces is as follows:
Home – this space, which is available without the need to login and holds topical, public information, plus links to useful resources.
LSST:UK Science Centre (requires login) – which holds material for the (PPRP-funded, Phase A) LUSC project team.
LSST:UK Executive Committee (restricted to Executive Committee) – which holds information specifically for the Executive Committee.
LSST:UK SWG (requires login) – which holds materials for the various science-working groups and science collaborations that LSST:UK engages with.
LSST:UK Board (restricted to Board Members, plus supporting roles (that is, Project Manager, Project Leader, and so on)).

LSST:UK Science Working Group Home

Created by George Beckett [Administrator], last modified by Sarah Bridle on May 27, 2016

Science Collaborations

- Dark Energy Science Collaboration
- Transients and variable stars
- Galaxies
- Informatics & Statistics
- Solar System
- Stars, Milky Way, and Local Volume
- Active Galactic Nuclei

Further information on the structure of the LSST Science Collaborations is available on the LSST Science Collaborations website.

Liaison activities with other projects and don

- Particle Physics
- Infra-red
- Spectroscopy
- SKA
- GAIA
- E-ELT
- Euclid
- WFIRST
- Athena

Other useful links:

Cross area activities

Relevant documents:

LSST:UK Science Requirements document

Compilation of reports from Liaisons and Points of Contact as input to the May 2016 Oxford LSST:UK Board Meeting

LSST:UK Project Scientist report for the May 2016 Oxford LSST:UK Board Meeting

LSST:UK Role	LSST:UK Name
LSST:UK Project Lead	Bob Mann
LSST:UK Project Scientist	Sarah Bridle
LSST:UK Board Chair	Tim Naylor
LSST:UK Board Deputy Chair	Roger Davies
LSST:UK EPO Coordinator	Andrew Norton
LSST:UK Public Data Coordinator	Robert Simpson
LSST:UK Training	Nic Walton

LSST:UK Particle Physics Liaison	Ian Shipsey
LSST:UK Infra-Red Liaison	Manda Banerji
LSST:UK Spectroscopy Liaison	Richard McMahon
LSST:UK SKA Liaison	David Bacon
LSST:UK GAIA Liaison	Nic Walton
LSST:UK E-ELT Liaison	Isobel Hook
LSST:UK Euclid Liason	Bob Nichol
LSST:UK Athena Liaison	Mike Watson
LSST:UK Deep Drilling Fields Liaison	Apply now!
LSST:UK Gravitational Wave Liaison	Apply now!

LSST:UK DESC Point of Contact	Apply now!
LSST:UK Weak Lensing Point of Contact	Benjamin Joachimi
LSST:UK LSS Point of Contact	Jon Loveday
LSST:UK SNe Point of Contact	Mark Sullivan
LSST:UK Clusters Point of Contact	Graham Smith
LSST:UK Strong Lensing Point of Contact	Aprajita Verma
LSST:UK DESC Theory and Joint Probes PoC	Jo Dunkley / Apply now!
LSST:UK Photo-z Calibration Point of Contact	Ofer Lahav
LSST:UK Cosmological Simulations Point of Contact	Carlton Baugh

LSST:UK Milky Way Science Collaboration Point of Contact	Apply now!
LSST:UK Variable Stars PoC (also reports to TVSCC)	Aleks Scholz
LSST:UK Star Clusters PoC	Tim Naylor
LSST:UK Magellanic Clouds PoC	Maria-Rosa Cioni - 2016
LSST:UK Near Field Cosmology PoC	Apply now!
LSST:UK Galactic Bulge PoC	Victor Debattista
LSST:UK Low-mass stars and the Solar Neighborhood PoC	Ben Burningham
LSST:UK Galactic Structure and ISM PoC	Vasily Belokurov

LSST:UK TVVSC Point of Contact	Stephen Smartt
LSST:UK SSSC Point of Contact	Wes Fraser
LSST:UK GSC Point of Contact	Sugata Kaviraj
LSST:UK ISSC Point of Contact (Information transcrivbed into Confluence PoC page by MGB)	Jason McEwen
LSST:UK AGN Point of Contact	Carole Mundell

https://docs.google.com/spreadsheets/d/1ddpbWj7WI9pVdy9x7vlYFtqqHdghpJu_jqSy3-eH3r0/edit#gid=0

Email nominations and self-nominations to George Beckett <george.beckett@ed.ac.uk>

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- Propose new PoCs and Liaisons
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PAGE TREE

- Active Galactic Nuclei
- Athena
- Cosmological Simulations Working Gro
- Cross area activities
- **Dark Energy Science Collaboration**
- E-ELT
- Euclid
- GAIA
- Galaxies Science Collaboration
- Galaxy Clusters (LSST:UK Clusters)
- Informatics & Statistics
- Infra-red
- Large Scale Structure Working Group o
- Particle Physics
- Photoz Working Group of the DESC
- SKA
- Solar System
- Spectroscopy
- Stars, Milky Way, and Local Volume

Space tools

Dark Energy Science Collaboration

Created by Sarah Bridle, last modified by Aprajita Verma on May 18, 2016

Science Collaboration Information	
Working Group	**UK Point of Contact**
Weak Lensing	Benjamin Joachimi
Large Scale Structure	Jon Loveday
Supernovae	Mark Sullivan
Clusters	Graham Smith
Strong Lensing	Aprajita Verma
Theory and Joint Probes	Jo Dunkley
Photoz	Ofer Lahav
Cosmological Simulations	Carlton Baugh

Useful Information:

LSST Website: http://lsst-desc.org/

Apply to join DESC here: http://www.lsst-desc.org/Membership

Please see the links above for specific information about each Working Group.

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

DESC whitepaper arXiv:1211.0310 set out initial goals

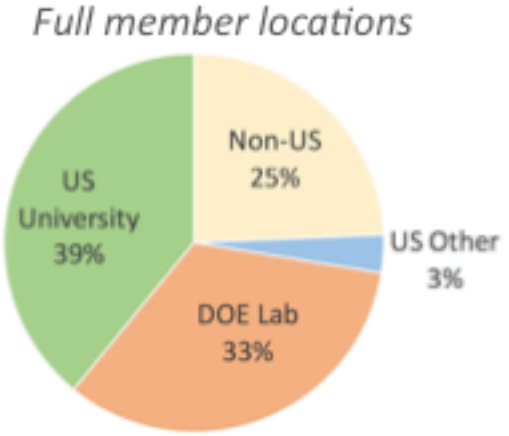
HEP style structure with democratic, member-based governance
Members with astrophysics and particle physics backgrounds
Expertise in instrumentation, computing, observing & theory

Rapidly evolved since inception to become active international collaboration
Over 490 members, 156 "full members"

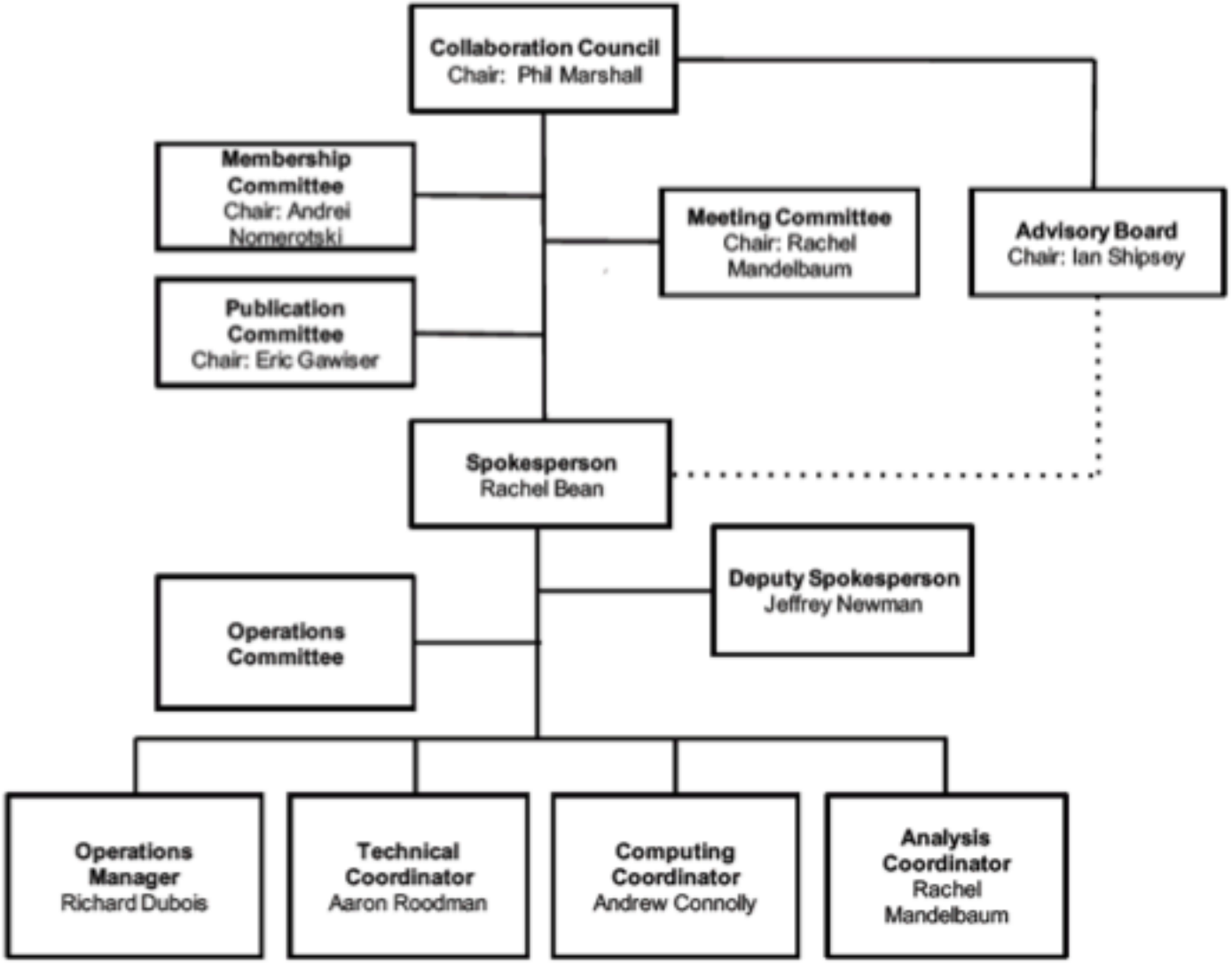
DOE is the lead agency:

- Six DOE Labs, 1/3 of full members, playing key roles.
- ~20 DOE HEP supported university members

Public website: http://www.lsst-desc.org/



Collaboration Structure



DESC work organized in 12 Working Groups

Collaboration Council Chair	Phil Marshall (SLAC)
Spokesperson	Rachel Bean
Deputy Spokesperson	Jeff Newman

DOE Lab researcher
DOE HEP PI grant support
Non-US member

Analysis Team *Coordinator: Rachel Mandelbaum*	
Working Group	**Conveners**
Clusters	Anya von der Linden Ian Dell'Antonio
Large Scale Structure	Eric Gawiser Anze Slosar (BNL)
Photometric Redshifts	Ofer Lahav Sam Schmidt
Strong Lensing	Chris Fassnacht Phil Marshall (SLAC)
Supernovae	Saurabh Jha Michael Wood Vasey
Theory/ Joint Probes	Elisabeth Krause Andrew Zentner
Weak Lensing	Joe Zuntz Michael Schneider (LLNL)

Computing and Software Infrastructure Team *Coordinator: Andrew Connolly*	
Working Group	**Conveners**
Cosmological Simulations	Katrin Heitman (ANL) Simon Krughoff
Survey Simulation	John Peterson Chris Walter
Computing Infrastructure	Scott Dodelson (FNAL) Richard Dubois (SLAC)

Technical Team *Coordinator: Aaron Roodman*	
Working Group	**Conveners**
Sensor Anomaly	Pierre Astier Andrei Nomerotski (BNL)
Photometric Calibration	Eli Rykoff (SLAC) Nicolas Regnault

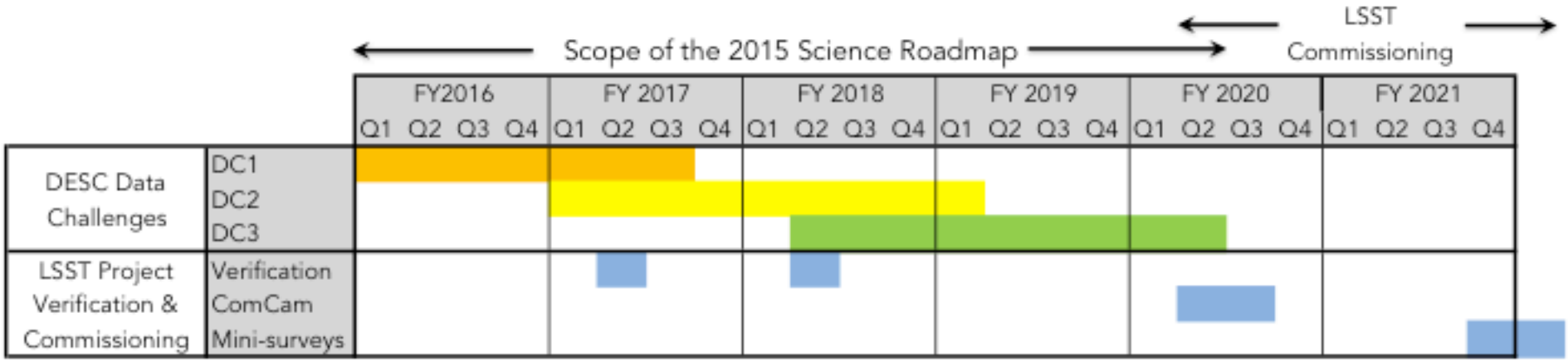
DESC Planning: 2015 DESC Science Roadmap (SRM)

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

Lays out essential tasks across the working groups to be ready for LSST commissioning

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)

Lays out WG key projects, deliverables and individual tasks to meet them

DC1 & DC2 Key Project **LSS1**: Preliminary Code for Measuring Power and Cross-power Spectra

LSS1.1 – DC1 SW: Write preliminary flat-sky power spectrum measurement code 06/16

LSS1.2 – DC2 SW: Exte

LSS1.3 – DC2 SW: Exte

DC1 & DC2 Key Project **LS**

LSS2.1 – DC1 RQ: LSS

LSS2.2 – DC1 SW: LSS

LSS2.3 – DC1 VA: Analy

LSS2.4 – DC2 RQ: Prop

LSS2.5 – DC2 RQ: LSS

LSS2.6 – DC2 SW: Dete

LSS2.7 – DC2 VA: Analy

LSS2.8 – DC3 RQ: LSS

DC1 & DC2 Key Project **LS**

ysis

LSS3.1 – DC1 SW: Crea

LSS3.2 – DC1 VA: Valid

DC1 Key Project **WL1**: Requirements on shear estimation

WL1.1 – DC1 SW: Softwa

WL1.2 – DC1 SW: Build a

WL1.3 – DC1 DP: Create

WL1.4 – DC1 RQ: Feedba

WL1.5 – DC1 SW: Null te

DC1 Key Project **WL2**: Syst

WL2.1 – DC1 RQ: System

WL2.2 – DC1 SW: Two-p

WL2.3 – DC1 SW: Model

WL2.4 – DC1 SW: Model

WL2.5 – DC1 SW: Model

DC2 Key Project **WL3**: Imag

WL3.1 – DC2 RQ: Set req

WL3.2 – DC2 DP: Precurs

WL3.3 – DC2 SW: Pipelin

WL3.4 – DC2 SW: Selecti

WL3.5 – DC2 SW: Softwa

WL3.6 – DC2 DP: Shear c

DC1 Key Project **CI1**: Estimate Resource Needs and Recommend the Host for DESC Computing Resources

CI1.1 – DC1 RQ: Estimate CPU and disk space requirements 12/15

CI1.2 – DC1 RQ: Recommend the Computing Resource Host 1/16

DC1 Key Project **CI2**: Define the Initial Elements of the Software Framework

CI2.1 – DC1 RQ: Software Framework Implementation 02/16

CI2.2 – DC1 RQ: Distributed Code Development Environment 2/16

CI2.3 – DC1 RQ: Workflow & Data Management Tools 02/16

DC1 Key Project **CI3**: Targeted Frameworks for Use by the Analysis Working Groups

CI3.1 – DC1 SW: A framework for Twinkles light curve generation (Key Project **DG2**) 06/16

CI3.2 – DC1 RQ: Develop a framework for **CX4** with the TJP WG 06/16

DC1 Key Project **CI4**: Develop a Distributed Code Development Environment

CI4.1 – DC1 SW: Produce an initial development environment 01/16

CI4.2 – DC1 SW: Augment the development environment 06/16

DC2 Key Project **CI5**: Post-DC1 Requirements of the Software and Computing Environment

CI5.1 – DC2 RQ: Updated Requirements for a DESC Software Framework 06/17

DC2 Key Project **CI6**: Develop the WL Framework to handle DC2-level requirements.

CI6.1 – DC2 SW: The WL Shear Pipeline in the Software Framework 06/18

If you have LSST:UK PI or Junior Associate status (see previous slide):

How do I join and get involved?

If your institute/country is a member:

- Applications for membership are online and are dealt with on a rolling basis http://www.lsst-desc.org/Membership
- *Members* have access to DESC communication tools, internal website, and documents
- *Full members* have access to DESC computing resources and all DESC data products. *Full membership* requires a description of the work you plan to undertake and a commitment of time to the collaboration
- Tools available include: mailing lists, a confluence wiki, a Github organization (hosting code and some documents)
- Bi-annual collaboration meetings (including a dark energy school, hack days, working group meetings). Next meeting: Oxford July 18-22 2016

If your institute/country is not a member:

- Ask your institute to join!

Ways to get involved

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- Contact the Points of Contact and Liaisons to discuss your science interests
- Join mailing lists set up by the PoCs and Liaisons
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LSST:UK

UK participation in the Large Synoptic Survey Telescope

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Oxford welcomes DESC in 2016

The LSST Dark Energy Science Collaboration has announced it will hold its Summer 2016 annual meeting in Oxford.

Dark Energy - the unexplained acceleration of the universe - is one of the greatest mysteries in science today. The LSST will produce a unique dataset of billions of galaxies, which will enable us to measure how Dark Energy varies over time, with unprecedented precision. The LSST will map the entire night sky every three days, and astronomers will use
the maps and catalogues it makes in multiple ways to zero in on the phenomenon of dark energy.

The Dark Energy Science Collaboration (DESC), with strong representation from across the international astronomy community, is actively preparing for these cosmological analyses of the LSST survey. A key mechanism for doing this is the bi-annual collaboration meeting, which typically brings together hundreds of astronomers.

Holding the Summer 2016 meeting in Oxford provides a great opportunity for Europe-based astronomers to participate and contribute to DESC work, plus is an important recognition of the UK's commitment to LSST.

Detailed information about the meeting will be on the internal DESC Confluence page. Eligible UK LSSTmembers are encouraged to apply to join DESC and to attend the meeting.