LSST Informatics and Statistics Science Collaboration (ISSC)

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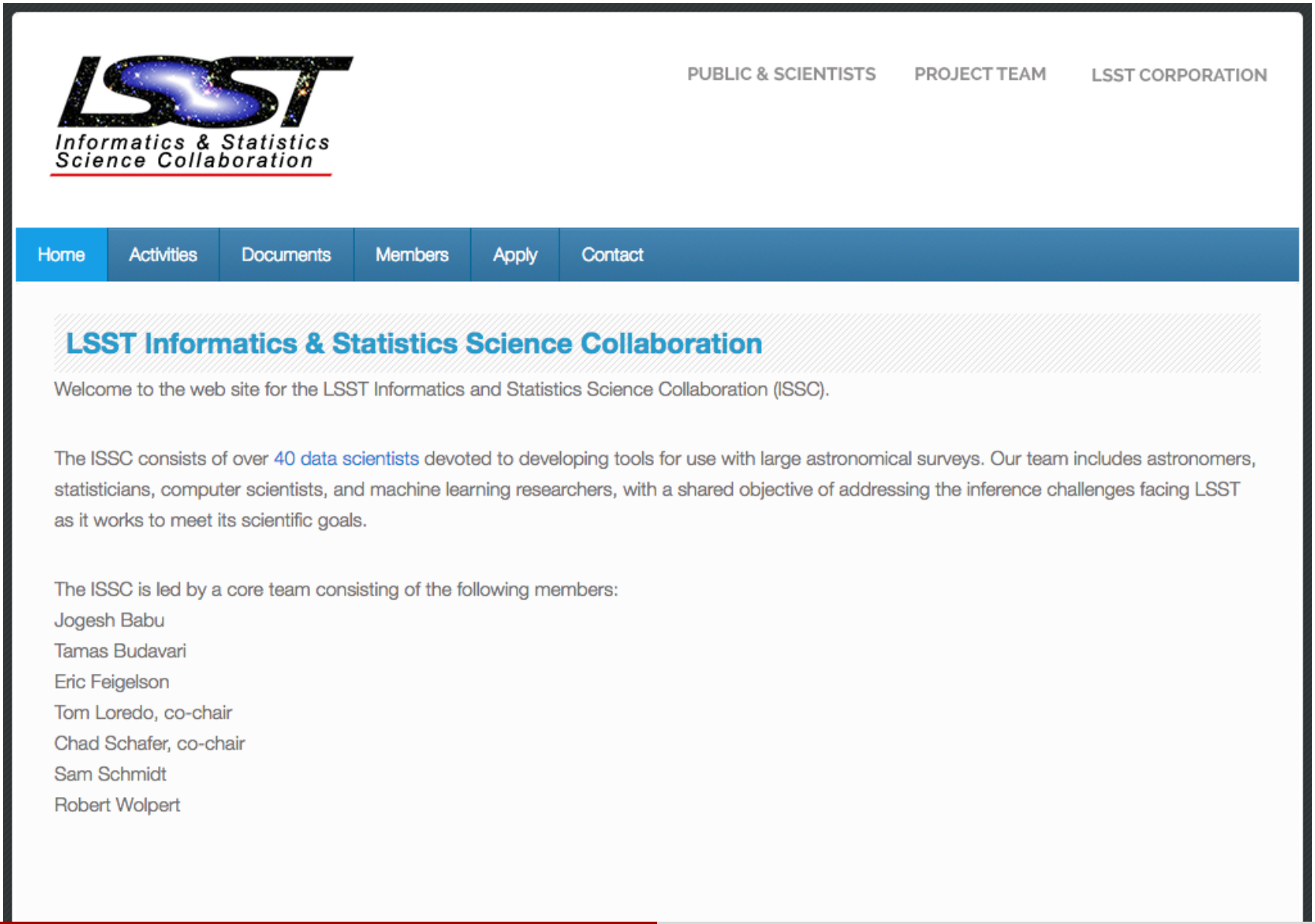
Mullard Space Science Laboratory (MSSL)
University College London (UCL)

National Astronomy Meeting (NAM), University of Nottingham, June 2016

LSST Informatics and Statistics Science Collaboration (ISSC)

US (https://issc.science.lsst.org/)



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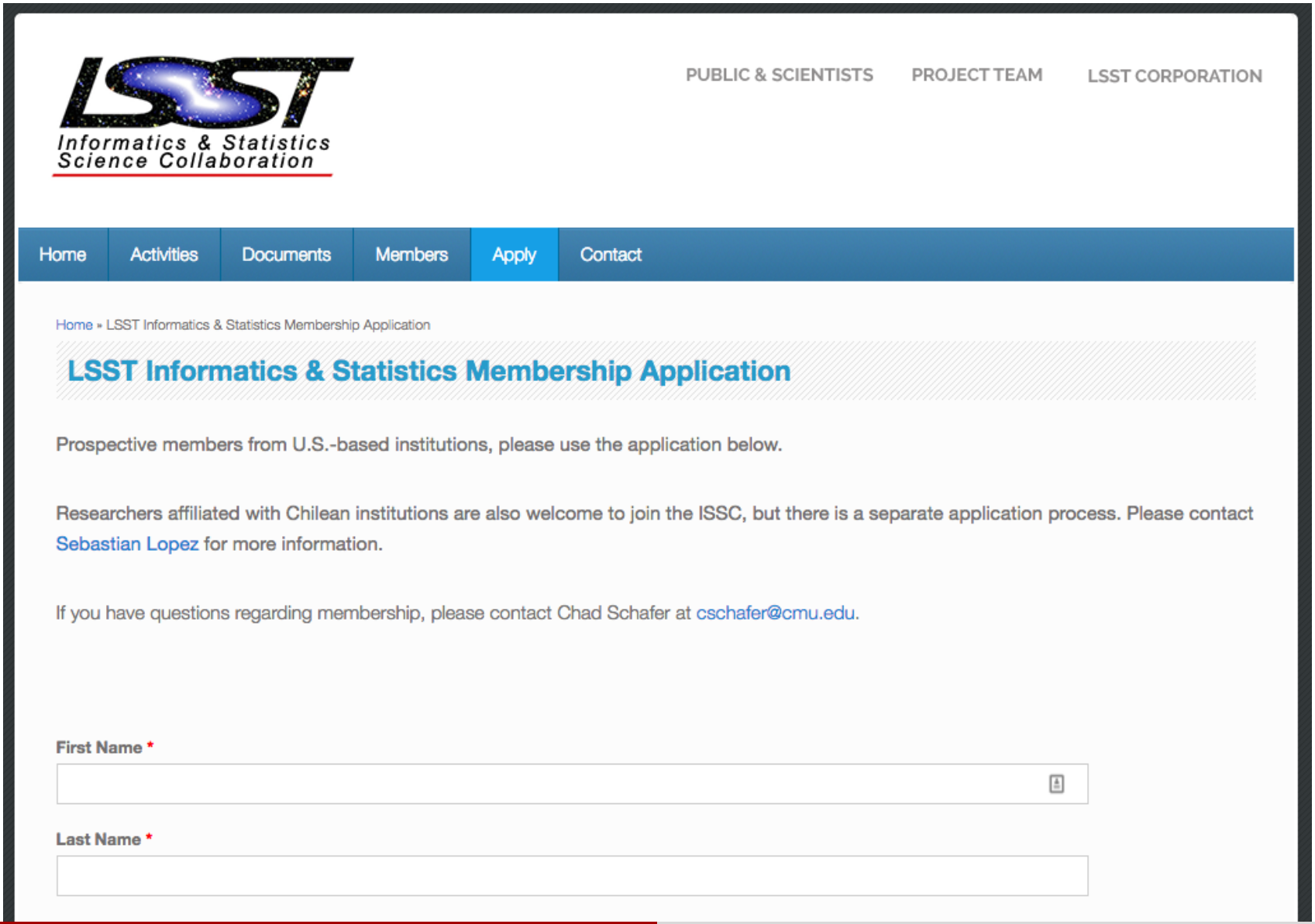
Joining (https://issc.science.lsst.org/apply)



LSST Informatics and Statistics Science Collaboration (ISSC)

LUSC-ISSC mailing list (LUSC-ISSC@jiscmail.ac.uk)

Subscribe by sending an email to listserv@jiscmail.ac.uk, with the following details:

Subject: <BLANK>
Message: SUBSCRIBE LUSC-ISSC <Firstname> <Lastname>

This mailing list will be used to keep everyone abreast of ISSC related activities.

Although ISSC is a distinct science collaboration, there will be close interaction with the activities of DESC and other science collaborations to ensure informatics and statistics developments are closely related to the science goals of LSST.

All list members can post messages so feel free to make use of this list for general discussions of interest to members and don't hesitate if you have any questions about ISSC!

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Conferences, meetings and visitor programmes

- Statistical Challenges in 21st Century Cosmology, Chania, 24-27 May 2016
  http://cosmo21.cosmostat.org/
- Statistical Challenges in Modern Astronomy, Carnegie Mellon University, 6-10 June 2016
  http://scma6.org/
- LSST@Europe 2, Belgrade, 20-24 June 2016
  https://project.lsst.org/meetings/lsst-europe-2016/
- DESC collaboration meeting, Oxford, 18-22 July 2016
  http://www.lsst.ac.uk/news/2016/oxford-welcomes-desc-2016-16-01-12
- SAMSI opening workshop on Statistical, Mathematical and Computational Methods for Astronomy, North Carolina, 22-26 August 2016
  https://www.samsi.info/programs-and-activities/research-workshops/2016-17-astro-opening-workshop-august-22-26-2016/
- SAMSI visitor programme, North Carolina
  https://www.samsi.info/programs-and-activities/year-long-research-programs/2016-17-program-on-statistical-mathematical-and-computational-methods-for-astronomy-astro/

Conferences, meetings and visitor programmes

- Biomedical and Astronomical Signal Processing (BASP) Frontiers workshop
  Villars, Switzerland, 29 January - 3 February 2017
  Dedicated LSST informatics and statistics session
  http://www.baspfrontiers.org/

BASP
Biomedical and Astronomical Signal Processing

IMPORTANT DATES

01.06.2016 Session proposal deadline
01.09.2016 Abstract submission opening
01.10.2016 Abstract submission deadline

About the workshop

The **International Biomedical and Astronomical Signal Processing (BASP) Frontiers workshop** was created to promote synergies between selected topics in astronomy and biomedical sciences, around common challenges for signal processing.

Building on the success of the first workshops (2011, 2013 and 2015), BASP Frontiers 2017 will gather around 100 participants and open its floor to many interesting hot topics in theoretical, astrophysical, and biomedical signal processing, with a particular focus on imaging.

Ski and full board philosophy: Following our tradition, BASP Frontiers 2017 will take

Photometric supernova classification

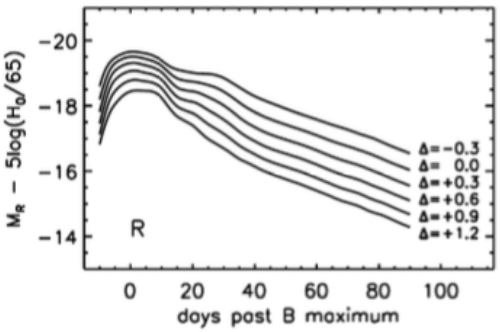
Machine learning

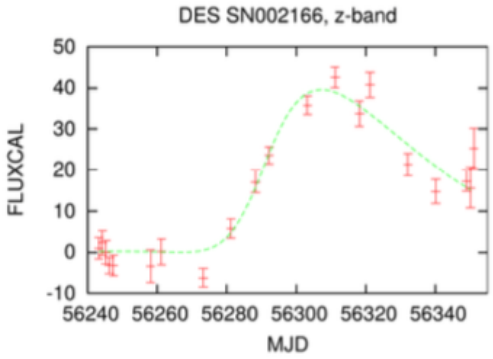
- Spectroscopic follow-up not possible for majority of sample.
- Photometric supernova classification to determine SN type by machine learning (Lochner, McEwen, Peiris, Lahav & Winter 2016; arXiv:1603.00882).
- Go beyond single techniques to study classes.
- Understand physical requirements (*e.g.* representative training, redshift).

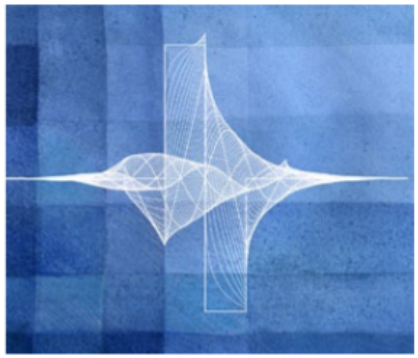
Michelle Lochner

Photometric supernova classification

Feature selection







Template Fitting

SALT2 templates fitted with SNCosmo +MultiNest

General parameterisations

Karpenka et al (2014) Newling et al. (2010) fitted with MultiNest

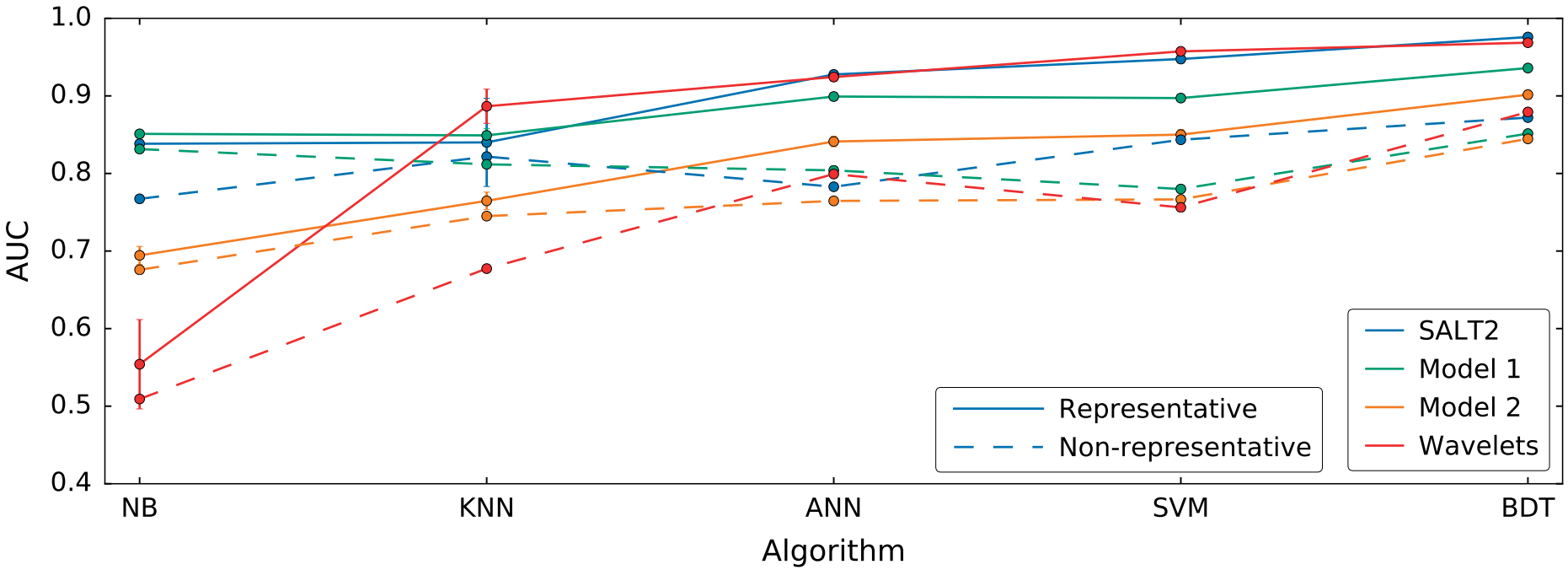
Wavelets

Gaussian Process fit to light curves; wavelet decomposition; PCA

Model Independence

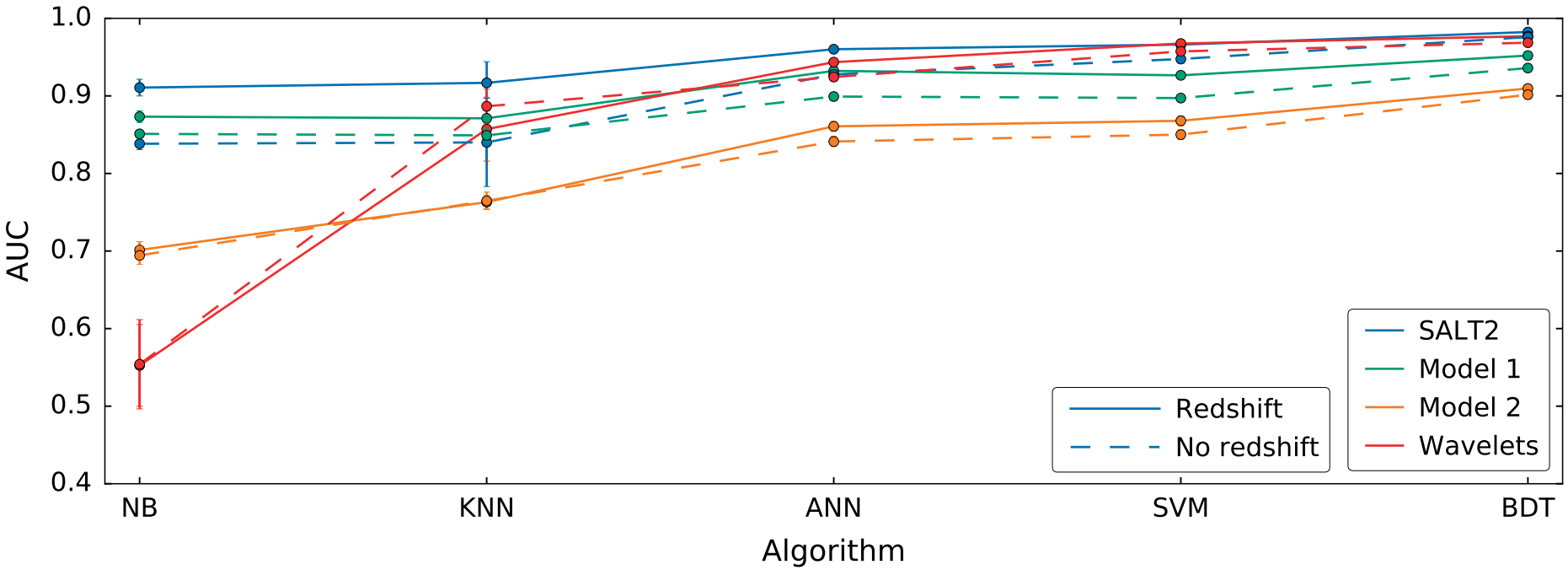
Photometric supernova classification

Importance of representative training data



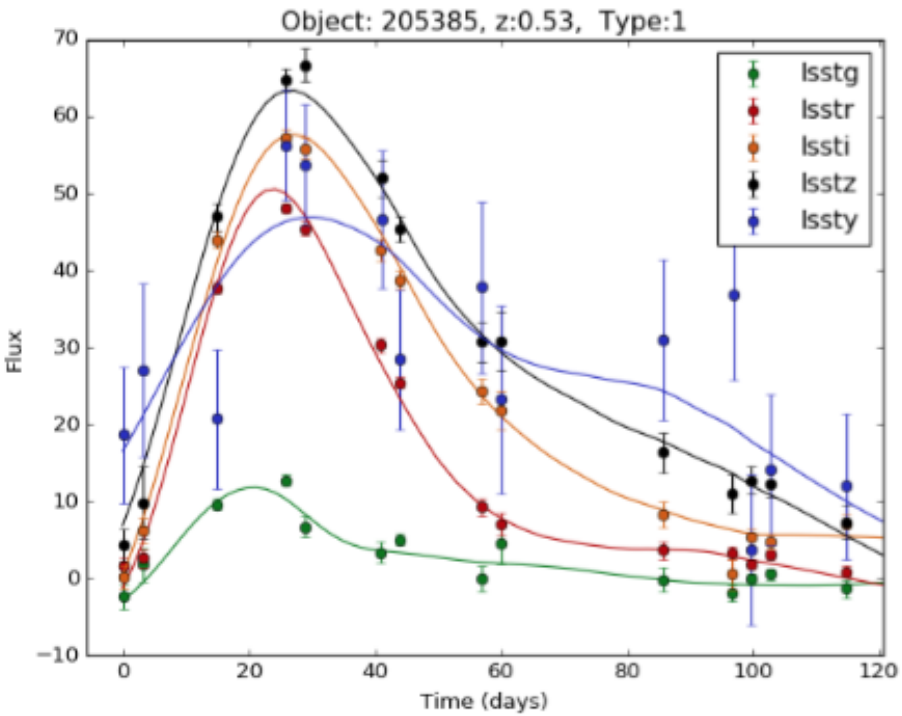
Photometric supernova classification

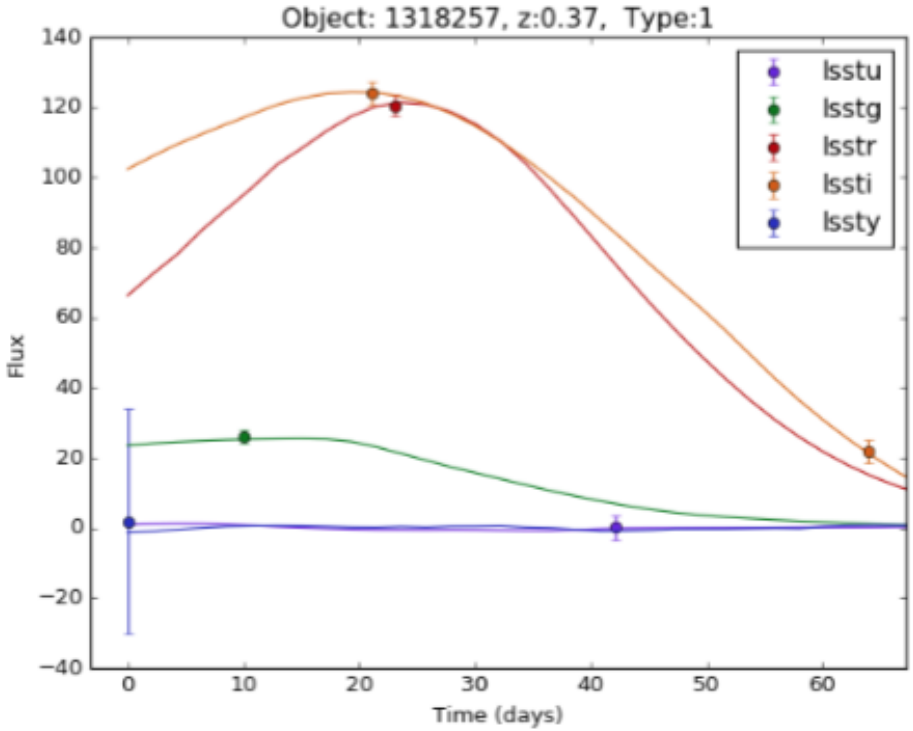
Importance of redshift



Photometric supernova classification

Applying to LSST cadence simulations

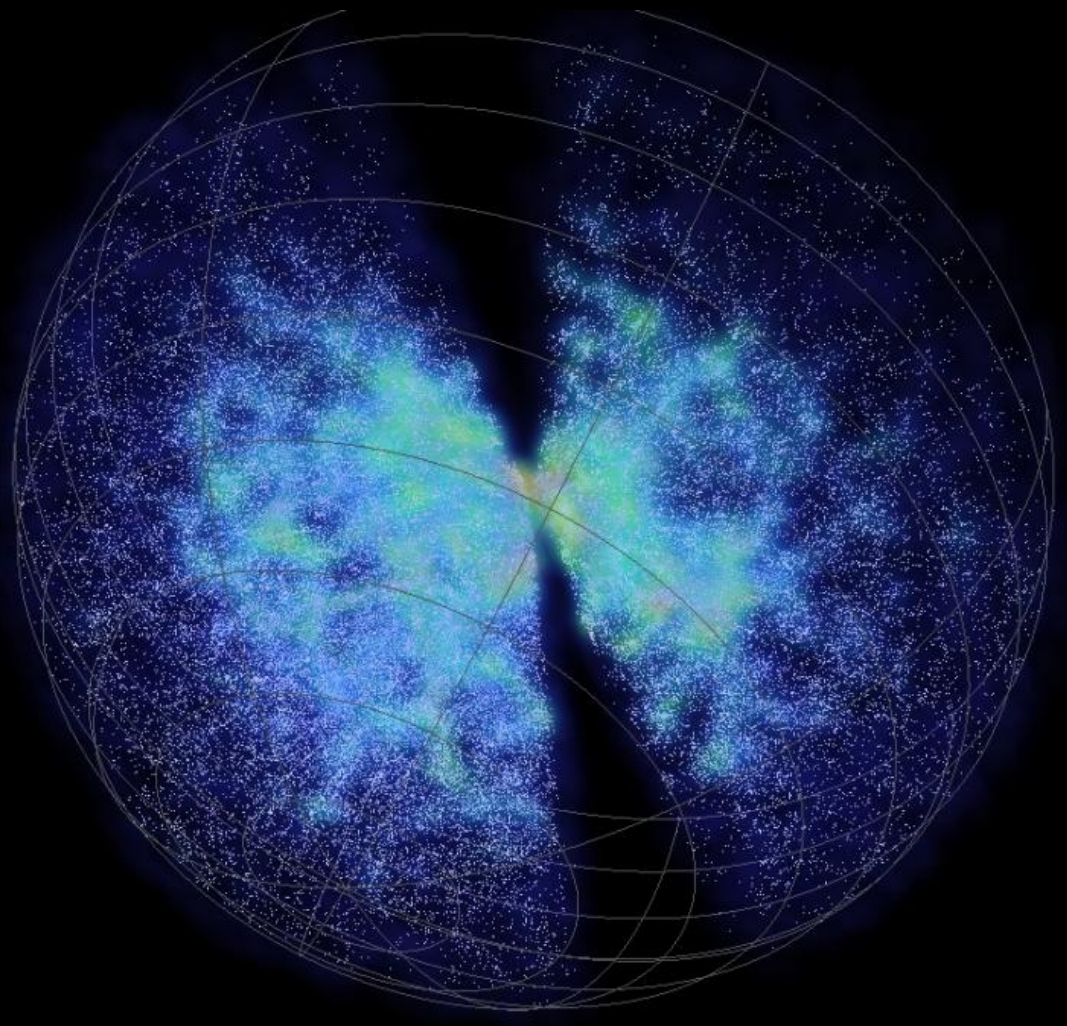




Wavelets,
Deep Drilling Fields

Wavelets,
Wide-Fast-Deep

LSST 3D data compression (3DDC) taskforce



Credit: SDSS

LSST 3D data compression (3DDC) taskforce

3DDC taskforce wiki page:
https://confluence.slac.stanford.edu/pages/viewpage.action?pageId=195857648

3DDC taskforce Slack team:
https://lsst3ddc.slack.com

Contributors: Franz Elsner, Jean-Eric Campagne, Benjamin Joachimi, Thomas Kitching, Francois Lanusse, Boris Leistedt, Jason McEwen, Hiranya Peiris, Layne Price, Anze Slosar, Edo van Uitert, . . .

- Why 3D?
  - Extract more information
  - Filter non-linear scales
  - Deal with covariances
- Challenges
  - Fast transforms for data and theory
  - 3D pixelisations
  - Mask, selection effects, covariances, systematics

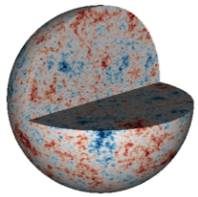
LSST 3D data compression (3DDC) taskforce

Identified existing codes for 2D/3D transforms

Add yours!	**CosmicPy**	C++, Py	Theory Fourier-Bessel
	MRS3D	C++	Fourier-Bessel + wavelets
	3DEX	F90 (!)	Fourier-Bessel transform
	HEALPIX	C, F90, Py, IDL	2D Spherical harmonics
	SSHT	C, Matlab	2D Spherical harmonics
	FLAG(LET)	C, Py, Matlab	3D Fourier-Laguerre + wavelets
	LagSHT	C++	3D Fourier-Laguerre + Bessel
	3DFast	C	Flat-sky Fourier-Bessel

Plan to start **Uber 3D code** TM

Get in touch if you'd like to contribute!



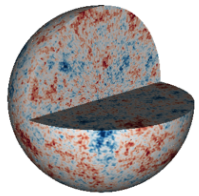
LSST 3D data compression (3DDC) taskforce

Uber 3D code™

https://github.com/astro-informatics/uber3d

- **Data**: survey => 3D clustering+shear power spectra
- **Theory**: interfaced with cosmology library

  Supports all existing transforms and pixelizations
- **Extras**: likelihoods, systematics mitigation, etc



LSST 3D data compression (3DDC) taskforce

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[ 88%] Built target healpix
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[ 94%] Building CXX object src/uber3d/CMakeFiles/uber3d.dir/cln_fitsio.cpp.o
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[ 96%] Built target uber3d
[ 98%] Building CXX object src/dsbt/CMakeFiles/dsbt.dir/fastDSBT.cpp.o
[100%] Linking CXX shared library libdsbt.so
[100%] Built target dsbt
[francois@Procyon build]$
```

Uber3D Trello Board after hack day,
March DESC Collaboration Meeting @SLAC