

# Large Synoptic Survey Telescope

www.lsst.org

## **LSST Education and Public Outreach**

Suzanne H. Jacoby<sup>1</sup>, K. D. Borne<sup>2</sup>, G. Brissenden<sup>3</sup>, C. A. Christian<sup>4</sup>, A. A. Henden<sup>5</sup>, C. J. Lintott<sup>6</sup>, J. K. Olsen<sup>3</sup>, E. E. Prather<sup>3</sup>, M. J. Raddick<sup>7</sup>, D. M. Ratcliffe<sup>8</sup>, T. S. Spuck<sup>9</sup>, M. Subbarao<sup>10</sup>, G. Squires<sup>11</sup>, LSST Outreach Advisory Board <sup>1</sup>LSST, <sup>2</sup>George Mason University, <sup>3</sup>University of Arizona, <sup>4</sup>STScl, <sup>5</sup>AAVSO, <sup>6</sup>University of Oxford, United Kingdom, <sup>7</sup>Johns Hopkins University, <sup>8</sup>Wichita State University, <sup>9</sup>Oil City High School, <sup>10</sup>Adler Planetarium, <sup>11</sup>IPAC/Caltech

With its open data policy, survey mode of operations and data products with vast potential for discovery, LSST exemplifies the exponential for discovery, LSST exemplifies the exponential for discovery, LSST exemplifies the exponential for discovery. Outreach (EPO). LSST will provide cyberinfrastructure and interfaces enabling users to visualize and individual learning environments. We're building on new media technologies that emphasize collaboration, communication, and personalization with an emphasis on Citizen Science and authentic research experiences. We present plans, prototypes, and results of EPO efforts underway during LSST Design and Development.



Goals of the EPO Program

Increase public awareness and support of scientific research.





Share the science and discoveries of LSST with a diverse audience. Strengthen STEM education at every level – pre college through lifelong learners. Support NSB Goal of Preparing the Next Generation of STEM Innovators Contribute to knowledge and skills for the 21<sup>st</sup> century workforce.



Outcome: Our audience discovers they are part of a dynamic universe that changes on many timescale.

and Support Systems

21st Century Student Outcomes

Framework for 21<sup>st</sup> Century Learning http://www.p21.org/







## Operations

Staff co-located with the Director's Office Communications • Public Information • EPO

Construction

#### EPO Included at all Project Stages - A robust system to meet user needs and establish models of best practice; large scale dissemination requires partners and outside resources.

for Excellence

Cast a Wide Net

LSST EPO will support a dynamic web portal that draws you in and opens opportunities to explore what's new in the sky. The user can then enter the spectrum of opportunities (right) at the point they feel most comfortable. At each point the user will be encouraged to advance, and will be directed to ways they can dig deeper toward a more enriched science experience. This progression of science experiences will be designed to advance the user toward higher levels of engagement, increasing the EPO "Étendue" of LSST.

#### LSST EPO "Étendue" = Number of Participants x Level of Engagement





Build infrastructure to enable EPO during Operations Data Center • User Interfaces • Software Tools



## **Design & Development**

Planning, collaborating, and prototyping specific elements for Construction and Operations.

Data Visualization Web browsers, e.g., WWT
Screens of all sizes including science center displays
Digital wall or planetarium dome
Many users; limited intellectual engagement

#### **Citizen Science** LSST sponsored projects

Externally developed projects Quite a few users; range of engagement depending on project

**Research Projects** LSST-developed research projects using real data

Classroom and online environments External programs LSST supports

Few users; greatest depth of engagement

Over time LSST EPO increases the number of participants highly engaged in STEM experiences.

## Amateur Astronomers

Follow-up opportunities Time window, magnitude overlap, sky coverage Machine learning training set



### Citizen Science

- Programs in which individual volunteers or networks of volunteers, many of whom may have no specific scientific training, perform or manage research-related tasks such as observation, measurement, classification, analysis, or computation.

#### Leverage the success of Galaxy Zoo

• Collaborate widely: Zooniverse, AAVSO, and LSST Science Collaboration Members, • Prototype LSST Citizen Science: Characterizing high proper motion objects & variables. • Implementation: Design, build, and deploy working projects within Zooniverse framework.



## Professional Development

Leverage to reach broadest audience while increasing the pedagogical content knowledge of instructors.

#### **Classroom Educators Science Center Educators Planetarium Staff**

#### **Online Instruction**

LSST Science Themes Accessing Data Products Provide a *tiered course* for interested users

#### **Face to Face**

## User Interfaces

Flexible and varied interfaces to engage people "where they live" (i.e., tools they use every day



Transfer knowledge to

Classroom

Museum

Dome

#### Implement workshops at professional meetings

ASCOT: browser/widget based, customizable, shareable, user selected tools

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