

**U. S. DEPARTMENT OF ENERGY
FIELD WORK PROPOSAL**

1. B&R No. KA1301021	Contractor No.: 2012-BNL-PO124-Fund	3. Date Prepared: 20111121	4. Task Term: Begin: 07/15/2012 End: 07/14/2017
5. Work Proposal No.: N/A		6. Work Authorization No.: KACH132	
7. Title: LAB 11-572 Early Career: Measuring Dark Energy with Gravitational Lensing in the Dark Energy Survey			
8. Principal Investigator(s): Sheldon, Erin S. (631) 344-3117			
9. Headquarters/Operations Office Program Manager: Rosenberg, Eli (301) 903-3711 eli.rosenberg@science.doe.gov	12. Headquarters Organization: Office of Science	15. HQ Organizational Code: SC	
10. Operations Office Work Proposal Reviewer:	13. Operations Office: CHICAGO	16. DOE Organizational Code: CH	
11. Contractor Work Proposal Manager: Ludlam, Thomas W. (631) 344-7753	14. Contractor Name: BROOKHAVEN SCIENCE ASSOCIATES BROOKHAVEN NATIONAL LABORATORY	17. Contractor Code: BN	
<p>18. Work Proposal Description (Approach, anticipated benefit in <u>200 words or less</u>, suitable for public release) :</p> <p>Data from the Dark Energy Survey (DES) will be used to constrain the properties of Dark Energy. The primary focus will be on measuring gravitational lensing effects to probe the expansion history and growth rate of massive structures in our universe.</p> <p>Dark Energy accelerates the expansion of the universe, dramatically increasing the volume in comparison to a matter-only universe. Dark Energy also inhibits the growth of massive structures under gravitational collapse. Thus the number density of massive objects such as galaxy clusters as a function of cosmic time is directly related to the properties of Dark Energy, in particular the equation of state parameter $w = \text{pressure/density}$. Critical to using the number density to constrain cosmology is the masses of the clusters, which we will measure using gravitational lensing effects in DES data. Using cluster counts, lensing and other complimentary probes, the DES will measure w to about 3%.</p> <p>DES will see first light in 2011. The intervening time will be spent developing data reduction pipelines and realistic simulations to test these pipelines. After first light, DES will take data for five years, during which the data will be processed as it arrives and analyses performed to extract Dark Energy parameters.</p>			
19. Principal Investigator(s) :		11/21/2011	
Signature(s)		Date	
20. Contractor Work Proposal Manager:	21. Operations Office Review Official:		
11/21/2011	11/21/2011		
Signature	Signature		
22. Detail Attachments:			
(x) a. Purpose	(x) d. Future accomplishments	() g. Capital Equipment Request Summary	
(x) b. Approach	() e. Relationships to other projects	() h. Other (Specify Topic)	
(x) c. Technical progress	() f. Explanation of milestones		