Haiman's Cosmology from Non-Linear Weak Lensing

Date submitted: Apr 15, 2014

PRINT CLOSE WINDOW

Summary index

File Download

It may take a few minutes to zip or tar your document for download.

Download all documents: **ZIP TAR**

Top of page

Title / FOS

TITLE	Cosmology from Non-Linear Weak Lensing
REQUEST NUMBER	AST140041
REQUEST TYPE	New
PRIMARY FIELD OF SCIENCE	121 - Extragalactic Astronomy and Cosmology
KEYWORDS	dark energy weak lensing

Top of page

PI Information

FIRST NAME	Zoltan

MIDDLE NAME	
LAST NAME	Haiman
ORGANIZATION	Columbia University in the City of New York
POSITION	Faculty
DEGREE	PhD
DEGREE FIELD	Astronomy
DEPARTMENT	Astronomy
ADDRESS1	1328 Pupin Physics Laboratories, Mailcode 5246
ADDRESS2	550 West 120th Street
CITY	New York
STATE	NY
ZIP CODE	10027
COUNTRY	United States
EMAIL	zoltan@astro.columbia.edu
PHONE	(212) 854-6822
FAX	
URL(S)	http://user.astro.columbia.edu/~zoltan/
DN(S)	CN=Zoltan Haiman,O=National Center for Supercomputing Applications,C=US/C=US/O=National Center for Supercomputing Applications/CN=Zoltan HaimanCN=Zoltan Haiman,OU=People,O=National Center for Supercomputing Applications,C=US/C=US/O=National Center for Su

Top of page

Co-PI(s) Information

None

Top of page

Supporting Grant(s) Information

PI NAME	Zoltan Haiman
FUNDING AGENCY	National Science Foundation (NSF)
FUNDING AGENCY DIVISION	AST
PROGRAM OFFICER NAME	Dr. Richard Barvainis
PROGRAM OFFICER EMAIL	rbarvai@nsf.gov
FUNDING TITLE	Cosmology from Non-Linear Weak Lensing
AWARD NUMBER	1210877
AWARDED AMOUNT	137124
PERCENTAGE OF AWARD SUPPORTING THIS REQUEST	100
START DATE	07/01/2012
EXPIRATION DATE	06/30/2015
FIELD OF SCIENCE	Extragalactic Astronomy and Cosmology

COMMENT The allocation we are requesting is to perform the suite of simulations closely following the description in the above NSF proposal. The major change is that CFHTLS data has become available, for which we propose tailor-made simulations

Top of page

Resources Requested

Please estimate what percentage of the work you expect to do in this allocation will be the following types (the 3 numbers should sum to 100):

- Production (actually doing research): 95
- Exploration/porting (preparing to do research): 5

Please estimate what percentage of the jobs you expect to run in this allocation will be the following types (the 3 numbers should sum to 100):

- Submitted through command line/script: 100

Please estimate what percentage of the science runs you expect to perform in this allocation will be the following types (the 4 numbers should sum to 100):

- Independent but related (such as jobs that make up an ensemble or parameter sweeps): 95
- Dependent (multiple jobs such as in a workflow): 5

RESOURCE NAME TACC Dell PowerEdge C8220 Cluster with Intel Xeon Phi coprocessors (Stampede)
RESOURCE REQUESTED AMOUNT 3500000
RESOURCE AWARDED AMOUNT

RESOURCE NAME TACC Long-term tape Archival Storage (Ranch)
RESOURCE REQUESTED AMOUNT 135000
RESOURCE AWARDED AMOUNT

RESOURCE NAME XSEDE-Wide File System (XWFS)
RESOURCE REQUESTED AMOUNT 85000
RESOURCE AWARDED AMOUNT

Top of page

Abstract

The subtle distortions in the shapes of distant background galaxies, caused by gravitational lensing, is a sensitive probe of dark energy and other cosmological parameters. This weak lensing signal has recently been measured for the first time for a large number (several million) galaxies in the CFHTLS survey, and will be available for several hundred million galaxies from LSST and other forthcoming astronomical surveys in the next decade. While the lensing shear power spectrum ranks among the most powerful cosmological probes, there are indications that higher-order statistics extract at least a comparable amount of complementary information from non-Gaussian features of the shear field. Here we propose to use a large suite of cosmological ray-tracing simulations to create a library of simulated lensing maps, and to measure non-linear statistics, including the statistics of peaks, higher-order moments, and Minkowski functionals. By mapping out the dependence of these statistics on cosmological parameters, as well as accurately determining their covariance, the proposed simulations will achieve two goals. First, we will

place constraints on dark energy and other cosmological parameters using the existing CFHTLS data. Second, we will create and validate a precision emulator of various WL statistics, analogous to an existing emulator for the matter power spectrum, which can be used by the community to analyze lensing data.

Top of page

PRINT CLOSE WINDOW