

Frontier Fields Lensing Map Call for Proposals

Proposal Deadline: February 4, 2016

Period of Work: May 15, 2016 - September 30, 2017

We are soliciting gravitational lensing maps for the last four Hubble Frontier Fields clusters (MACSJ0717.5+3745, MACSJ1149.5+2223, AbellS1063, and Abell 370) based upon the exceptionally deep HST FF imaging and other new ancillary data. Previously unsupported teams may also apply to create gravitational lensing maps for Hubble Frontier Fields clusters Abell 2744 and MACSJ0416.1-2403 if those teams provide a substantially different model set from existing models.

Background:

The Frontier Fields program is a three-year Director's Discretionary time campaign to observe six strong-lensing clusters and six parallel fields with HST and Spitzer. The cluster fields combine the power of HST with the natural gravitational telescopes of high magnification clusters of galaxies to produce the deepest observations of clusters and background lensed galaxies ever obtained. The parallel fields are the second deepest 'blank' field observations ever obtained with HST, and will provide a statistical census of the faintest observable galaxies in the distant universe.

The HST observations of the first four Frontier Field clusters and their parallel fields (Abell 2744, MACSJ0416-2403, MACSJ0717.5+3745, and MACSJ1149.5+2223) were completed in HST Cycles 21 and 22. The observations of the fifth and sixth Frontier Fields are currently underway for Cycle 23 and will be completed by September 2016. The resulting HST images reach 5σ depths of ~ 28.7 – 29 th AB magnitude for point sources in the Advanced Camera for Surveys F435W, F606W, and F814W filters, and the Wide Field Camera 3 infrared F105W, F125W, F140W, and F160W filters. Approximately 140 orbits of Hubble observing time will be devoted to each cluster. Spitzer Space Telescope Director's discretionary time is also being used to obtaining deep IRAC 3.6 and 4.5 micron imaging of both the cluster and parallel fields for all Frontier Fields.

The HST Frontier Fields data products are available at

<http://archive.stsci.edu/prepds/frontier/>

Lensing models for all the Frontier Fields, based upon pre-FF imaging are available at

<http://archive.stsci.edu/prepds/frontier/lensmodels/>

The Spitzer Space Telescope Frontier Fields data and observing plans are available at

<http://ssc.spitzer.caltech.edu/warmmission/scheduling/approvedprograms/ddt/frontier/>

Further description of the Frontier Fields locations, observing strategy, and ancillary data are available at:

<http://www.stsci.edu/hst/campaigns/frontier-fields/>

The Frontier Fields mid-term review report and recommendations are available at:
http://www.stsci.edu/hst/campaigns/frontier-fields/documents/FF_MidTermReview.pdf

Deliverables:

For each supported lensing model team, we require the following delivered products:

(1) A "best effort" lens model for each cluster based upon the new Frontier Fields HST data, covering the full Frontier Fields HST ACS field of view $\sim 202'' \times 202''$.

For each lens model, a map in FITS format with WCS tied to the HFF reference frame is required for either or both of the following:

- lens potential (preferred, allowing for time delay estimates)
- deflection (x and y)

Optionally, maps of the following may also be submitted, or these quantities may be derived by STScI from the lens potential and deflection maps:

- mass (κ)
- shear (γ , both components, or amplitude and phase angle)
- magnification (at $z = 1, 2, 4, 9$)

(2) A range of lens models (preferably around 100, minimum 20) sampling the range of uncertainties, in the same format as the "best effort" lens model for each cluster.

(3) README files describing the construction of deliverables 1 & 2, team members, and other acknowledgements.

Models for the first four clusters (Abell 2744, MACSJ0416.1-2401, MACSJ0717.5+3745, and MACSJ1149.5+2223) and a brief progress report are due **February 1, 2017**. Models for the final two clusters (Abell S1063 and Abell 370) are due **September 15, 2017**. The models, associated files and data products will be publicly released to the community after delivery to STScI.

Additional deliverables:

Each proposing team is encouraged to propose a unique set of deliverable ancillary products, depending upon the expertise and data available to each team.

(4) Additional observational data used to create lensing maps, including

- non-public spectroscopic catalogs
- photometric redshift catalogs
- wide-field ground-based imaging

- (5) Additional analysis/measurements made to create lensing maps, including
- multiple image identifications
 - weak lensing shear measurements

These additional deliverables will be shared with the HFF lensing teams in order to coordinate efforts and ensure the highest quality output products. Therefore the distribution of the products described in (4) and (5) to STScI is needed by roughly July 1 2016 for MACSJ0717.5+3745, MACSJ1149.5+2223, and if supported, Abell 2744, MACSJ0416-2403; and by roughly February 1 2017 for AbellS1063 and Abell 370. (Exact delivery dates for these ancillary products is negotiable).

Other related high-level data products are also welcome, but not required for this call. These may include weak lensing magnification maps of the HFF parallel fields, multi-wavelength HFF catalogs, simulated cluster models for systematic bias estimates, and other figure of merit estimates for the delivered lensing models.

Any ancillary unpublished data or measurements will be treated as proprietary, and shared only with the teams for the purpose of constructing lensing models.

All HFF lensing teams are REQUIRED to appropriately acknowledge and credit the use of shared data (e.g. spectroscopy) and measurements (e.g. WL shear measurements), both in their descriptions of HFF lensing maps (3) and any publications and presentations. HFF lensing teams are also required to acknowledge the FF implementation team, NASA and ESA in their publications, presentations, and press releases based upon the HFF HST and Spitzer data.

Period of Performance:

The period of performance is anticipated to be May 15, 2016 to September 30, 2017.

Applicant Requirements:

Qualified applicants must have a PhD in astronomy or related field, and a demonstrated track record of producing magnification maps for strongly lensed clusters of galaxies.

Proposal Requirements:

Applicants should provide the following information in response to this request for proposals:

- A statement of work, including a detailed description of the work to be performed and a schedule for that work during the period of performance (not to exceed 3 pages).
- A brief resume or CV for all investigators involved in the statement of work.
- A budget for the work (see below).

- A list of publications in the past five years related to the analysis, interpretation, or scientific characterization of galaxies magnified by strongly lensed clusters of galaxies at ultraviolet, optical, or near-infrared wavelengths.

Proposals should not include requests for HST observing time. There is no HST observing time associated with this Request for Proposals.

Budgets:

U.S. proposers may submit a budget request to support this effort for an amount not to exceed **\$75,000** per submission for previously funded teams, and **\$100,000** for new teams. Budget submissions at this stage should include brief descriptions and justifications of costs associated with the planned work effort.

Only one budget per submission is allowed; any costs requested for subcontracts are the responsibility of the primary institution submitting the proposal and must be included in the primary institution's budget request. Additional budget information may be required by STScI at a later date for successful proposers.

Funding:

Proposals requesting funding will be accepted from universities, nonprofit research institutions, private for-profit organizations, and Federal employees. Only U.S. applicants are eligible to request funding. STScI will fund any selected proposals via firm fixed price contracts.

Funding is subject to HST contract rules; thus it cannot be spent on international travel, travel to conferences (domestic or international), or hardware. Salary and domestic travel (including Hawaii) for collaboration is permitted.

Proposal Submission:

Proposals may be submitted electronically to Cheryl Schmidt in the STScI HST Mission Office (schmidt@stsci.edu) in either PDF or Microsoft Word format, or may be submitted by mail to the following address:

Ms. Cheryl Schmidt
HST Mission Office
Space Telescope Science Institute
3700 San Martin Drive Baltimore, MD 21218

If submitting electronically, please use a unique filename beginning with your last name (e.g., [smith_frontierfields_rfp.pdf](#)). Questions about this request for proposals or the HST Frontier Fields should be sent to Dr. Helmut Jenkner (jenkner@stsci.edu).

All proposals are due by 5:00 PM EST, **February 4, 2016**.