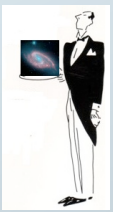
SERVS: The Spitzer Extragalactic Representative Volume Survey



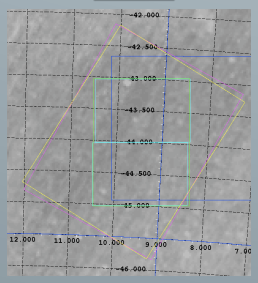
Mark Lacy, the SERVS team*

SERVS will map 18deg^2 of sky in the [3.6] and [4.5] bands of warm Spitzer to AB magnitudes of 24.0 and 23.2 (5-sigma), respectively. SERVS is deep enough to undertake a complete census of massive galaxies from z~6 to ~1 in a volume ~0.8Gpc^3, and large enough to overcome the effects of cosmic variance, which place severe limitations on the conclusions that can be drawn from smaller fields. We will greatly enhance the diagnostic power of the Spitzer data by performing most of this survey in the region covered by the near-IR VISTA-VIDEO survey, and in other areas covered by near-IR, Herschel and SCUBA2 surveys. We will build complete near-infrared spectral energy distributions using the superb datasets from VIDEO, in conjunction with our Spitzer data, to derive accurate photometric redshifts and the key properties of stellar mass and star formation rates for a large sample of high-z galaxies. Obscured star formation rates and dust-shrouded BH growth phases will be uncovered by combining the Spitzer data with the Herschel and SCUBA2 surveys. We will thus build a complete picture of the formation of massive galaxies from z~6, where only about 1% of the stars in massive galaxies have formed, to z~1 where ~50% of them have. Our large volume will also allow us to also find examples of rare objects such as high-z quasars (~10-100 at z>6.5), high-z galaxy clusters (~20 at z>1.5 with dark halo masses >10^{14} solar masses), and evaluate how quasar activity and galaxy environment affect star formation. In this poster, we show the areas to be covered by SERVS, ancillary data at other wavelengths, and briefly discuss the AOR design strategy.

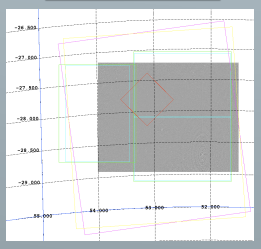
The SERVS fields

Field	Area (deg^2)	Field center, PA	Near-IR	Mid-IR (Spitzer)	Far-IR/ submm	Radio	X-ray	Optical
ELAIS-S1	3	003748-4400 0 deg	VIDEO Z,Y,J,H,K to 25.7,24.6,24.5,24.0,23.5 (AB)	SWIRE [3.6]-[160] (Lonsdale et al 2003)	Herschel HERMES, level 6	ATLAS 20cm (Middelberg et al. 2008)	Small amount of XMM & Chandra archival data	ESIS B,V,R,I to 25,25,24.5,23.2 (Vega). SpARCS z-band to 24.2 (AB)
XMM-LSS	4.5	022200-0448 0 deg	VIDEO Z,Y,J,H,K to 25.7,24.6,24.5,24.0,23.5 (AB)	SWIRE, SpUDS [3.6]-[70]	Herschel HERMES level 5, S2CLS	-	XMM-LSS, SXDS	CFHTLS wide, deep on part of field, u,g,r,i,z to >26,26.5,25.5,25.5,24.5 (AB)
CDFS	4.5	033219-2806 0 deg	VIDEO Z,Y,J,H,K to 25.7,24.6,24.5,24.0,23.5 (AB)	SWIRE, SIMPLE [3.6]-[8.0]	Herschel HERMES level 2,5	ATLAS 20cm (Norris et al. 2006)	CDFS	SWIRE CTIO mosaic data r,i to 24.2,23.2 (AB) over most of field. SpARCS z-band to 24.2 (AB)
Lockman	4	104912+5807 328 deg	DXS J, H,K to 23.1,22.7,22.5 (AB)	SWIRE	Herschel HERMES level 3,5, S2CLS	GMRT 610MHz: Garn et al. (2008b)	Chandra observations of deep SWIRE field, deep ROSAT field	Partial SWIRE KPNO mosaic data U,g,r,i to r~24.5, Subraru archival data, SpARCS z-band to 24.2 (AB)
ELAIS-N1	2	161000+5430 ~350 deg	DXS J, H,K to 23.1,22.7,22.5 (AB)	SWIRE	Herschel HERMES level 5, S2CLS	GMRT 610MHz: Garn et al.(2008a)	Chandra archival data	SWIRE INT data u,g,r,i,z to 23.4, 24.9, 24.0, 23.2 and 21.9 (Vega), SpARCS z-band to 24.2 (AB)

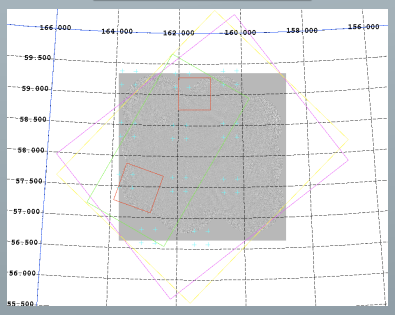
ELAIS S1



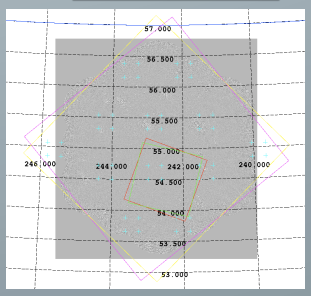
CDFS on ATLAS radio



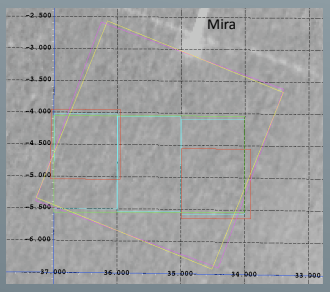
Lockman on GMRT radio



ELAIS N1 on GMRT radio



XMM-LSS



Key:
Green boxes: SERVS coverage ([3.6],[4.5])
Cyan: Near-IR VIDEO tiles (southern fields) or UDX pointings (northern fields)
Magenta boxes: SWIRE MIPS coverage ([24]-[160])
Yellow boxes: SWIRE IRAC coverage ([3.6]-[8.0])
Red boxes: Herschel Hermes level =<5
Blue box: ATLAS (ES1; Middelberg et al. 2008)

Website: www.its.caltech.edu/~mlacy/servs.html

AOR design

- SERVS fields take several days to observe, long enough that field rotation during the execution of the AORs needs to be accounted for.
- Two epochs required to remove asteroids. Also allows for variability studies, both on their own and when compared with SWIRE. Separation days to months.
- Each epoch has 3x200s frames using 3 points from the small cycling dither pattern. Scientifically useful mosaics can thus be made from a single epoch, but combining the two epochs improves artifact rejection.
- Small (3x3 maps, 280" spacing, 1.7hr) individual AORs allow efficient filling of survey area.
- Epochs are constrained to a few day window each to minimize the effects of field rotation.

*The SERVS team: Adam Stanford, Alastair Edge, Alberto Franceschini, Andreea Petric, Angela Mortier, Anna Sajina, Antonio Cava, Aprajita Verma, Carol Lonsdale, Claudia Maraston, Danielle Nielsen, Dave Alexander, Dave Clements, David Bonfield, Duncan Farrah, Eduardo Gonzales, Eelco van Kampen, Eleanor Dyke, Evanthia Hatziminaoglou, Gillian Wilson, Glen Parish, Gordon Richards, Gordon Squires, Harry Ferguson, Huub Rottgering, Ian Smail, Isaac Rosebloom, Ismael Perez-Fournon, James Dunlop, Jason Surace, Jim Geach, Jose Afonso, Kathy Rome, Kevin X, Lori Lubin, Marguerite Pierre, Markos Trichas, Masami Ouchi, Matt Jarvis, Mattia Vaccari, Michael Rowan-Robinson, Minjin Kim, Nick Seymour, Nieves Castro, Olivier LeFevre, Peter Thomas, Philip Best, Ray Norris, Rob Ivison, Robert Becker, Ross McLure, Roy Gal, Sam Hickey, Scott Chapman, Seb Oliver, Sebastien Foucaud, Shelly Bursic, Steve Rawlings, Susan Ridgway ,Tanya Urrutia, Tony Readhead

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