

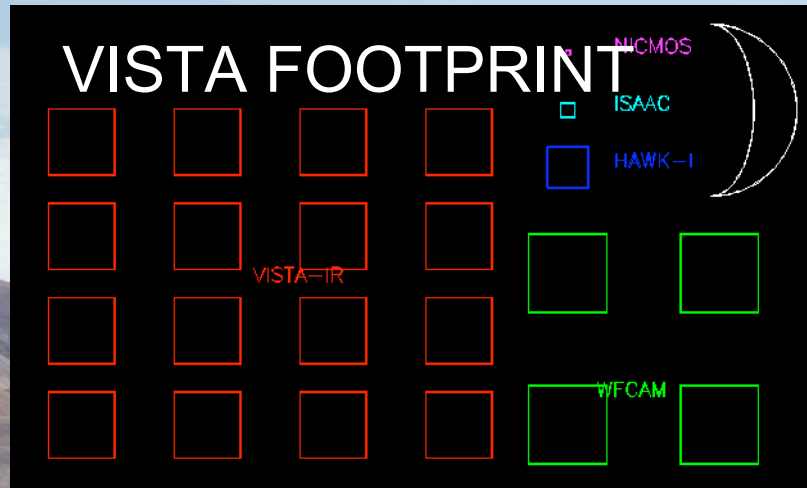
VIKING: the VISTA Kilo-degree
INfrared Galaxy survey

Will Sutherland
(VISTA Project Scientist)

Galaxy And Mass Assembly (GAMA)

Simon Driver
(GAMA PI)

ESO/VLTs



ESO/VISTA

Six Public Surveys:

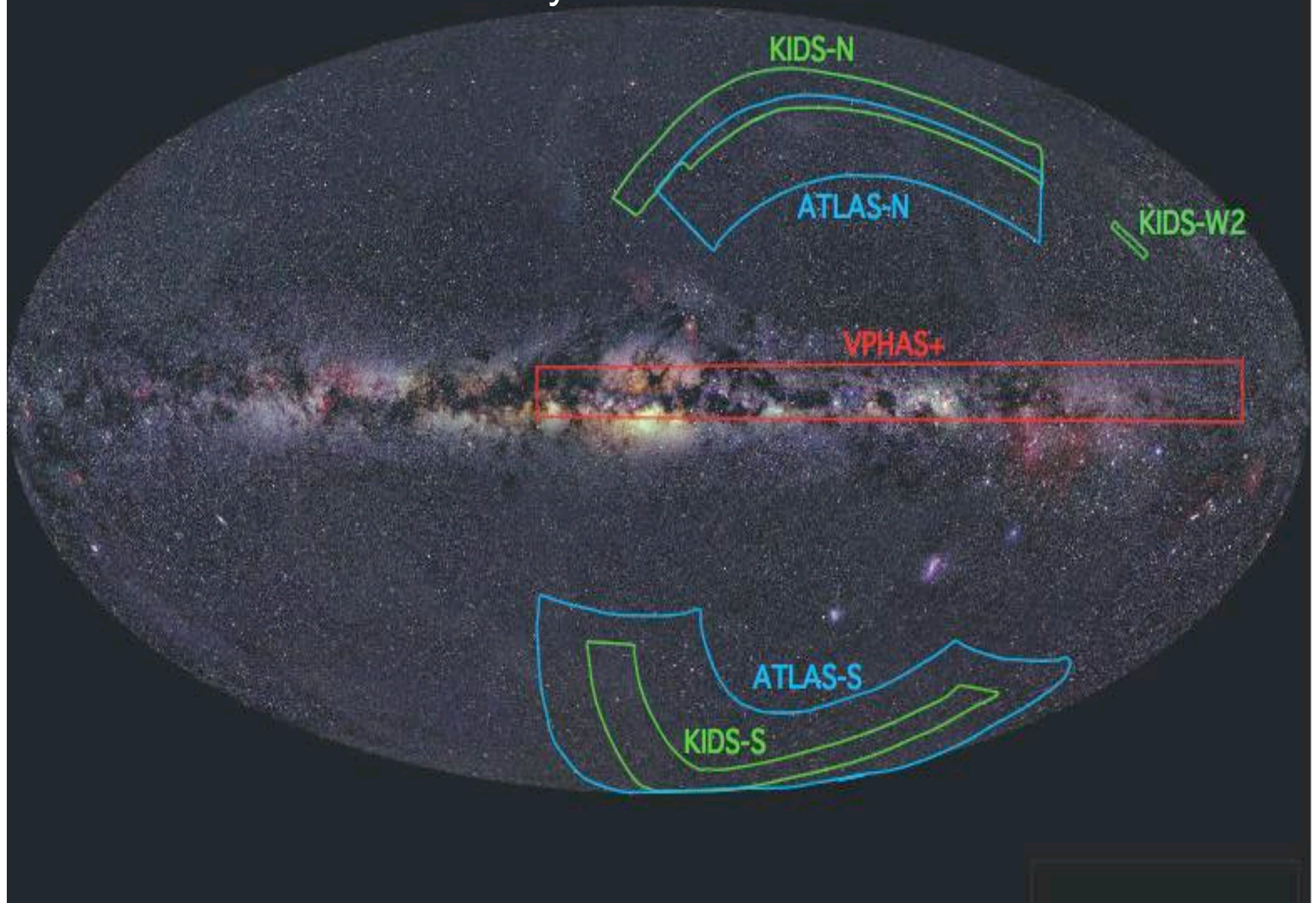
1 Hemisphere, 2 Galactic, 3 Extragalactic

- VVV : VISTA Variables in Via Lactea.
 - Bulge, multi-epoch for variables, + galactic plane.
- VMC: Magellanic Clouds + bridge
- VHS: VISTA Hemisphere Survey
 - J, Ks, ~ 60sec, + more bands in DES area.
 - ~ 3.5 mag gain over 2MASS. Complements WISE.
- VIKING: VISTA Kilo-degree Infrared Galaxy survey
 - 1500 deg², ~ 2dFGRS stripes.
 - ZYJHKs, ~ 400 sec, complement VST-KIDS.
- VIDEO: VISTA Deep Extragalactic Observations
 - ~ 13 deg², mainly 3 SWIRE fields. “SDSS at z ~ 1 - 2”.
 - Lots of Spitzer / Herschel / SCUBA2 / ALMA synergy.
- Ultra-VISTA: Ultra-deep survey
 - 1 field = COSMOS. Y,J,H,Ks + narrowband 1.18 μm.
 - 0.75 deg² gets ¾ of time (~ 1000 hrs).

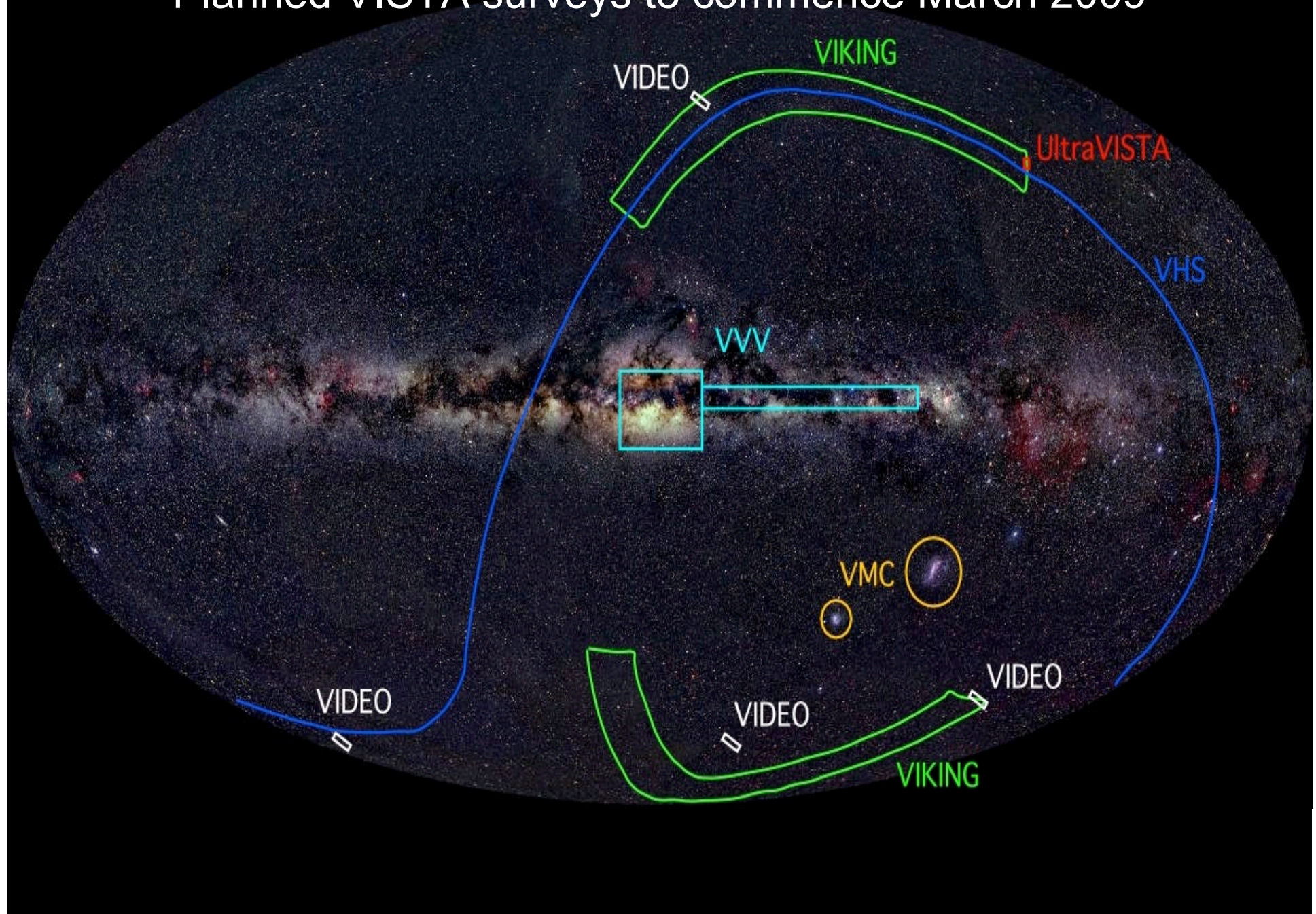
VIKING basics:

- 1500 deg², high |b|, in two stripes, NGP + SGP.
- Area matches 2dFGRS and VST-KIDS.
 - Optimal for Southern followup, VLT, ALMA, etc.
 - NGP stripe on equator, also overlaps UKIDSS, Sloan.
- 9-band combined survey: ugri (VST), ZYJHK_s (VISTA)
 - Depth: ~ UKIDSS + 1.5 mag, Sloan + 2 mag.
 - ~ 220 nights of VISTA time over 5 years.
- PI: WJS. Co-PI: Konrad Kuijken.
 - 30 co-I's, 14 UK + 16 other ESO.

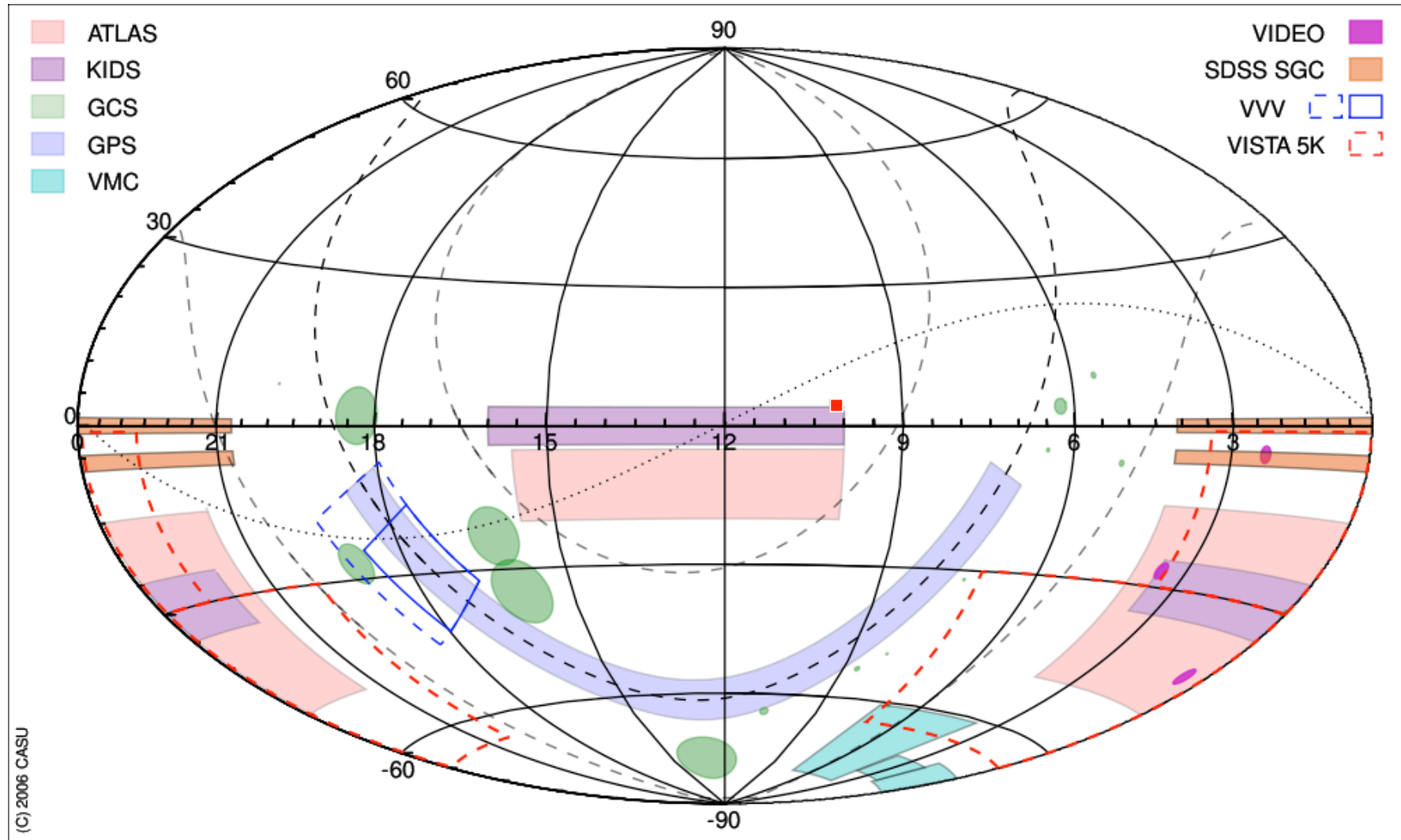
Planned VST surveys to commence March 2009



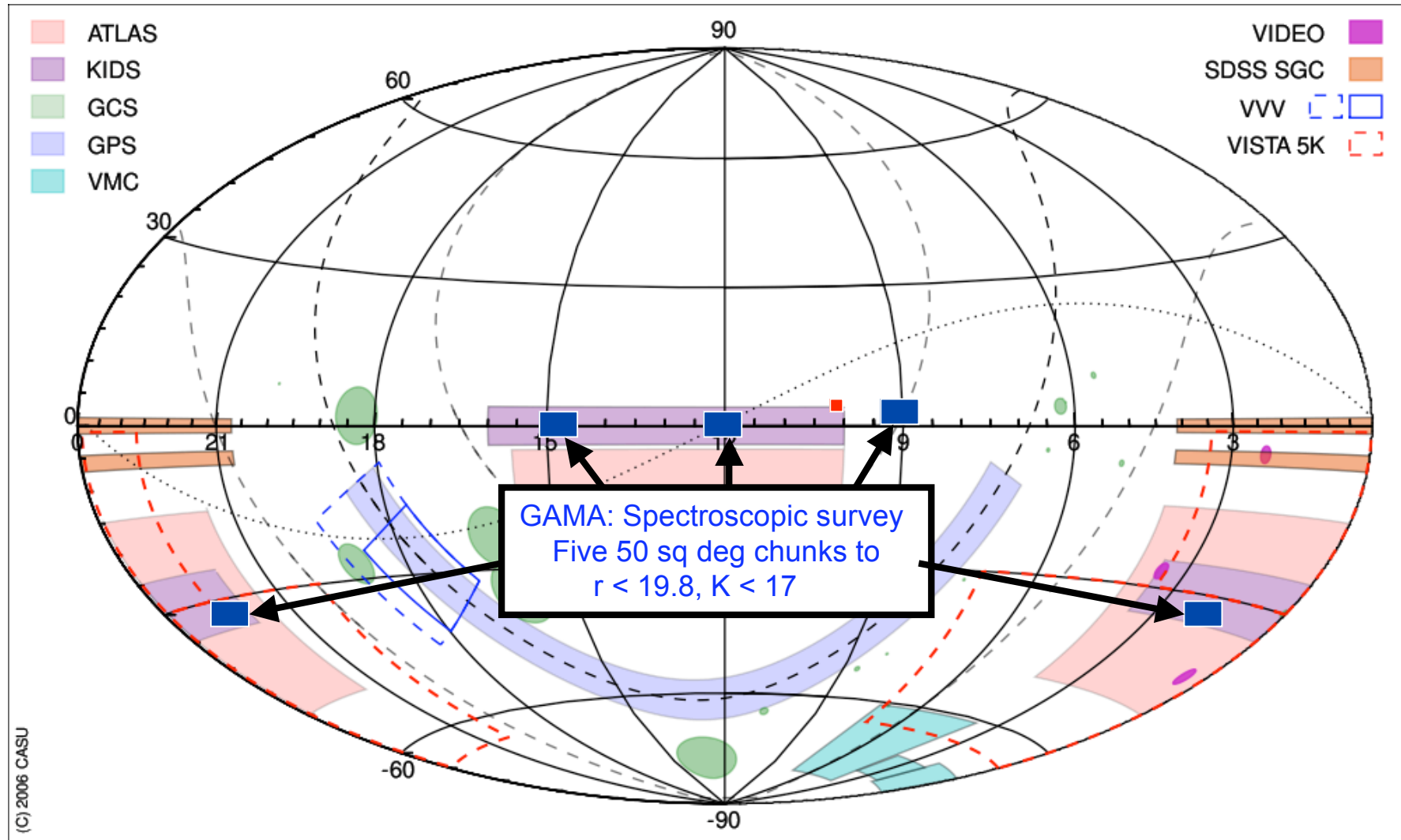
Planned VISTA surveys to commence March 2009



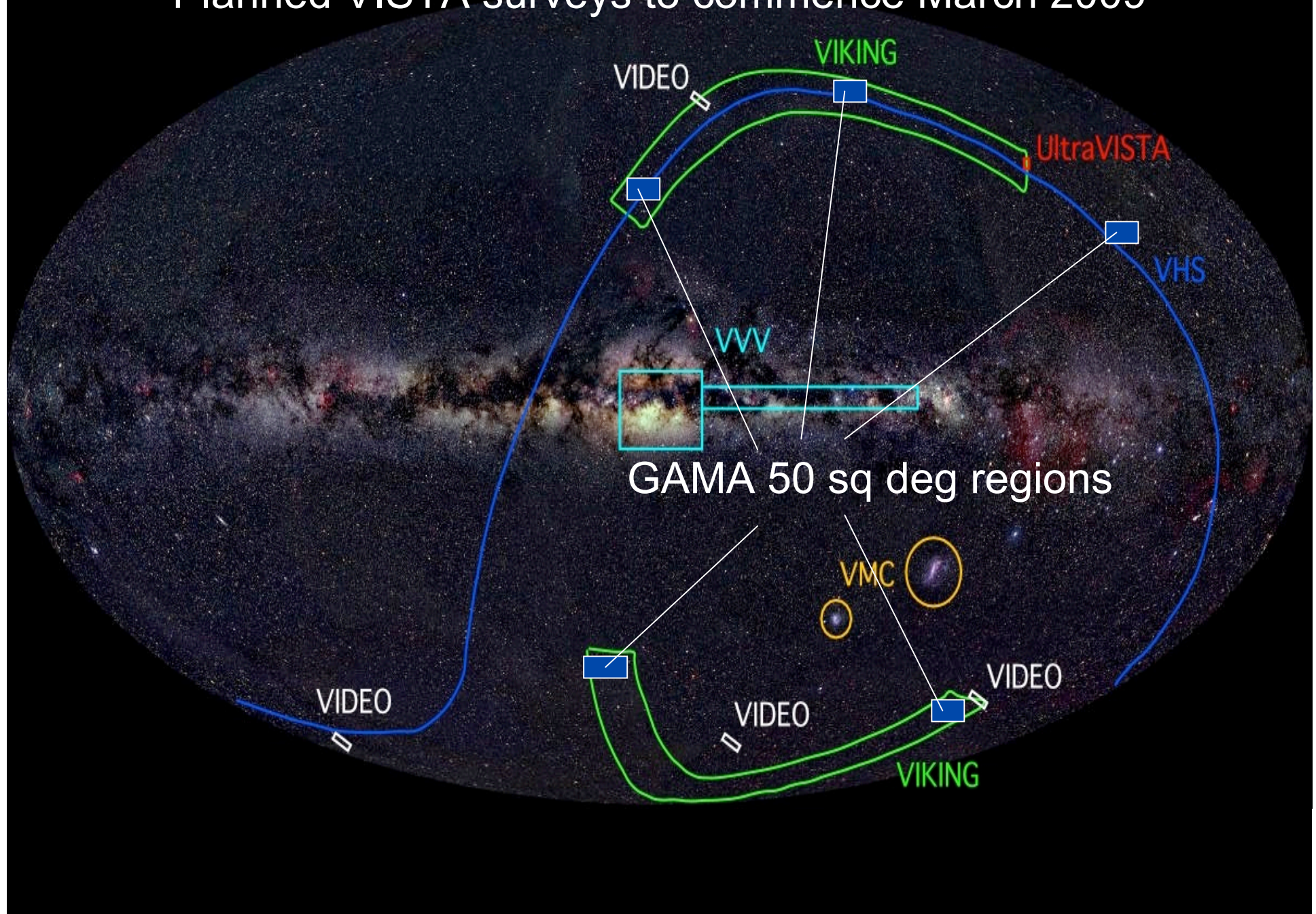
But which area to survey with XMM ?



But which area to survey with XMM : GAMA regions ?

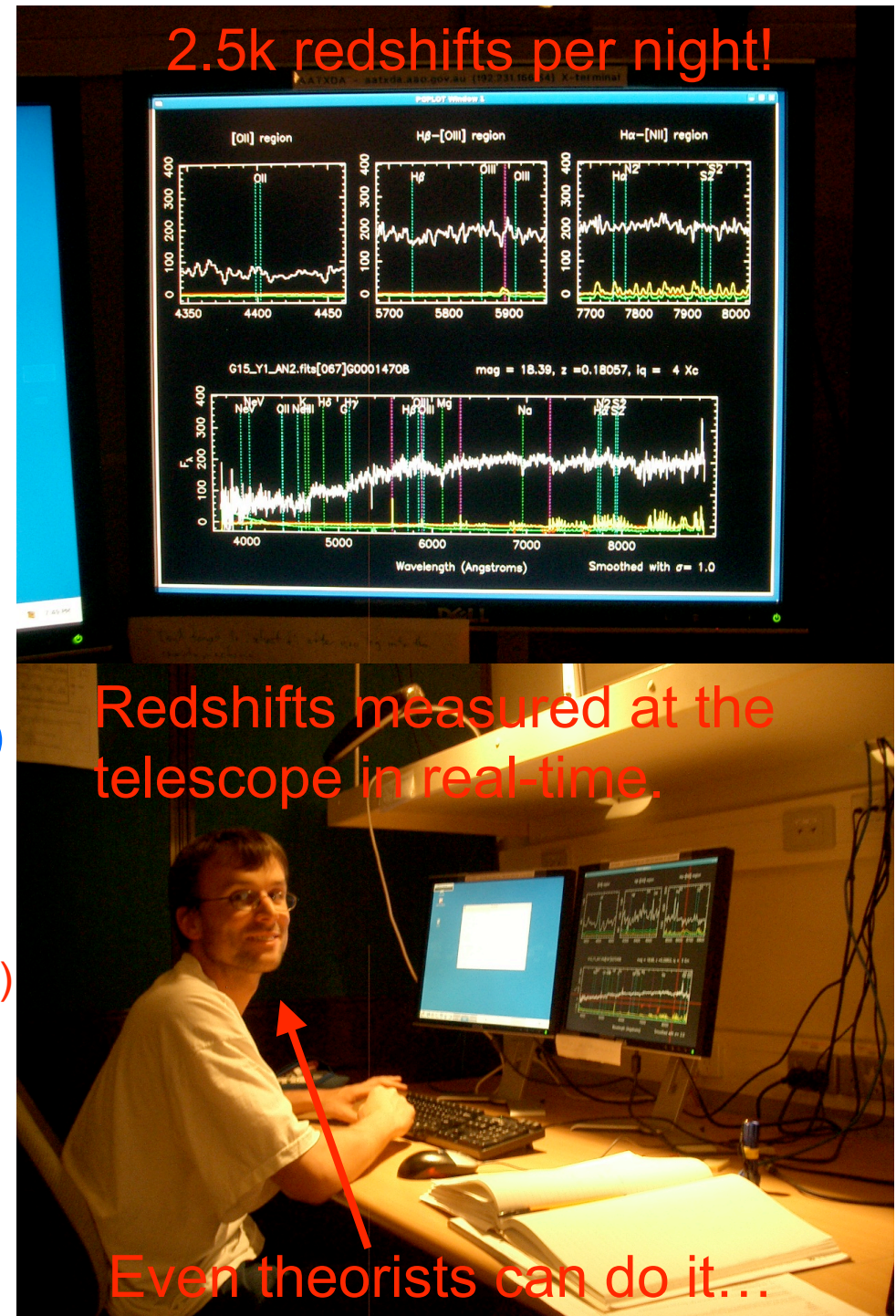


Planned VISTA surveys to commence March 2009

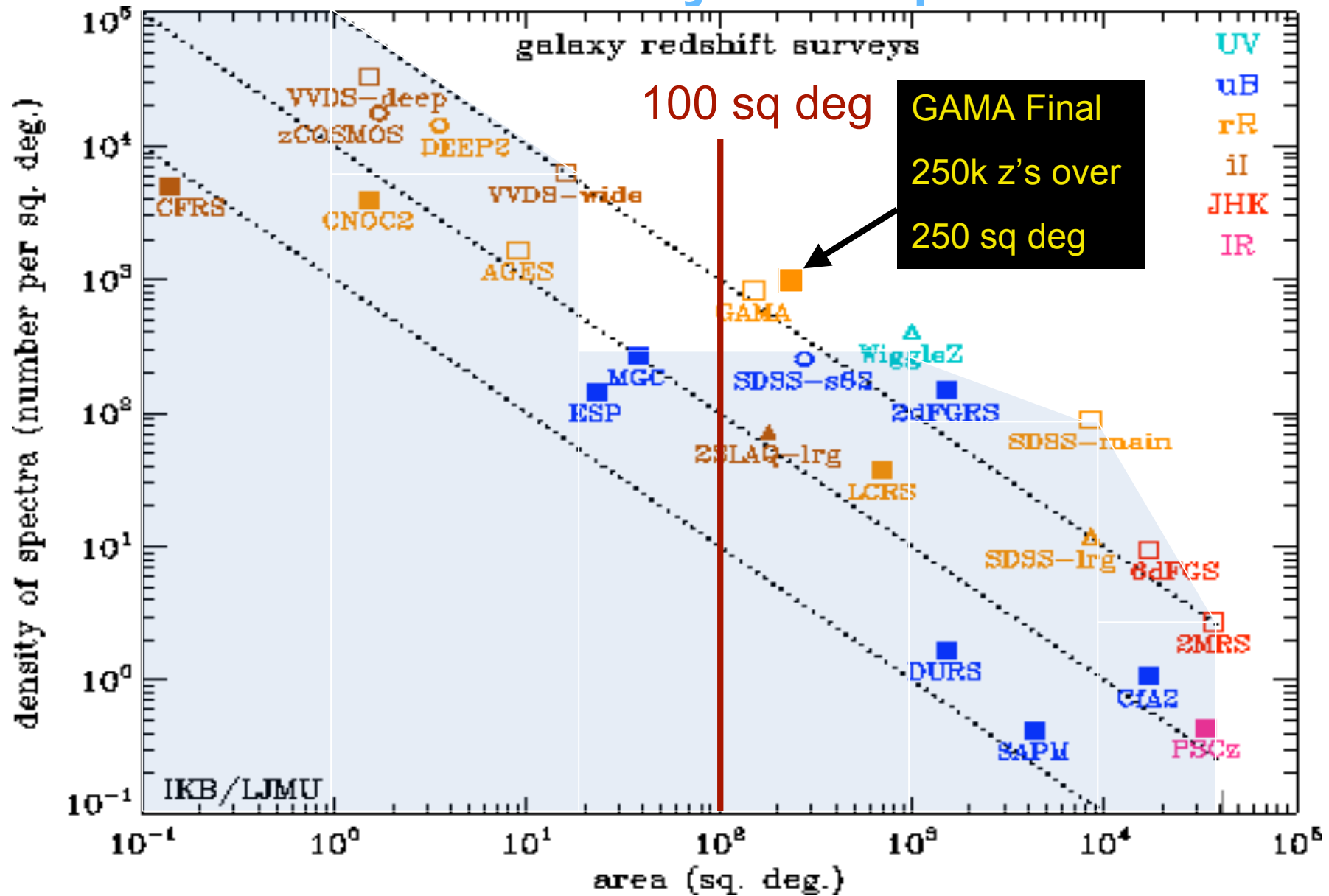


GAMA

- Spectroscopic survey overlapping with:
 - VST KIDS
 - VISTA/VIKING
 - HERSCHEL-ATLAS
- Input cat based on:
 - SDSS (North), VST (South)
 - UKIDSS (North), VISTA (South)
- 156 nights at AAT with AAΩ
- Five 50 sq deg regions (250 sq deg)
 - $r < 19.8$, $K < 17.0$ (AB mags)
 - $0.0 < z < 0.4$ (< 1 for AGN)
- Started March 2008
 - 50,271 redshifts obtained (21 nights)
 - 96.6% completeness
- Redshift density:
 - 12x SDSS
 - 8x 2dFGRS
 - 5x SDSS stripe 82

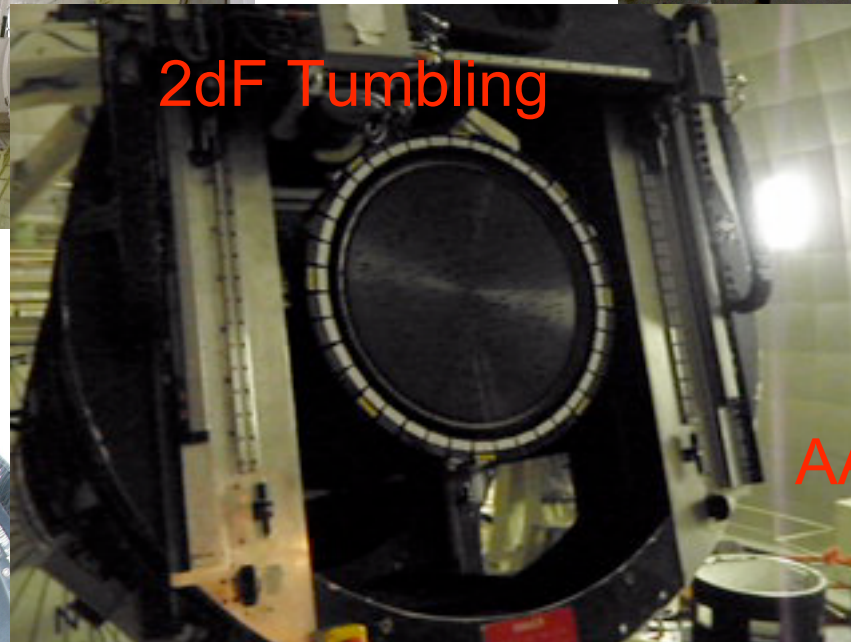
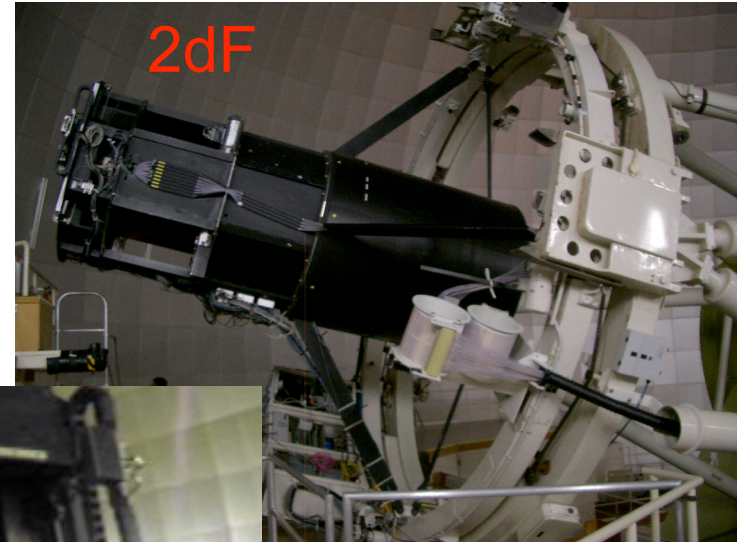
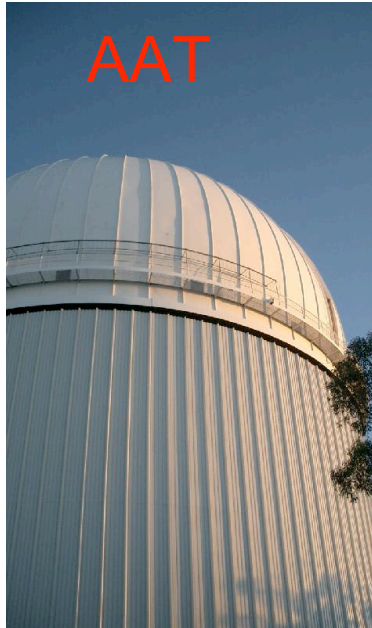


GAMA: Survey comparison



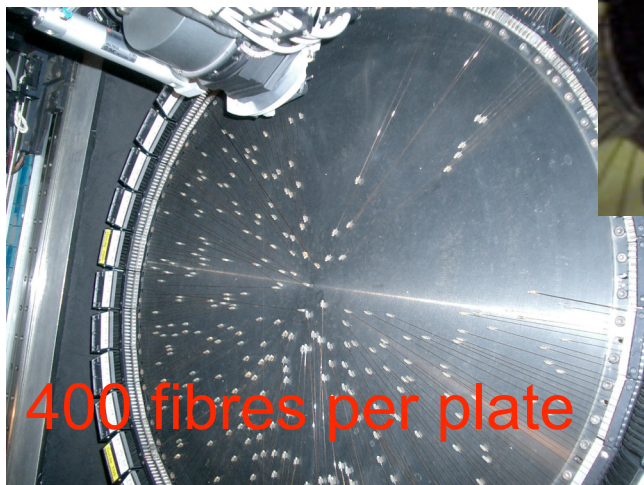
The Anglo-Australian Telescope

(3.9m)



Double-beam spectrograph

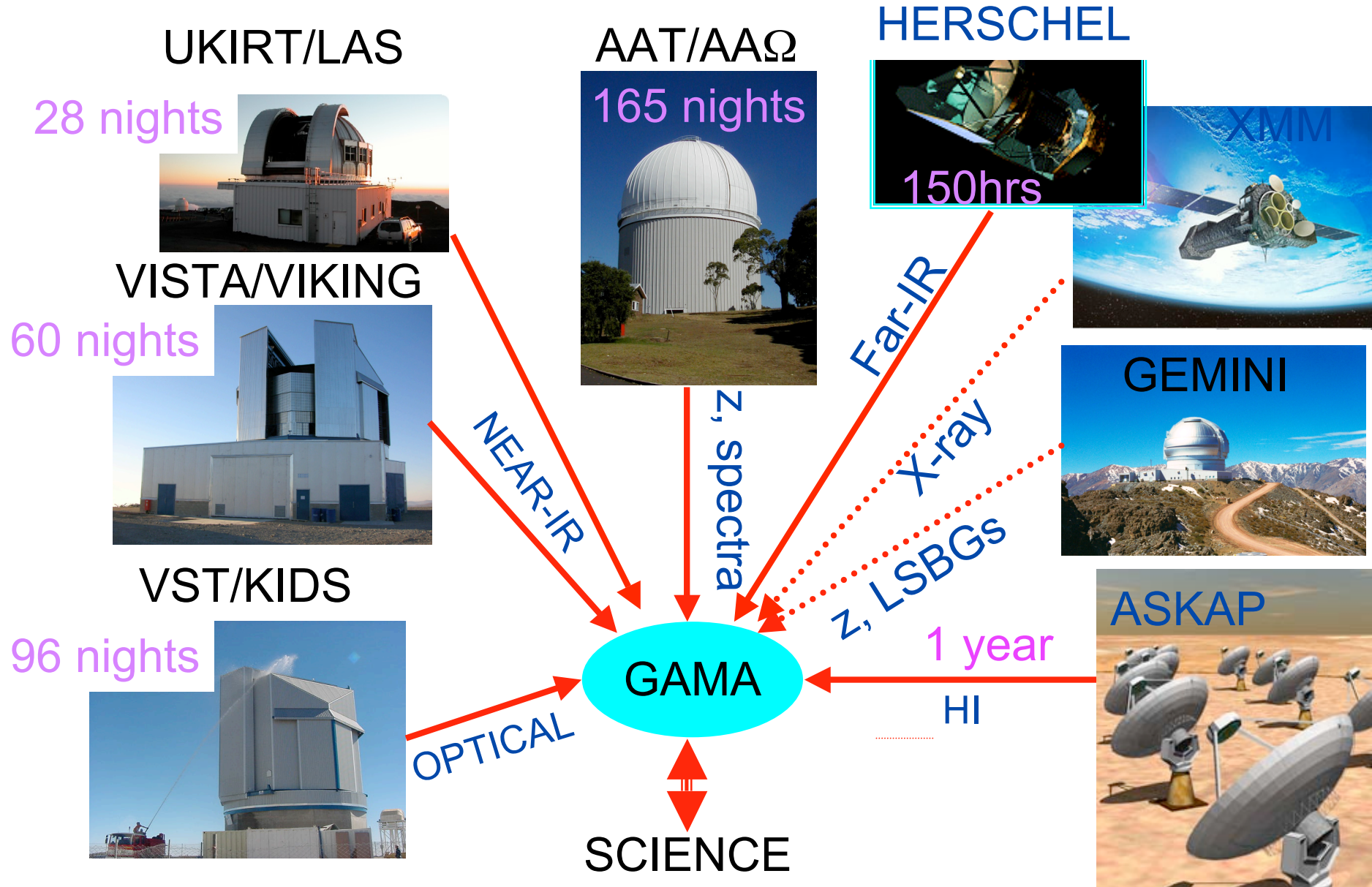
Robotic positioner



2.5k redshifts per night via two 400 fibre plates!

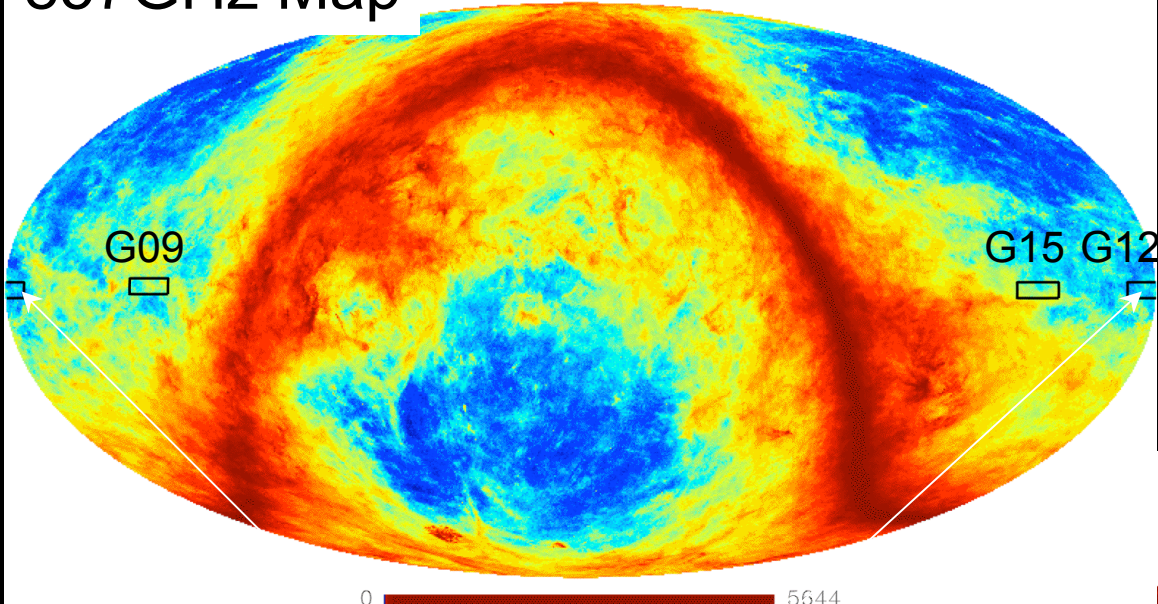


GAMA: Contributing Facilities



/map_tot_857GHz_eq.fits: UNKNOWN1

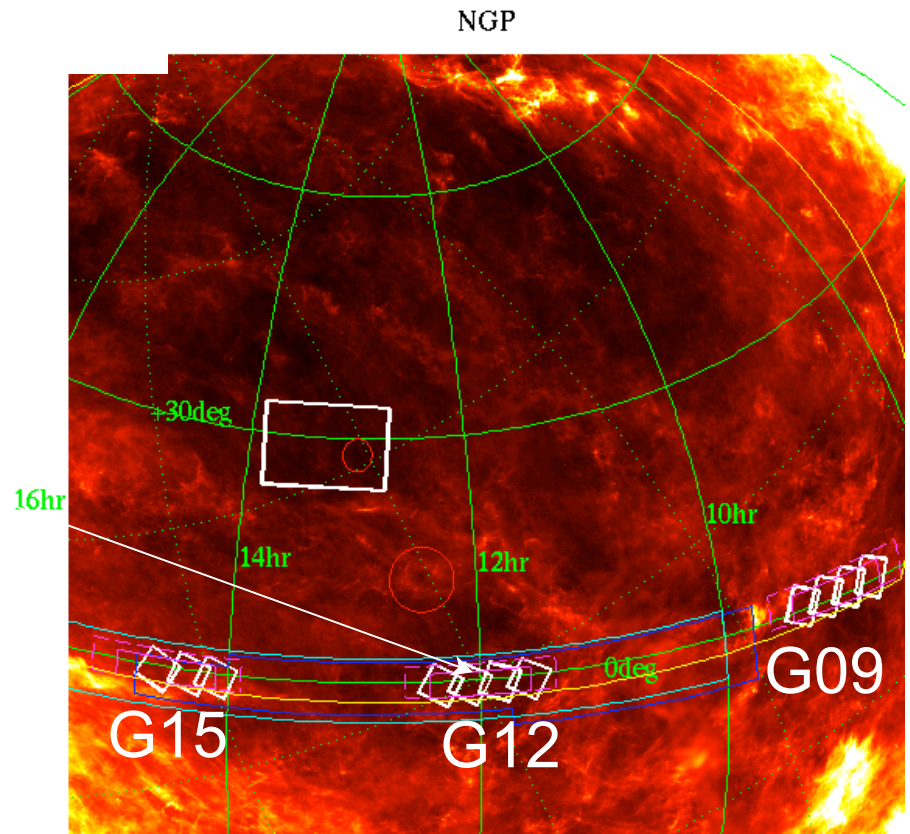
857GHz Map



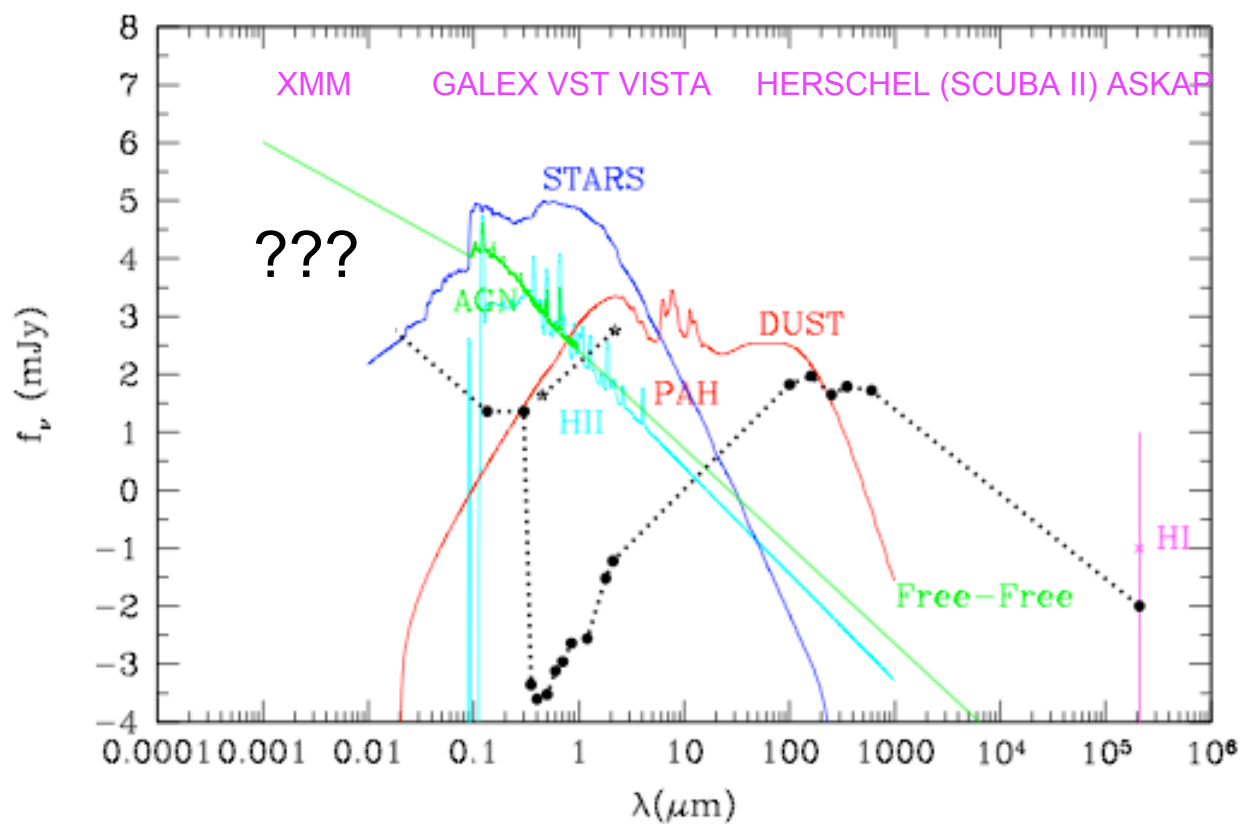
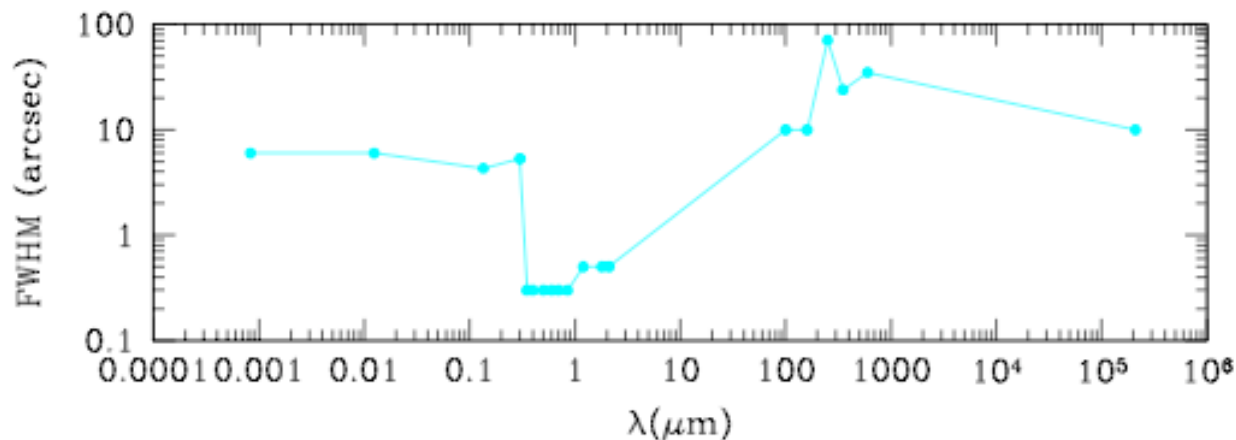
**HERSCHEL-ATLAS
SURVEY**
Launch:
Oct-Dec 2008
(next talk)

GAMA 12hr REGION

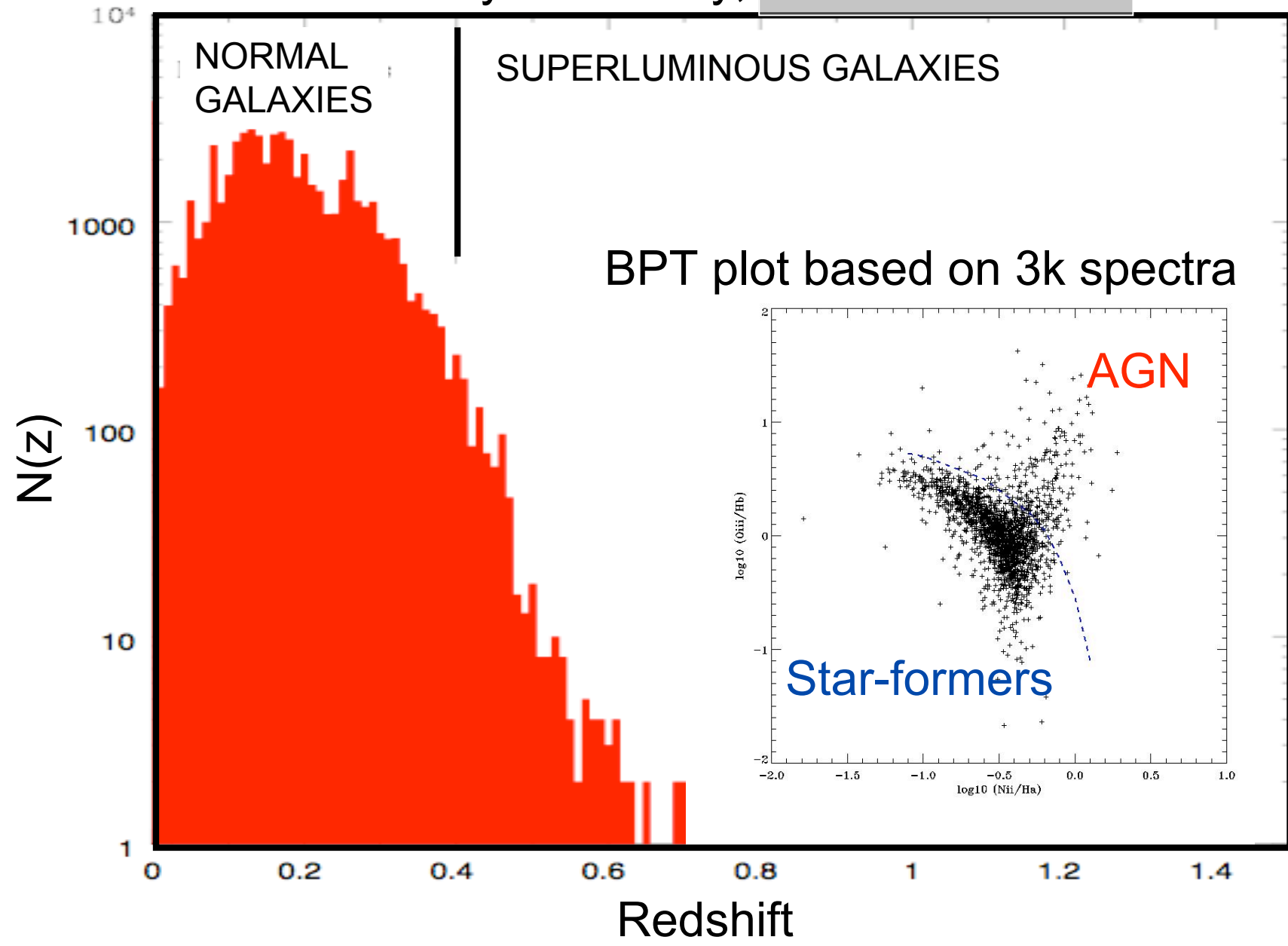
GAMA12 region avoids
Galactic Cirrus



Aim to model total energy output of galaxies for >5k systems



Resolved systems only, no UVX selection



GAMA: Facility Wavelength Time Depth Status
 (on GAMA) (5σ , AB)



AAT/AAΩ
GAMA

Spectra

165nights

$r < 19.8$, $K=17.0$ mag

in progress



UKIRT
LAS

Near-IR (YJHK)

35nights

$Y=22.0$, $J=20.9$, $H=20.2$, $K=20.4$ in prog.



VISTA
VIKING

Near-IR (YJHK)

75nights

$Z=23.8$, $Y=23.0$, $J=22.8$, $K=21.9$ Mar 09

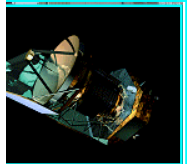


VST
VST

Optical (ugriz)

120nights

$u=24.8$, $g=25.4$, $r=25.2$, $i=24.2$ Mar 09



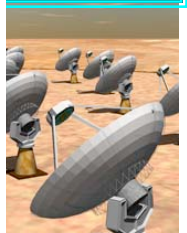
HERSCHEL
ATLAS

Far-IR

200hours

100,160,250,350,500 microns
67, 94, 45, 62, 53 mJy

Mar 09



ASKAP
DEEP

Radio (21cm)
700MHz-1.8GHz

1yr

1.4GHz
0.03mJy

2010+



XMM

X-Ray Meeting in Paris April 08 to discuss 100 sq deg survey

?

GAMA regions

Five equal sized chunks of 4 by 12 degrees surveyed to the same depth

	RA(deg)	Dec(deg)	
G09	129.0-141.0	-1 to +3	FIXED
G12	174.0-186.0	-2 to +2	FIXED
G15	211.5-223.5	-2 to +2	FIXED
G03	~30.0-45.0	-35 to -31	NOT
G22	~315.0-330.0	-35 to -31	FINALISED (but inside Her'l-ATLAS)

GAMA regions



AAT SDSS UKIRT VISTA VST HERSCHEL ASKAP

G09	20%	100%	100%	Yes	Yes	Yes	No
G12	30%	100%	100%	Yes	Yes	Yes	Yes
G15	20%	100%	100%	Yes	Yes	Yes	No
G03	0%	No	No	Yes	Yes	Yes	No
G22	0%	No	No	Yes	Yes	Yes	No



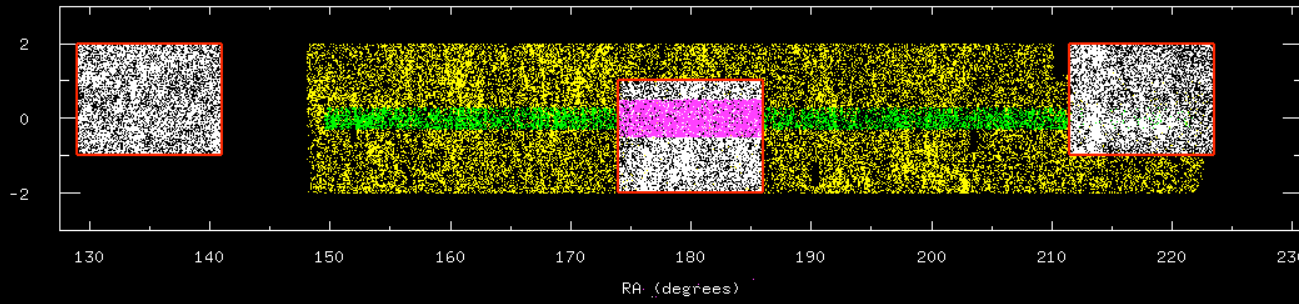
XMM?

SPT?



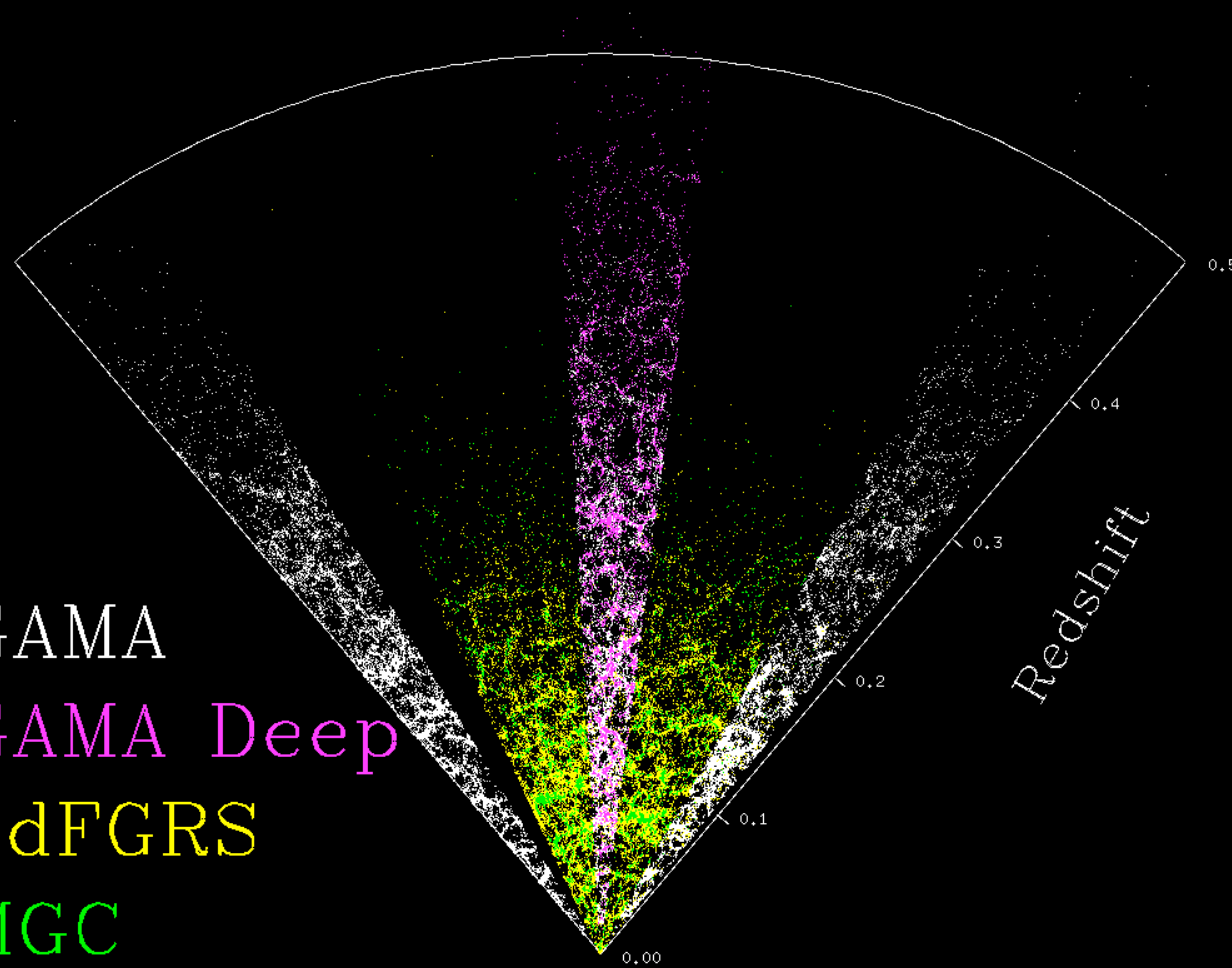
Move ASKAP/DEEP to G03 or G22?

Dec (degrees)



GAMA
CONE
PLOT
08/04/08

GAMA
GAMA Deep
2dFGRS
MGC

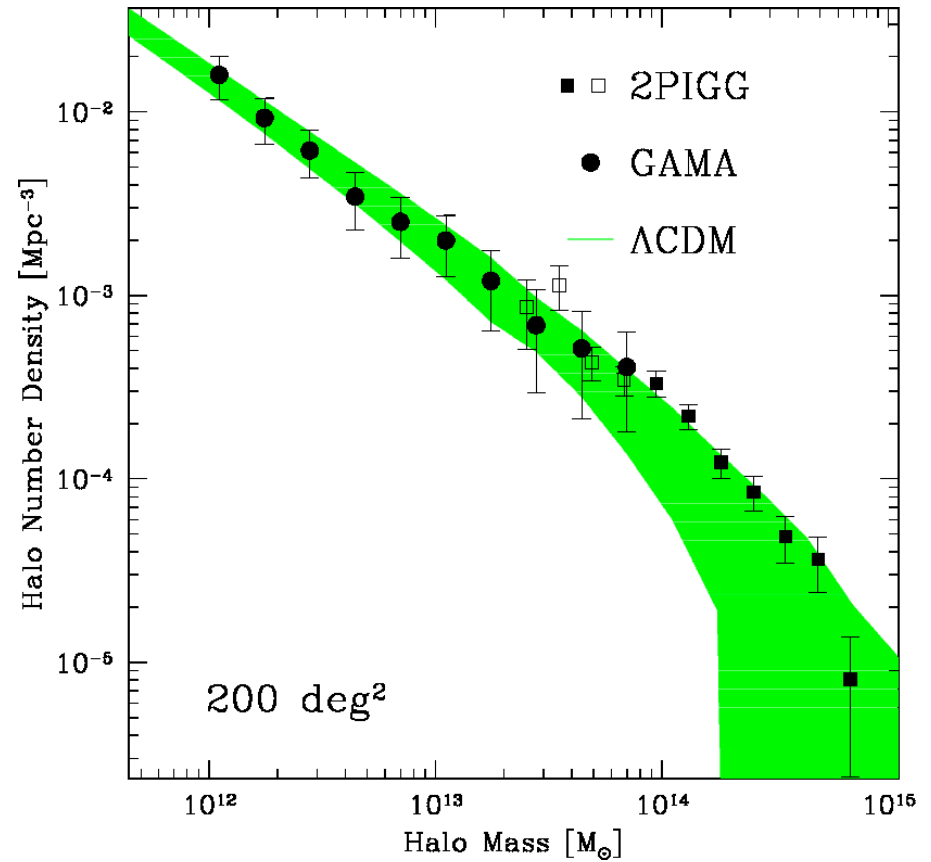
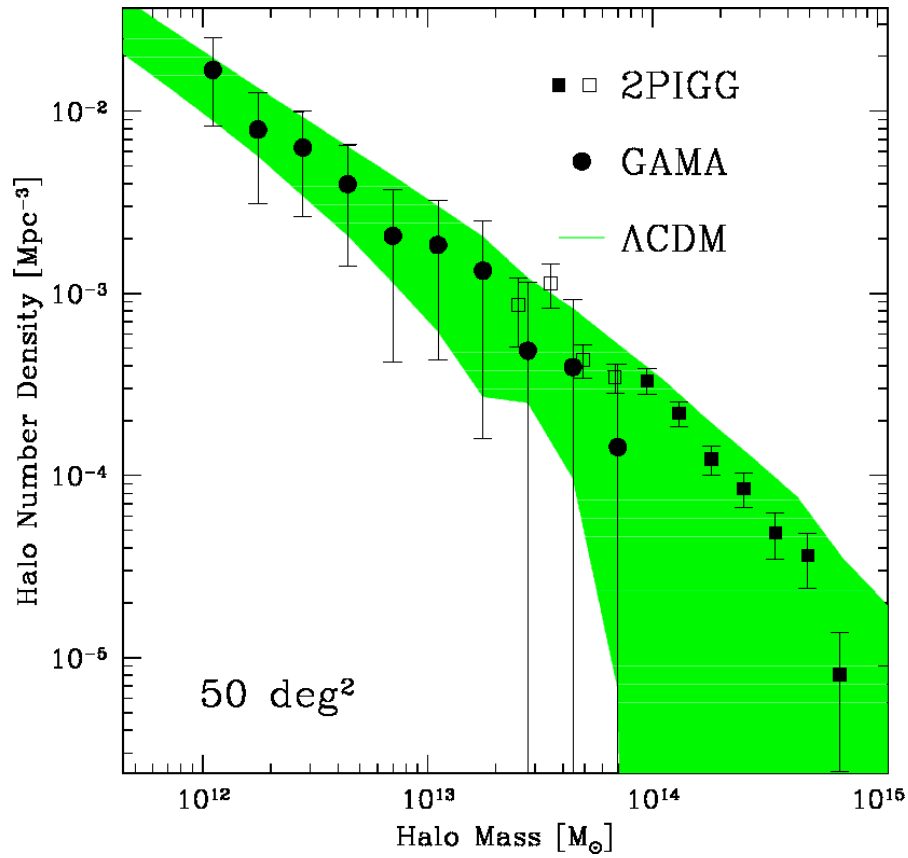


Redshift

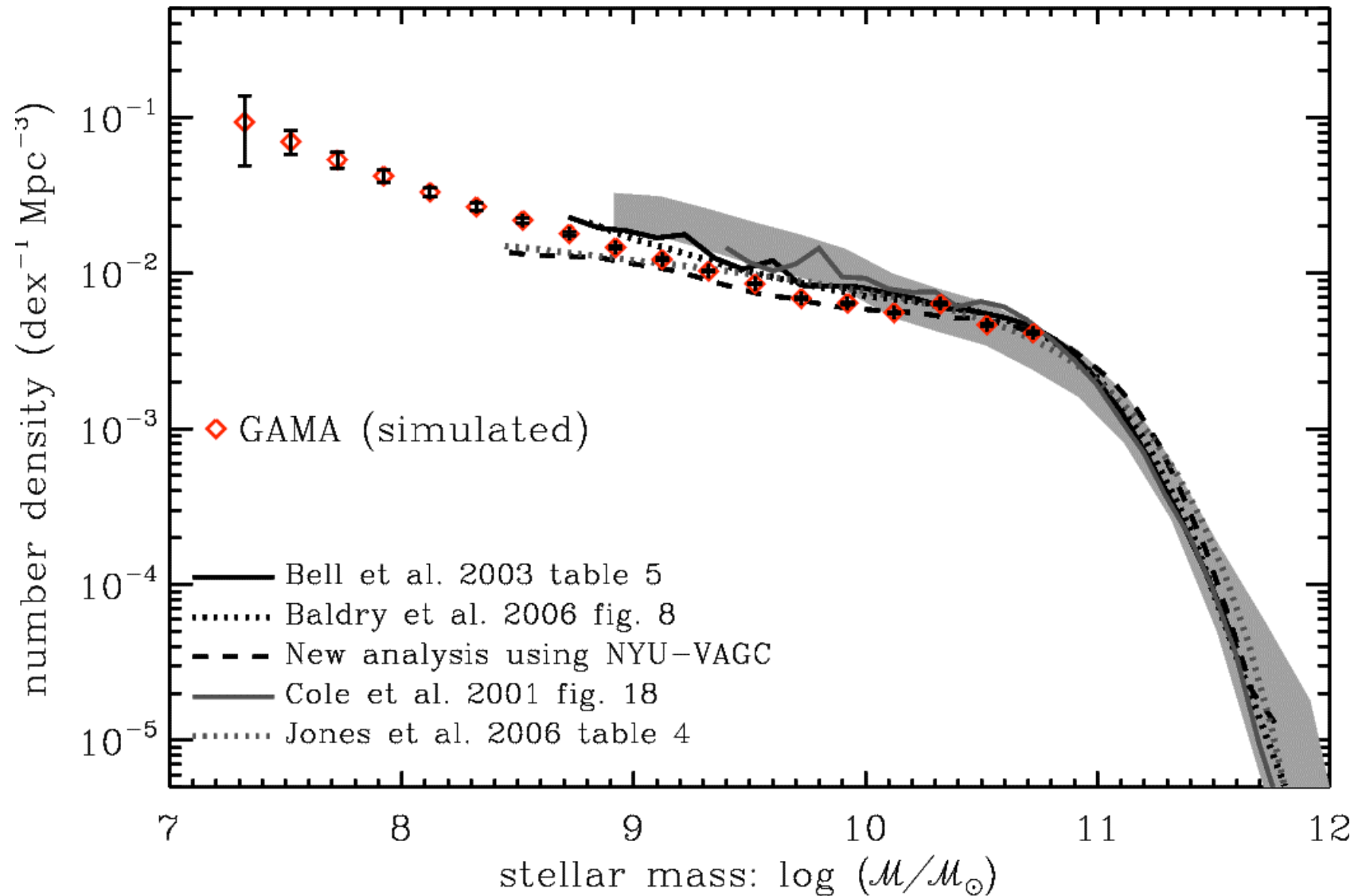
GAMA: Science

- 250 sq deg. (5x50 sq deg. chunks each 4x12.5deg), 250k galaxies $z < 0.4$
- General:
 - **A study of structure on 1kpc-1Mpc scales**, where baryon physics is critical
 - Tracing how mass (stars, dust, gas) follows light
 - Provide a definitive low redshift benchmark for the JWST and the SKA
- Specific goals:
 - **the CDM Halo mass function** from group velocity dispersions
 - the stellar mass function into the dwarf regime
 - the HI mass function and associate gas/stellar mass ratios
 - the baryonic mass function and baryon to dark matter ratios
 - determine the galaxy merger rates as a function of mass ratio
 - individual baryon budget and energy output of 250k galaxies
- Provision of a SDSS/2MASS like public database incorporating:
 - Optical: ugri (VST), spectra (AAT)
 - Near-IR: ZYJHK (VISTA)
 - Far-IR: 100-500 microns (HERSCHEL)
 - **Radio: 21cm (ASKAP/DEEP)**

The CDM halo mass fn



The GAMA Stellar Mass fn

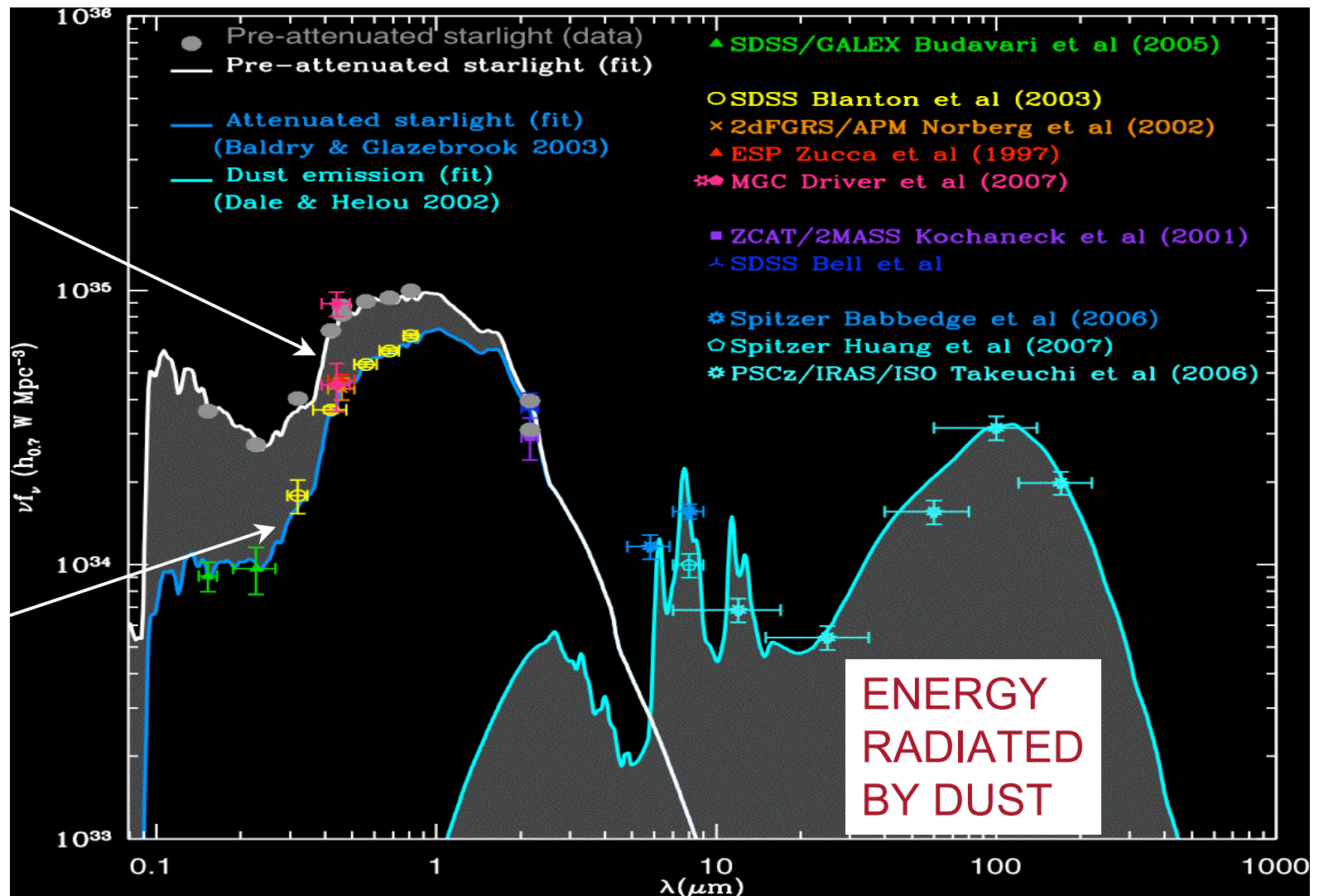


Energy Output

GAMA will measure the individual energy output from 0.3 to 500micron for ~250k galaxies (c.f. Driver et al. 2008)

ENERGY
PRODUCED
BY STARS

ENERGY
WHICH
ESCAPES
INTO IGM



Galaxy And Mass Assembly

Simon Driver (Univ. St Andrews) and the GAMA team (incl. VIKING)

1. What is GAMA?

- New generation SDSS scale survey: 250 sq deg, 2mag deeper than SDSS
- Fully multi-wavelength: AAT, VST, VISTA, HERSCHEL, ASKAP (GALEX, SCUBAII)
- A comprehensive study of matter and energy on 1Mpc to 1kpc scales $z < 0.4$

2. Overlap with XMM

- Superb overlap with proposed XXL survey field (100 sq deg = 2 GAMA chunks)
- Comparable $n(z)$ distributions for normal galaxies
- GAMA could be expanded to include UVX selection
- Will provide: optical, near-IR, far-IR, spectra and radio measurements/

3. GAMA update:

- GAMA commenced March 1st 2008
- >50,000 redshifts measured in three weeks with AAT/AAΩ (>96% Completeness)
- Proposal to commence GAMA south due March 2009 for obs starting Oct 2009
- Quick look science: Local LF, bimodality, BPT, SFH, Photo-z calibration....

4. How you can get involved:

- Annual data release (December 2008)
- Website: <http://www.eso.org/~jliske/gama/>
- Contact: spd3@st-and.ac.uk

GAMA: Team Affiliations and Structure

WORKING GROUPS/HEADS

SCIENCE	CATS	DATABASE	OBS	MOCKS	RADIO	SPEC. PIPE.	IMAGE. PIPE.
Peacock (ROE)	Baldry (LJMU)	Liske (ESO)	Driver (PI, St And)	Norberg (ROE)	Hopkins (USyd)	Loveday (Sussex)	Bamford (Nott.)

TEAM MEMBERS

Bland-Haw'n (U.Syd)
Cameron (St And)
Conselice (Nott.)
Couch (Swin.)
Croom (U.Syd)
Cross (Edin.)
Frenk (Durham)
Hill (St And)

Jones (AAO)
Kuijken (Leiden)
Lahav (UCL)
Nichol (Ports.)
Oliver (Sussex)
Parkinson (Edin.)
Phillipps (Bristol)
Popescu (UCLan)

Prescott (LJMU)
Proctor (Swin.)
Sharp (AAO)
Staveley-Smith (UWA)
Sutherland (Camb.)
Tuffs (MPIK)
van Kampen (Innsbruck)
Warren (Imperial)

TEAM AFFILIATIONS:

UKIRT/LAS, VST/KIDS, VISTA/VIKING, HERSCHEL-ATLAS, DURHAM ICC

WEBSITE:

<http://www.eso.org/~jliske/gama/>