THE HERSCHEL ATLAS SURVEY

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With help from…
Steve Eales (PI), *Matt Jarvis, Antonis Georgakakis, Dave Clements, and the 100+ Herschel ATLAS Team*

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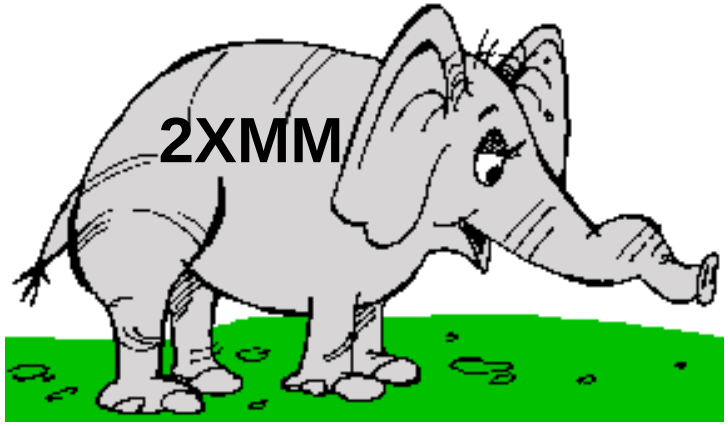
LARGE SURVEY MOTIVATIONS

- Large Samples
- Rare Objects
- Cosmic Variance



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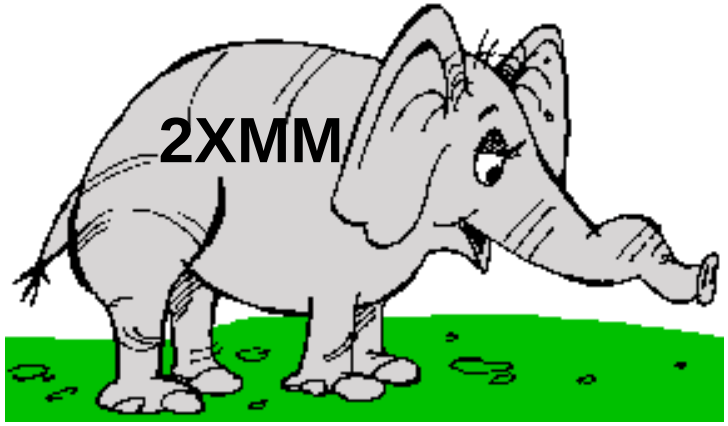
- *Large Scale Structure*

- ***Unique Multi-λ data***



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- ***Unique Multi-λ data***

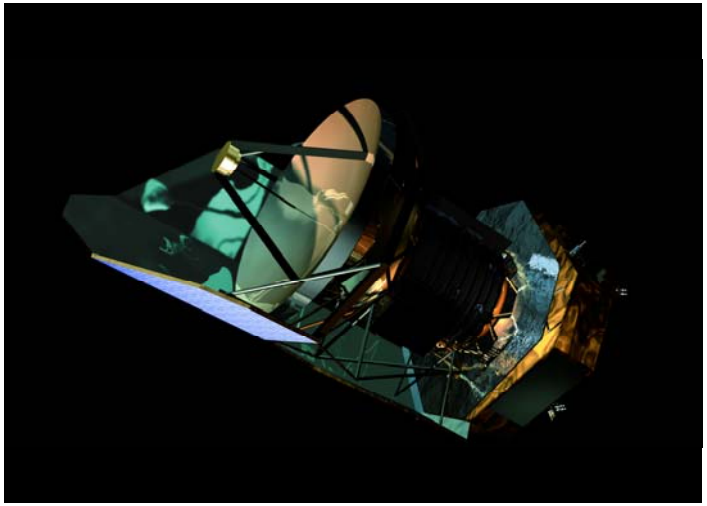
$\Rightarrow$ HERSCHEL ATLAS

WHAT IS HERSCHEL-ATLAS?

Open Time Key Project (600hrs)

PI: Steve Eales (Cardiff)

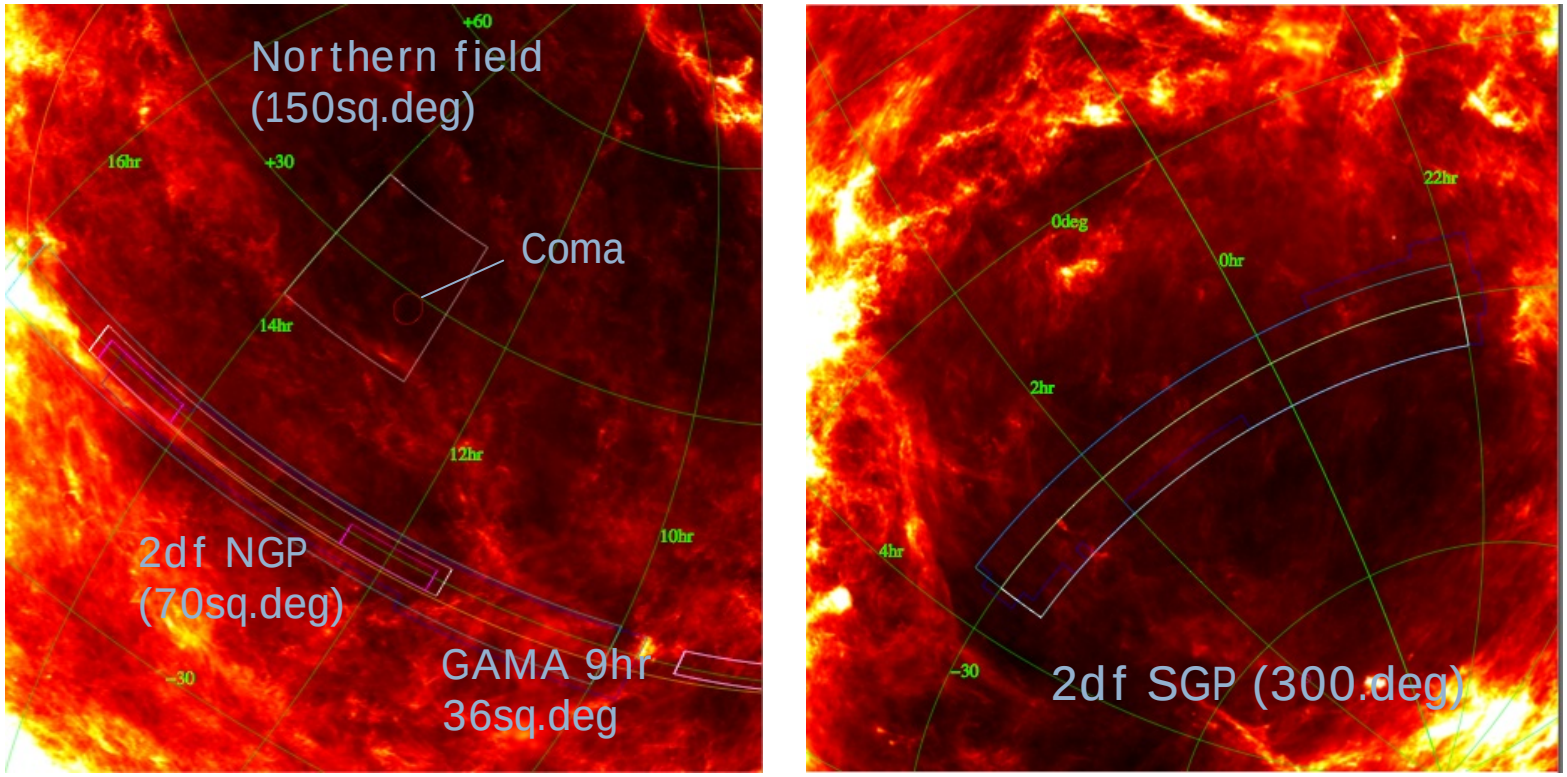
600 sq.deg^2 SPIRE Survey



Limits: 67, 94, 45, 62, 53 mJy @ 110, 170, 250, 350 and 500μm.

- Local(ish) Galaxies
- Planck synergies
- Efficient lens survey
- Rare object science
- Large-scale structure
- Clusters
- Galactic science

Herschel-ATLAS Fields



Complementary data:

Imaging (SDSS/VST/VISTA); Spectra (2dF, SDSS, GAMA); Planck HFI 350μm-3mm; Dark Energy Survey, SPT (South), SASSy (SCUBA 850μm), LOFAR (North)

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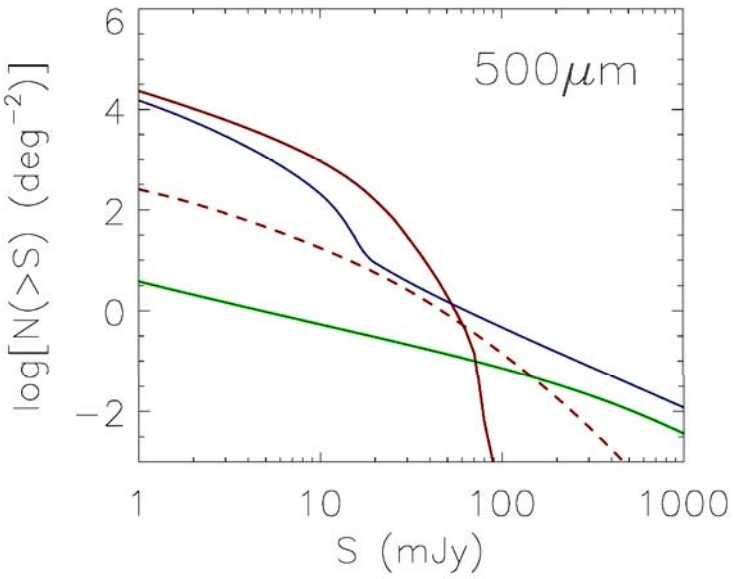
HERSCHEL-ATLAS GOALS

- Low z Galaxies
  - ~75,000 gals at z<0.3 (50% w/*z*)
- High z Clusters/S-Z
  - "Decontaminate" Planck sources
- Strong Lensing
  - Negative K-correction at z>1:
- AGN
  - SEDs; Galaxy/BH co-evolution
- Large Scale Structure
  - 400,000 gals, <z>~1, scales ~1000 Mpc
- Dust and Protostars

Figure: Mattia Negrello



— high z gals
— low-z gals
-- lensed high z
— FSRQ

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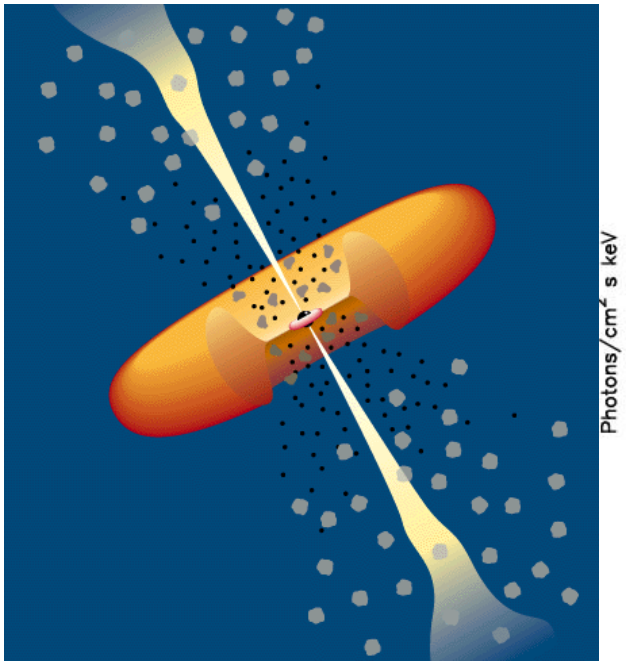
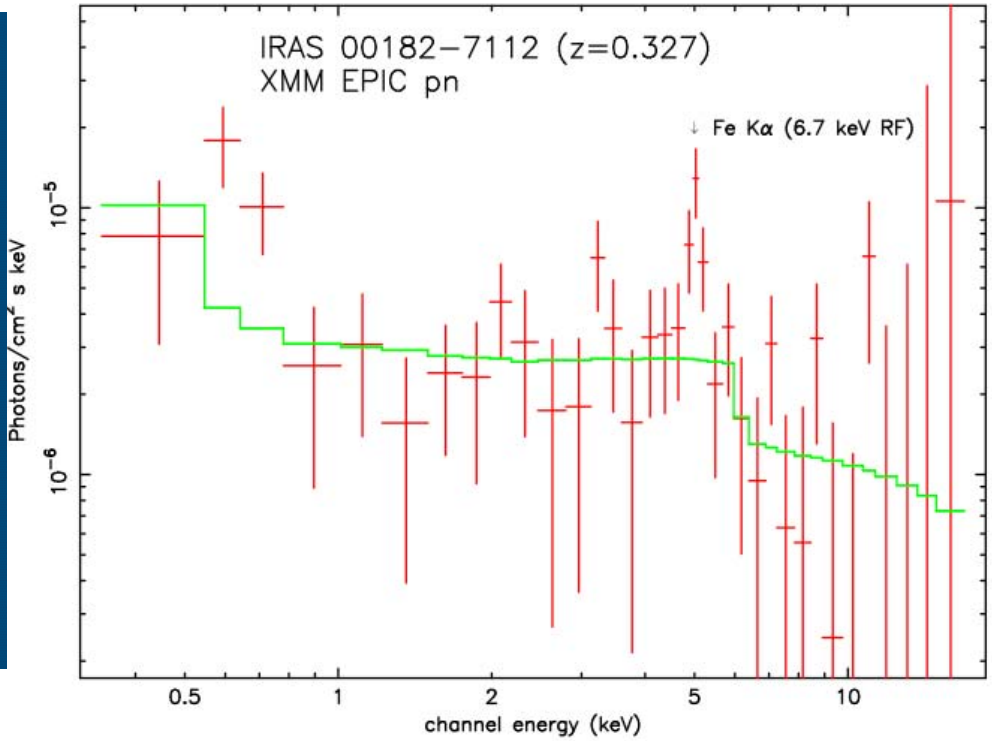
HERSCHEL-XMM GOALS

- AGN
  - SEDs and bolometric luminosities of all important AGN classes
  - Starburst/AGN connection
  - Nature of local ULIRGs
- SFRs of X-ray selected “normal” Galaxies
  - Obscured SF at low *z*
- High z Clusters
  - High z clusters in formation
  - Simultaneous X-ray/S-Z
- Strong Lensing
  - New lensing clusters?
- LSS:
  - Galaxy/hot baryon cross-correlation

EXAMPLE 1: THE GREAT DEBATE

SB vs. AGN? XMM detects hidden AGN in HLIRG IRAS 00182-7112 (Nandra & Iwasawa 2007)





Spectrum: 10ks; Detection: ~200s!
Similar for z~0.1 ULIRG

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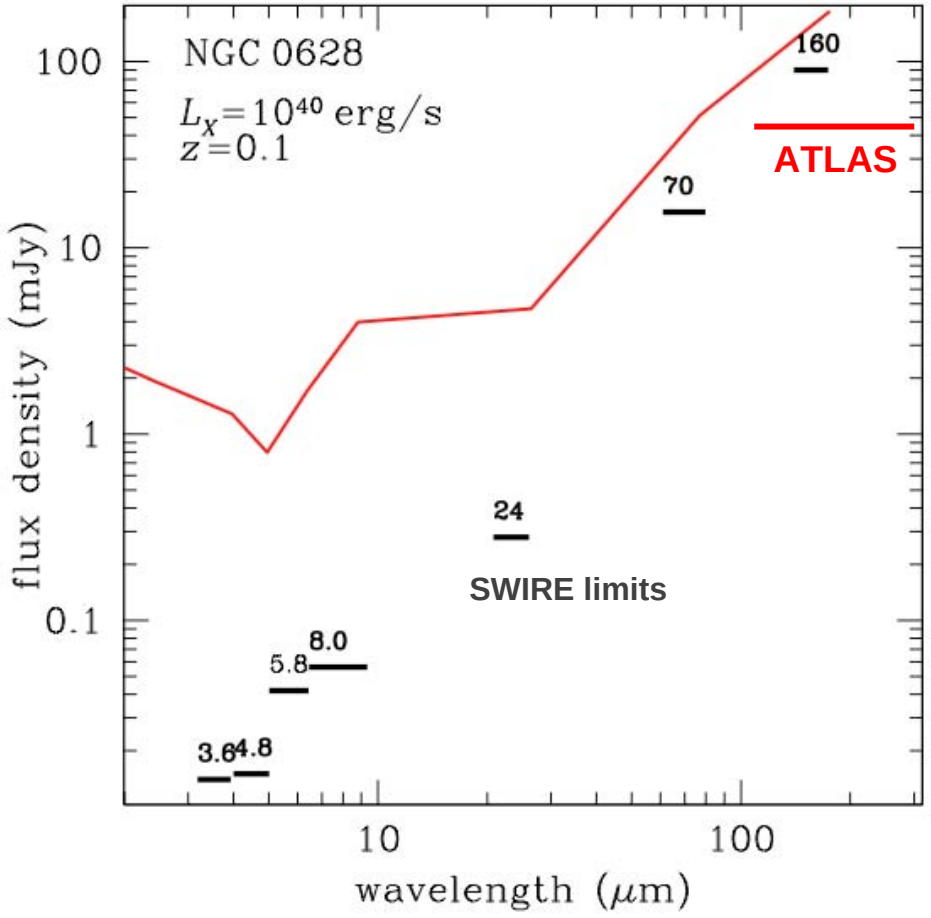
EXAMPLE 2: STARBURST GALAXIES

- ATLAS targets $z<0.3$
- At $z=0.1$ "normal" spiral has $F_X=4\times10^{-16}$ cgs
- ~2Ms XMM exposure!
- $\Rightarrow$ ATLAS easily detects XMM "normal" galaxies (i.e. regardless of exposure strategy)

SINGS SED (Kennicutt et al 2003)
Figure: A. Georgakakis



OBSERVATION STRATEGY

- OR.....

How the  do you cover 600 deg^2 with XMM?

Pointed: 5ks/pointing 5 pointings/deg^2 $\Rightarrow$15-20Ms
Slew: 40s exposures, cover w/multiple slews?
Raster??? Probably ideal…

CONCLUSIONS

- ATLAS ~ 2-3XMM size
- But lots of XMM/Herschel synergies
- Unique multi-λ angle
- Redshifts (2dF, SDSS, GAMA)
- Science:
  - AGN
  - Clusters
  - Lensing
- ⇒ **Serious contender?**