Legacy Catalogs: Update on DSR Preparations

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Products Covered

- CMB Lensing Map
- Extragalactic Sources
- Galaxy Clusters
- Galactic Sources
- Transients
- Near-Earth Objects
CMB Lensing Map

- Legacy product will be a lensing map(s) for 40% of the sky covered by the wide area survey
- Excellent overlap with e.g., LSST, DESI, eRosita, etc
- Improved Cosmological Constraints via cross-correlations with other LSS Surveys (e.g., Doux+18, and others)
- Calibration of Systematic Errors in other surveys (e.g., Schaan+17, and others)
- High-redshift mass calibration via CMB halo lensing (clusters, AGN, other sources; e.g., Raghunathan+17, Melin+15, and others)

Development work led by Neutrino Mass Working Group!

Figure G. Holder; S4 noise curve J. Meyers
Extragalactic Sources

Figures from Joaquin Vieira
Extragalactic Sources

- Some of the DSFGs identified by CMB-S4 will be protoclusters (high redshift progenitors of galaxy clusters)

- Planck’s “PHz” catalogue contains about 2000 “red peaks” in the CIB, over about a quarter of the sky
  - >200 followed up with Herschel, but we still don’t really known what these are
  - there are hence no good theoretical predictions for their abundance
- CMB-S4 will detect many more

Credit: ESO/ALMA (ESO/NAOJ/NRAO)/Miller et al.
Galaxy Clusters: Cosmological and Astrophysical Implications

"The number of massive galaxy clusters could emerge as the most powerful cosmological probe [if systematics can be controlled]" - DOE Cosmic Visions

Dodelson+1604.07626

Coordinate with DE Working Group
Galactic Sources

- Planck (and earlier ground-based surveys) catalogue ~150 CO clouds at $|b|>30^\circ$
- Planck also found hundreds of “cold cores” at high latitudes (some in known GMCs, others unknown)
- H-ATLAS discovered some sources associated with stars, including a few debris disk candidates
- As well as extracting Galactic sources in CMB-S4 maps, we can cross-correlate with stellar (and other Galactic) catalogues
- Not the highest priority - but does allow us to connect with another community of astronomers

RCW 38 HII region
(90,150, 220 GHz; rgb)
Credit: K Schaffer, SPT-SZ

HELP WANTED!
Transients - GRBs and FRBs

- Orphan GRB afterglows (generic prediction of GRB models, but none yet detected)

- New probe of the Epoch of Reionization! CMB S4 should be able place interesting constraints on some models of GRBs from population 3 stars at z~20

- FRBs (A. Kosowsky to forecast); challenges include detector glitches, Cosmic Rays

Forecasting Machinery in place, need straw cadence to run projections for CMB-S4.
Near Earth Objects

Figure by Gil Holder
Rough 5 page (including Figures) Blocking for DSR

• Introduction (1/2 page)

• CMB Lensing Map (1/2 page)

• Extragalactic Sources (3/4 page) + Figure

• Galaxy Clusters/protoclusters (3/4 page) + Figure

• Galactic Sources (1/2 page)

• Transients (1/2 page) + Figure (?)

• Near-Earth Objects (1/2 page) + Figure (?)

• Anything Other Legacy catalogs we are missing?

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