Thoughts: How does the Working Group Operate with the Global Fit?

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Worries We Have and Have Heard

About the global fit:

- Are we just writing one paper to rule them all every few years?
- How do we highlight individual contributions?
- How do we avoid "cog in a machine" feelings among WG members?

About the status quo:

- Hard to do targeted analyses or ask new questions; huge amount of work to endlessly re-constrain conventional atmospheric neutrinos, etc. and doing that requires event selections with broad energy ranges
- Takes too long to get a publication with a new result, especially as we enter sqrt(t)

Goals

- Maintain at least the current opportunities for publications, talks, etc. as well as the role of a diffuse analyzer
- Open up some new opportunities to answer targeted physics questions with less gruntwork in addition to standard, sample-focused papers
- Fill in all the gaps in our knowledge of the diffuse flux!

Our concept

- **Global fit is a *toolkit***, not a paper or an analysis
- Gives *you*, the analyzer, freedom to lean on previously-known results and mix-and-match them to answer *your* physics questions, with *your* paper, without re-inventing the wheel
- Basically the same as how we place priors on charm from some previous diffuse results now, but much better
- Frees analyzers to plug holes in our global understanding (e.g. Yang's targeted PeV muon analysis) without re-controlling atmospheric neutrinos endlessly
- Keys:
  - *Same rate of papers (per sample, etc.) and structure of papers and authorship as now*
  - *Every paper that comes out of the diffuse group is the best knowledge of the diffuse spectrum we can possibly have*

Examples from Other Fields

- This is basically standard practice in cosmology

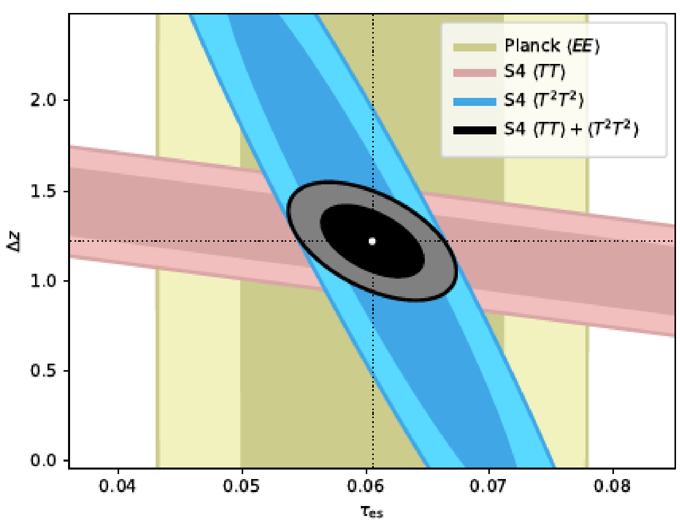

Figure 24. *CMB-S4 constraints on the optical depth and duration of reionization in a joint analysis using the kSZ power spectrum and four-point function.*

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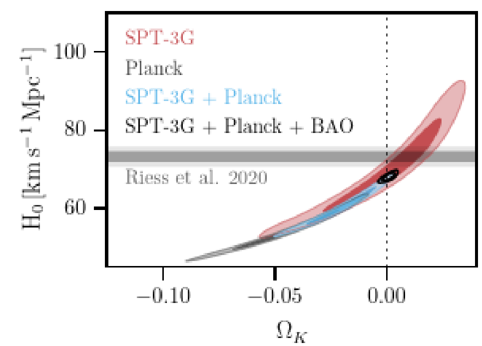

FIG. 5. Marginalized 2D 68% and 95% posterior probability contours in the H_0 vs. Ω_K plane for SPT-3G (red), *Planck* (dark grey), SPT-3G+*Planck* (blue), and the combination of SPT-3G 2018, *Planck*, and BAO data (black lines). The SPT-3G data by itself places constraints competitive with *Planck* on curvature, in part due to the upturn in the degeneracy between Ω_K and H_0 as Ω_K increases. The combined SPT-3G 2018 and *Planck* data results in a curvature constraint consistent with the standard model prediction at $1.8\,\sigma$. While this raises the inferred H_0 value compared to *Planck*-only constraints to $60.6 \pm 3.4\,\mathrm{km\,s^{-1}\,Mpc^{-1}}$, it remains in tension with the distance-ladder measurement by R20, for which we show the $2\,\sigma$ interval in the horizontal grey bands, at $3.5\,\sigma$

Discussion

- These are our thoughts. What are yours?