What to de-scope?

- Paolo’s suggestions on Tuesday:
  - 1 rpm -> 0.5 rpm
  - 1.5 m -> 1.2 m -> 0.8 m
  - ~2400 detectors -> ~1200 detectors
What to de-scope?

• Paolo’s suggestions on Tuesday:
  
  • 1 rpm -> 0.5 rpm: not easy to translate this to sensitivity without detailed study
  
  • 1.5 m -> 1.2 m -> 0.8 m: focus on this
  
  • ~2400 detectors -> ~1200 detectors: just integrate twice as long
Inflation

• The precision on $r$ improves as we increase the aperture size (Di Valentino, Melchiorri, Lesgourgues). However, the power to distinguish between models does not improve so much (Martin, Clesse, Vennin).

• I.e., as long as we can detect $r \sim 10^{-3}$, the precise value does not seem to matter so much.

• Improvement in $n_s$ modest from 1.2 to 1.5m.

• **Conclusion**: 1.2m would be sufficient. 0.8m not good because of insufficient ability to de-lens.
Inflation

- **Conclusion**: 1.2m would be sufficient. 0.8m not good because of insufficient ability to de-lens.

- Having said it:
  - Once the model is chosen, detailed studies can reveal more physics of inflation, e.g., reheating. Constraining more parameters can benefit from a larger aperture.
Neutrino: $N_{\text{eff}}$

- Detecting $N_{\text{eff}} > 3.000$ [thus confirming the standard prediction $N_{\text{eff}}=3.046$] would be tremendous.

- Aiming at $\Delta N_{\text{eff}}<0.02$.

- COrE+ only would not achieve this [$\Delta N_{\text{eff}}\sim0.03$ for both 1.2 and 1.5m]. 0.8m kills [$\Delta N_{\text{eff}}\sim0.04$] (Di Valentino, Melchiorri).

- But, $\Delta N_{\text{eff}}\sim0.02$ (or even 0.01) could be achievable in combination with the large-scale structure (but needs checking; Lesgourgues).

- **Conclusion**: 1.2m would be sufficient. 0.8m not good.
Neutrino: \( N_{\text{eff}} \)

- **Conclusion**: 1.2m would be sufficient. 0.8m not good

- Having said it:
  - A benefit of going to 1.5m is an ability to break degeneracy between, e.g., \( N_{\text{eff}} \) and the helium abundance, running index, etc
Neutrino: $m_\nu$

- Target: to detect $\Sigma m_\nu = 60$ meV

- 1.2 and 1.5m yield similar results ($1\sigma \sim 44$ meV) because the error bars are limited by parameter degeneracy (Di Valentino, Melchiorri, Lesgourgues)

- Can achieve the target ($1\sigma \sim 20$ meV) when combined with the large-scale structure (e.g., DESI)

- Would it be similar for 0.8m? Yes with the BB analysis (Melchiorri), but an analysis with the lensing reconstruction would be necessary to conclude whether 0.8m would do

- **Conclusion**: 1.2m is sufficient. Too early to tell whether 0.8m would do
Galaxy Clusters

• 0.8m completely kills this science, except for a large-scale Compton Y map

• Trade-off between 1.2m and 1.5m: not yet done, will be done for the ECO paper (Melin, Bartlett)

  • But, the gain is steep: 1.5m is far more preferred than 1.2m for, e.g., lensing mass estimation of clusters

• Conclusion: this science will drive the need for 1.5m. Detailed studies necessary for the trade-off

  • Synergy with ground-based telescopes should be carefully described
Census of Baryons

• Seeing the feedback of AGNs on the gas distribution in galaxies (tSZ) (Bartlett, Melin)

• In-situ dust contamination is significant, and cleaning it requires a high frequency

• How high is sufficient (>500GHz? 600GHz?) requires more study

• **Conclusion:** this science will drive the need for a higher frequency, *higher than needed for the CMB science*
Other topics

• Peculiar velocities (Burigana, Notari)

• Non-Gaussianity (Desjacques)

• These do not seem to drive the design
Science: Summary

- The baseline of 1.2m in 60-600 GHz seems OK for:
  - Inflation
  - Neutrino parameters

- The science that demands 1.5m is the galaxy cluster and large-scale structure studies. More detailed study is necessary for this option (ECO paper and Phase A)

- Higher frequency helps separation of dust/CIB and the SZ effect. How high? Needs more study