Science Summary

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What to de-scope?

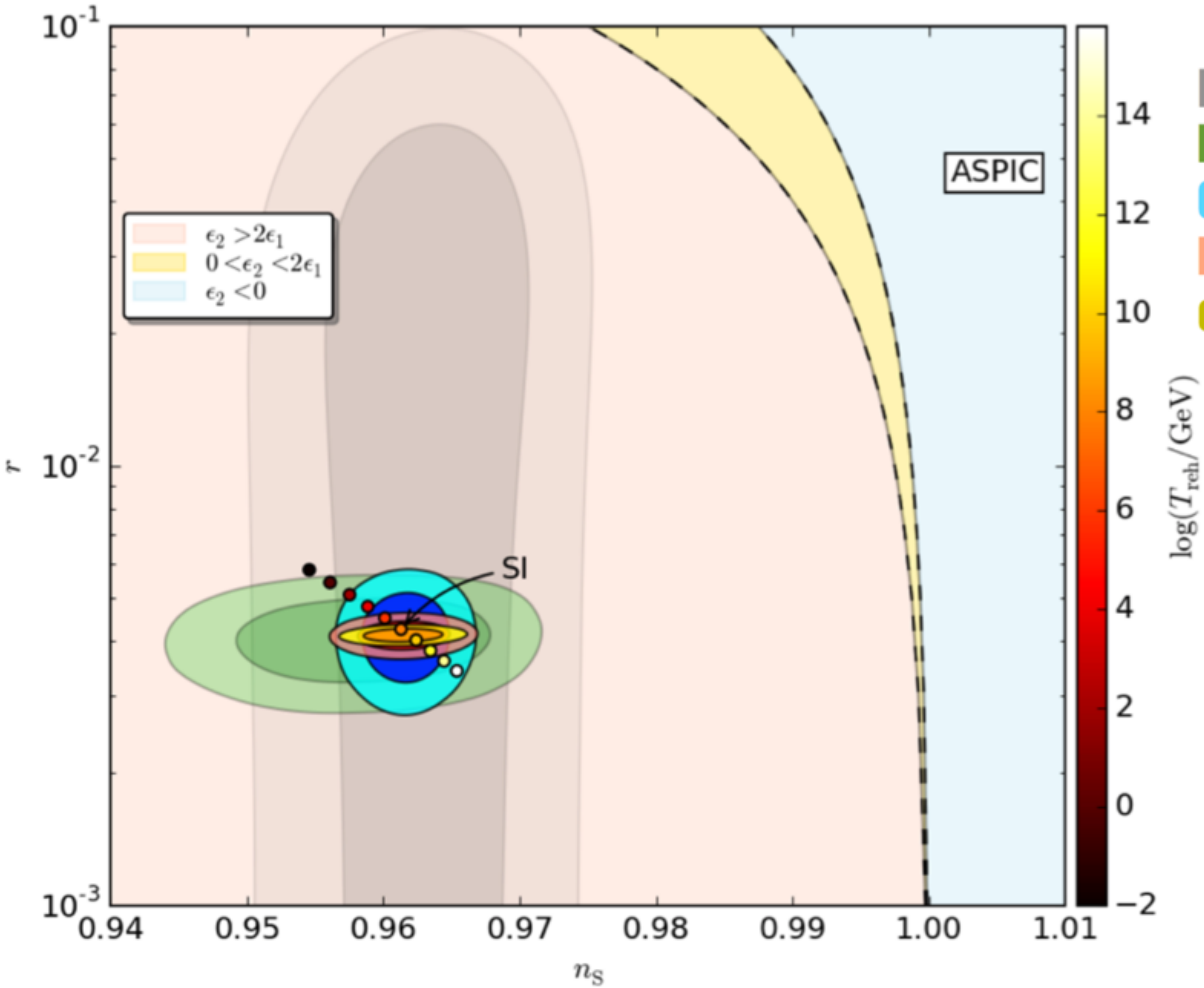
- Paolo’s suggestions on Tuesday:
  - 1 rpm -> 0.5 rpm
  - 1.5 m -> 1.2 m -> 0.8 m
  - ~2400 detectors -> ~1200 detectors

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



Planck
LiteBird
CORE (no del.)
LiteCORE120 (del.)
optCORE (del.)

Clesse/Martin/Vennin

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_{eff}

- Detecting N_{eff} > 3.000 [thus confirming the standard prediction N_{eff}=3.046] would be tremendous
  - Aiming at ΔN_{eff}<0.02
  - COrE+ only would not achieve this [ΔN_{eff}~0.03 for both 1.2 and 1.5m]. 0.8m kills [ΔN_{eff}~0.04] (Di Valentino, Melchiorri)
  - But, ΔN_{eff}~0.02 (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_{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_{eff} and the helium abundance, running index, etc

Neutrino: m_ν

- Target: to detect $\sum m_\nu$=60 meV
- 1.2 and 1.5m yield similar results (1σ~44 meV) because the error bars are limited by parameter degeneracy (Di Valentino, Melchiorri, Lesgourgues)
  - Can achieve the target (1σ~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