

Band-Defining and Thermal Blocking Filters

| | | |
|--------------------|---------|-----------|
| Intro/Planck | Lange | 10 min |
| UK Effort | Haynes | 10 min |
| Polarization Syst. | Pisano | 10 min |
| Microstrip Filters | Wollack | 10 min |
| Bulk Materials | Kuo | 10 min |
| Panel Discussion | All | remainder |

Requirements for CMBpol

| | Planck |
|----------------------------------|--------------------------|
| • High in-band transmission | Very Good |
| • Excellent out-of-band blocking | Excellent |
| • Negligible emission | OK |
| • Negligible cross-polarization | OK |
| • Well matched | NA |
| • Low scattering & diffraction | NA |
| • Low reflectivity | NA |
| • Diameters $> 1\text{m}$?! | $\sim 1\text{ cm} \dots$ |

Basics of Metal Mesh Filters

Resonant Mesh Filters Using Densely Packed FSS Elements for Space Applications

Ge Wu¹, Volker Hansen¹, Hans-Peter Gemuend² and Ernst Kreysa²

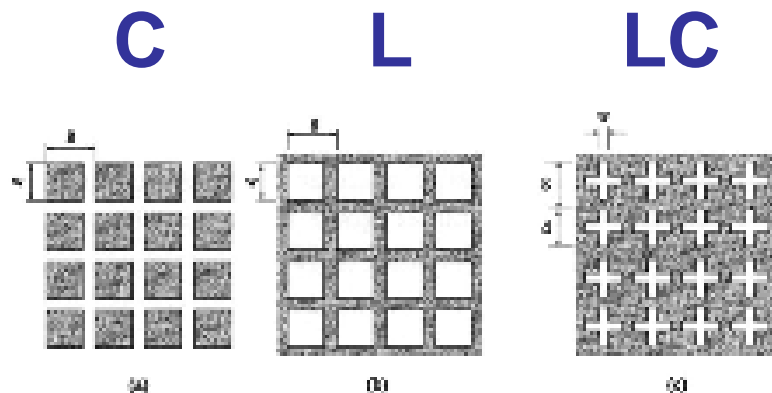


Fig. 2. (a) Capacitive mesh, (b) Inductive mesh and (c) Resonant mesh.

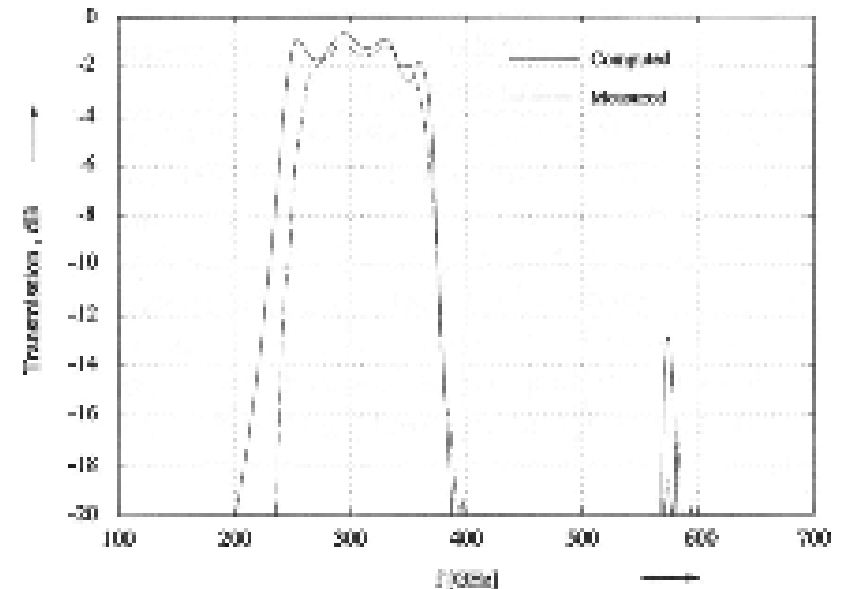
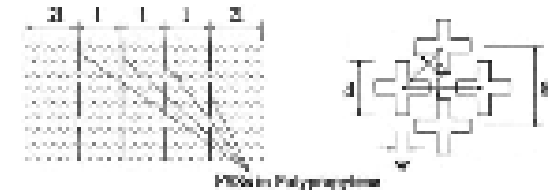
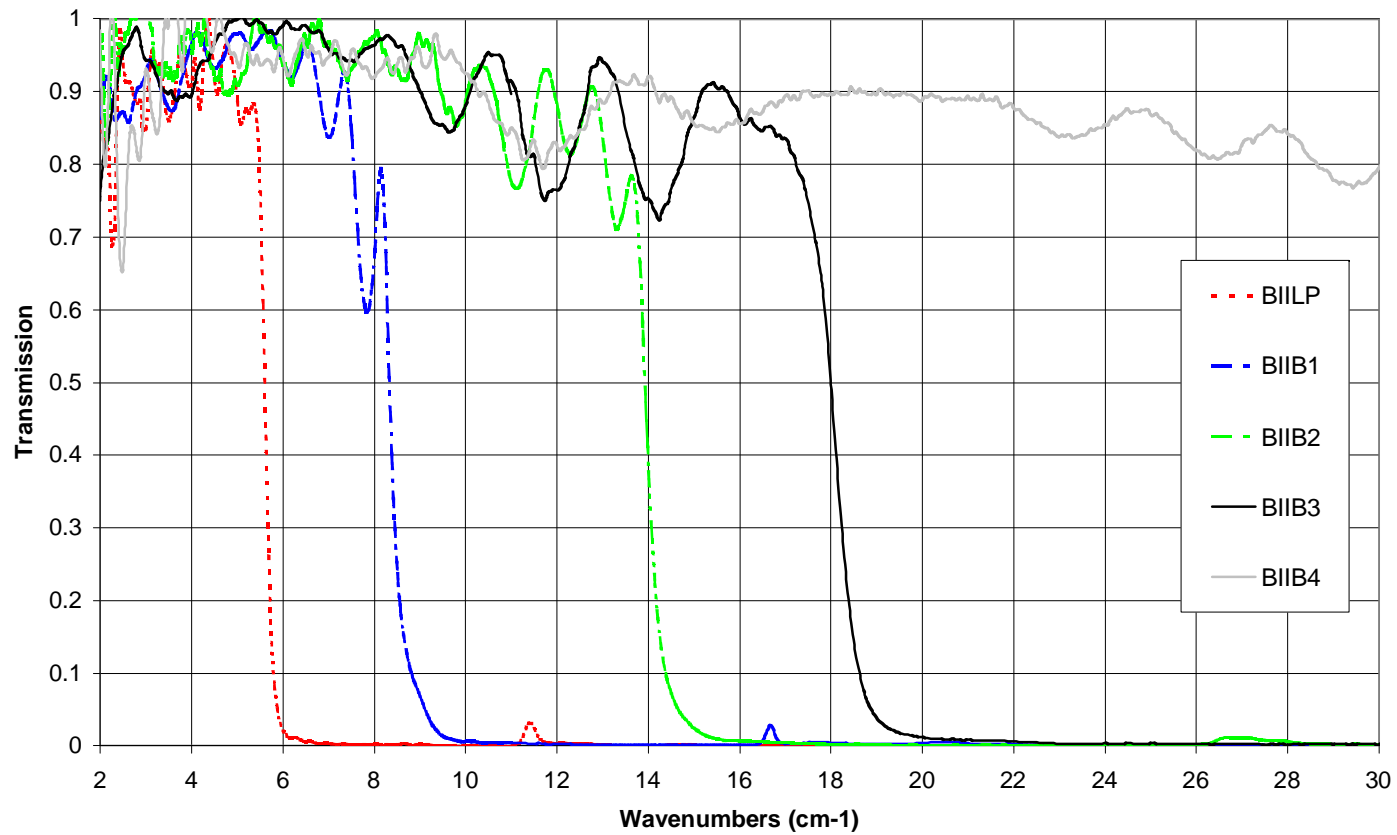


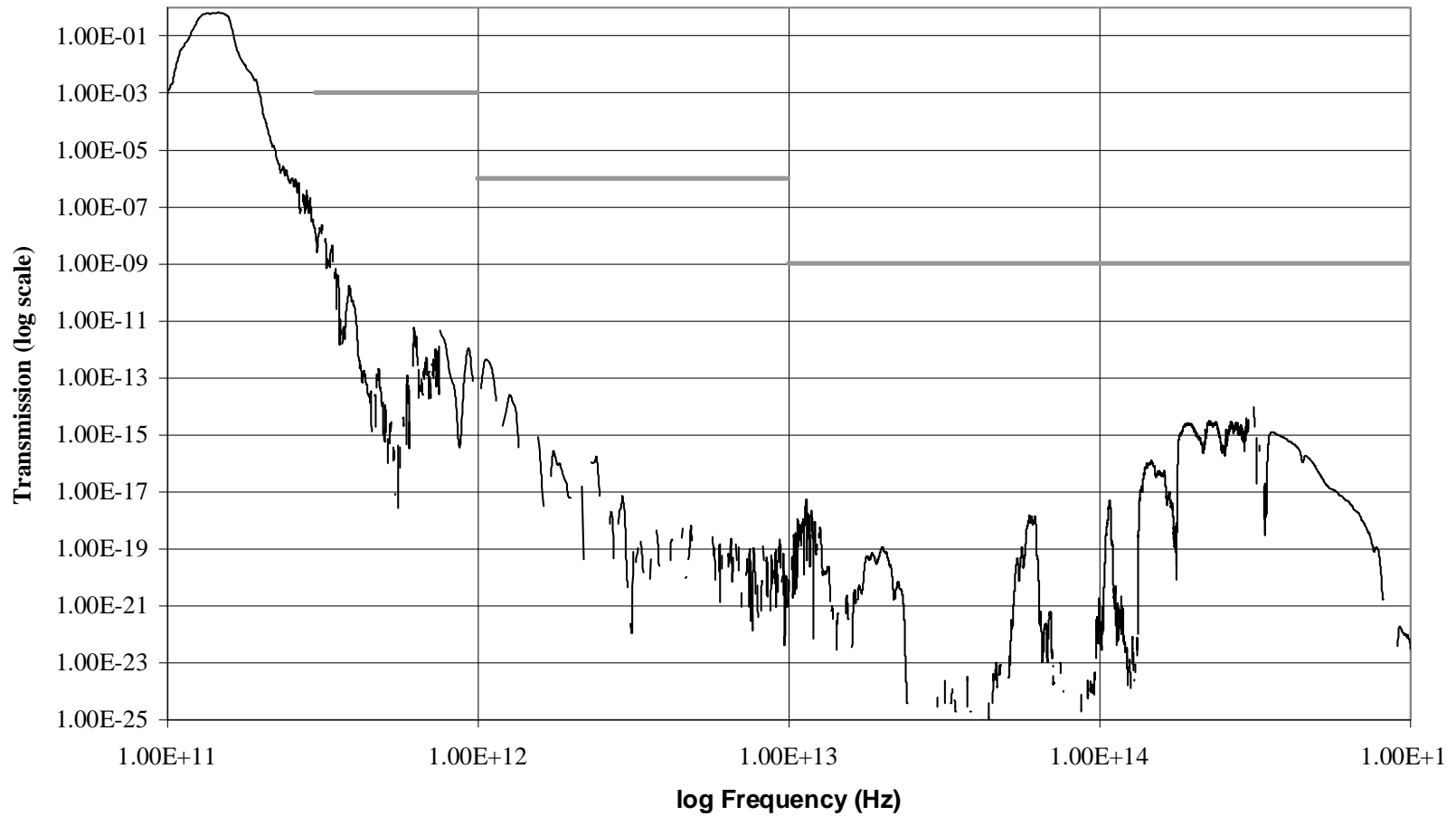
Fig. 5. Computed and measured transmission of the 4-resonant-mesh-filter (type 2).

Dielectric separation: $l = 133\mu\text{m}$. Grid parameters are: $g = 492\mu\text{m}$, $d = 400\mu\text{m}$, $w = 52\mu\text{m}$.

Typical Filter Stack

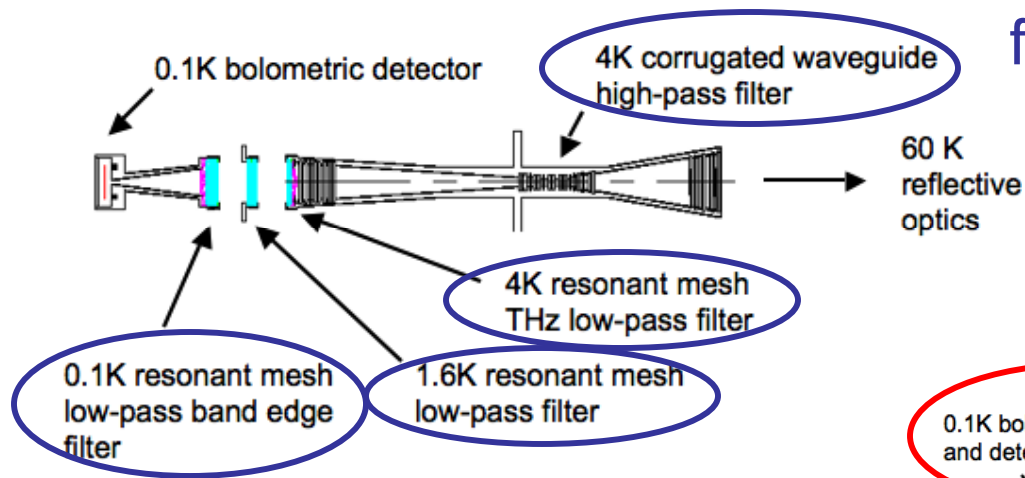


Out of band rejection (?)



Different optical configuration => very different requirements on filters!!

Planck HFI Optical Filter Layout

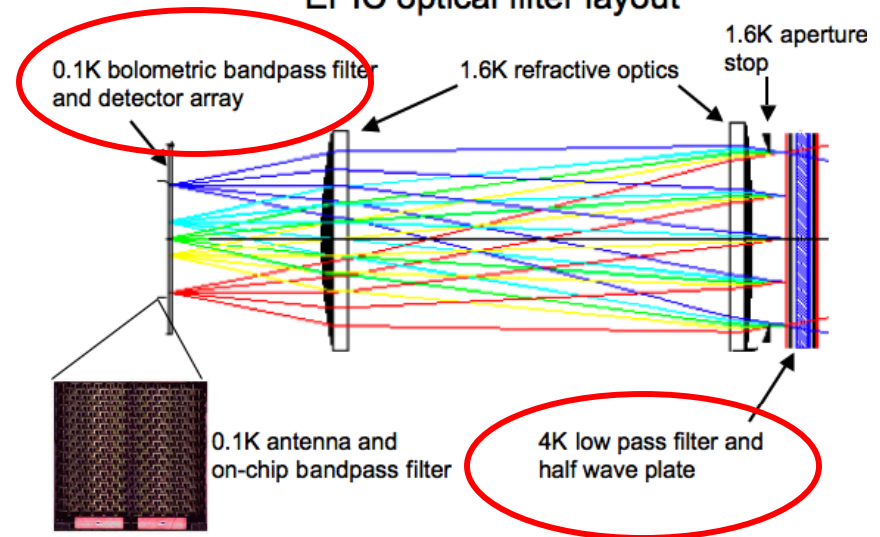


All filters behind feedhorn

Large filters inside primary optics

No feedhorn?

EPIC optical filter layout



Sources of Loading on Planck Polarized Bolometers

| Band [GHz] | CMB | 60K 'scope | Filters & feeds | NET* [$\mu\text{K}_{\text{CMB}} \text{s}^{0.5}$] |
|------------|-----|------------|----------------------------|--|
| 100 | 66% | 19% | 15% | 70 |
| 143 | 51% | 31% | 18% | 50 |
| 217 | 27% | 47% | 26% | 75 |
| 353 | 7% | 61% | 32% | 320 |

*for a single detector, based on ground test