

As implemented in BICEP3 in late 2016:

- 10x 1/8" thick HD-30 sheets glued to 1/8" Al rings
- Placed between the window and the 50 K alumina filter, replacing previous 10x stack of metal mesh filters
- Each HD-30 sheet effectively thermally isolated; absorbs IR and re-radiates
- 50 K tube ΔT decreased from 6 K to less than 4 K with the switch from metal mesh filters to HD-30
- Implied reduction of 50 K absorbed IR: from 18 W with mesh filters down to 12 W with HD-30: factor of $\sim 9x$ reduction of total incident 300 K IR
- Increase of in-band transmission of 10-filter stack from $\sim 92\%$ to $\sim 100\%$
- Previous metal mesh filter stack performance consistent with $\sim 2\%$ wide-angle scattering of throughput, absorbed by forebaffle and other 300 K structures. Switch to HD-30 stack lowered in-band loading by $\sim 6 K_{RJ}$

Things to keep in mind for the future

- Consider LD-24? Higher FIR cutoff, but higher MIR scattering due to smaller cell size. Better mechanical stability on multiple pump-downs: re-use from run to run (Keith Thompson can explain!).
- 50 K alumina filter functions to reduce loading onto 4 K by absorbing incident IR and re-radiating. The job of the foam filter stack is to reduce loading onto the $\sim 100\%$ emissive 50 K alumina filter. You need both...



B3 HD-30 foam filter stack

FIR Transmission of LD-15, LD-24, HD-30

Chart Area

