Size of telescope

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Assumptions

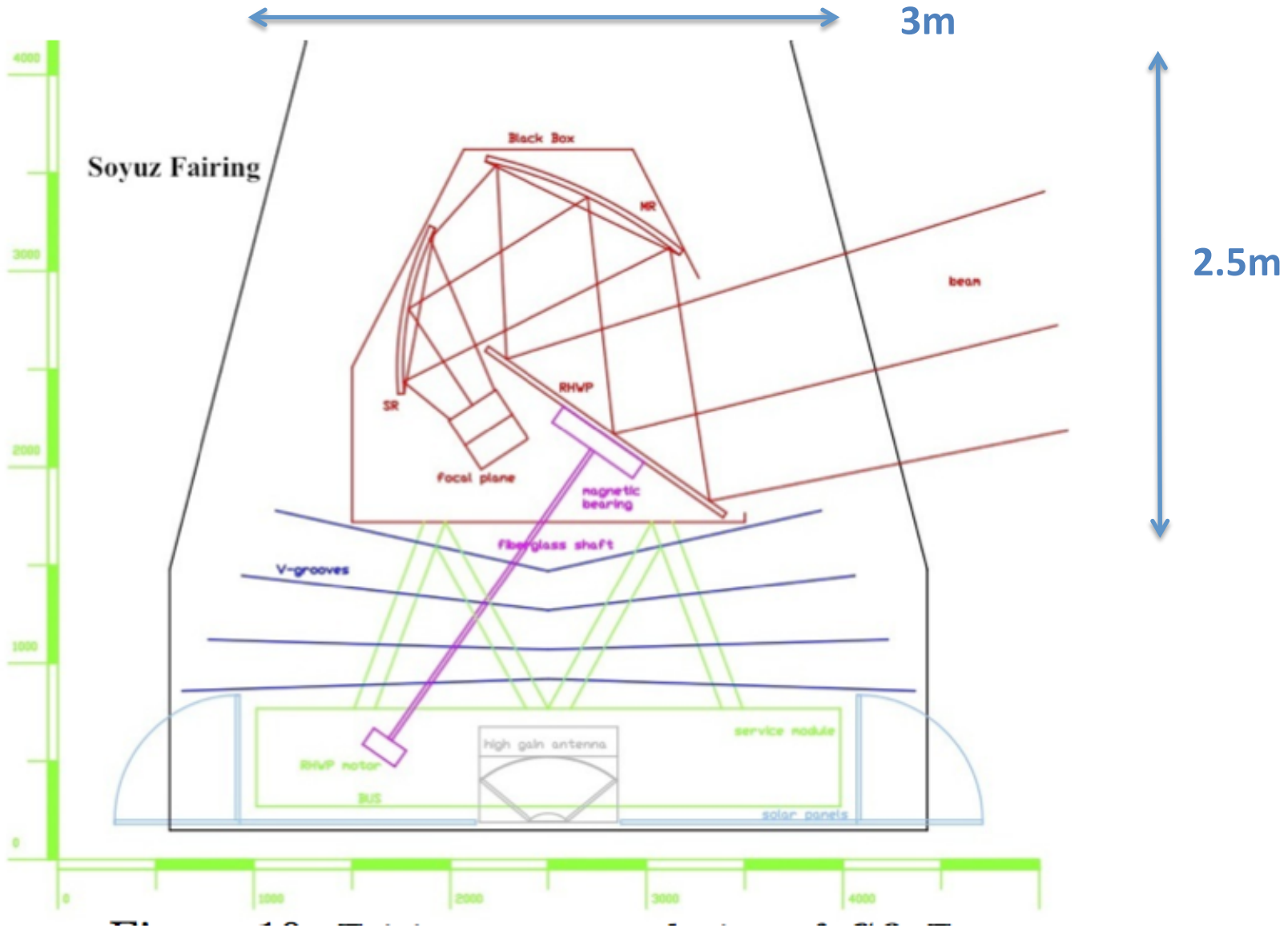
- Telescope based on mirrors
  - To build on Planck heritage
  - In order to cover a wide spectral coverage
    - Lens based telescope (B-Pol) would need several optical systems
    - Limited angular resolution
    - Limited spectral band numbers
    - Can have several HWPs
- Telescope with off axis configuration
  - Dragone – Mizuguchi condition
- Largest possible primary projected aperture
  - will depend on the use of HWP or not

Requirements

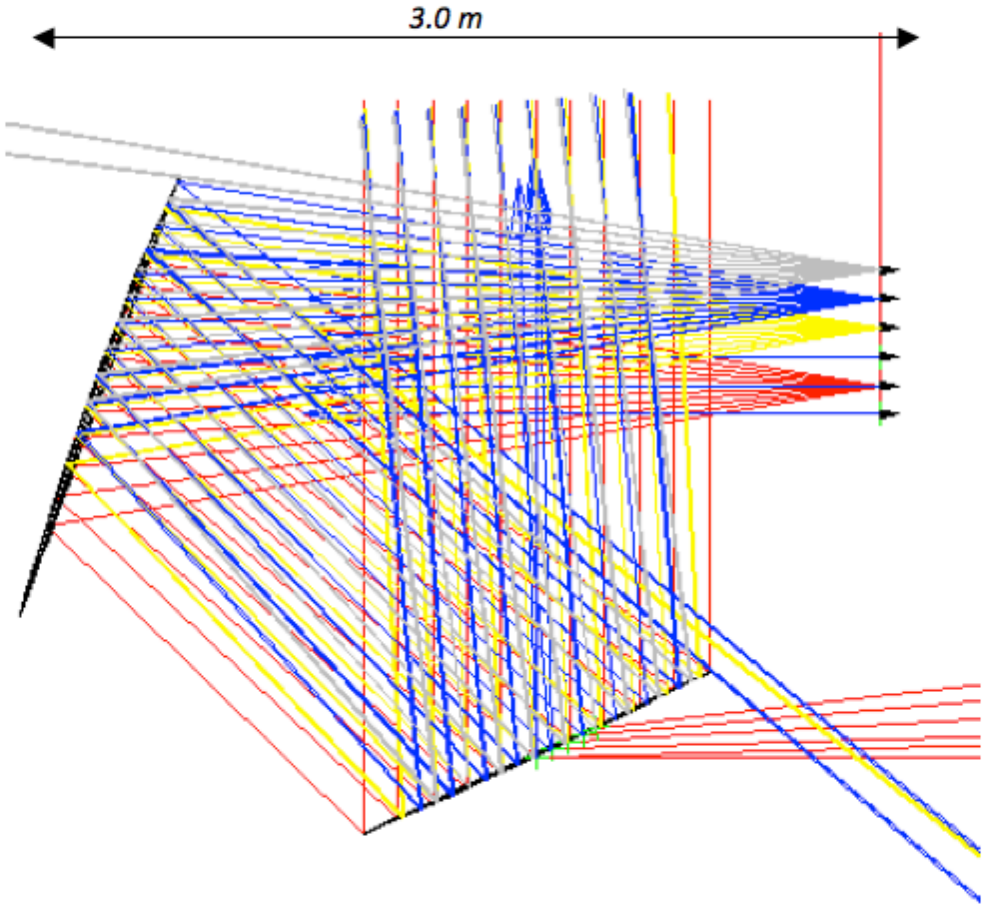
- We do not take into account the financial side
- Dimension requirements
  - Payload to fit within a Soyuz fairing.
    - Cylinder of about 2.9m diameter
- Largest possible primary projected aperture
  - will depend on the use of HWP or not
- Low aberrations

Reminder

- Planck primary:1556 × 1887mm → 1.5m proj. aperture
- COrE (with HWP): 1.2m proj. aperture



1.2m F3 CATR telescope

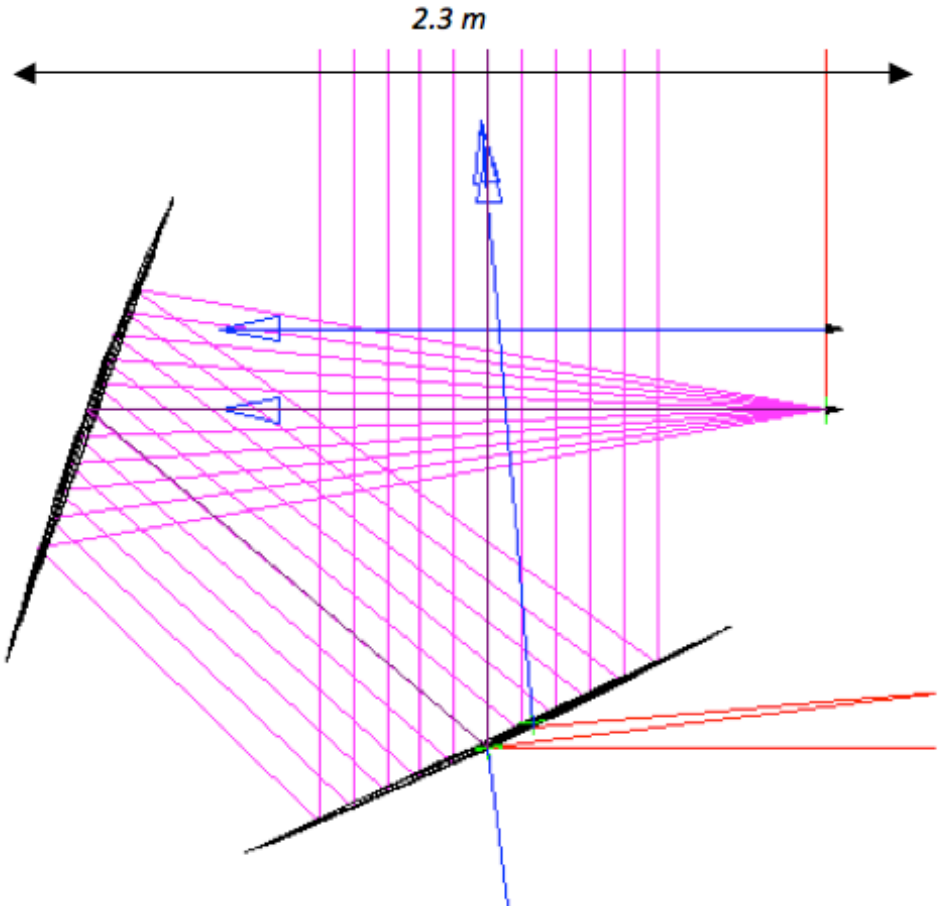


Best for optical performance

But too large

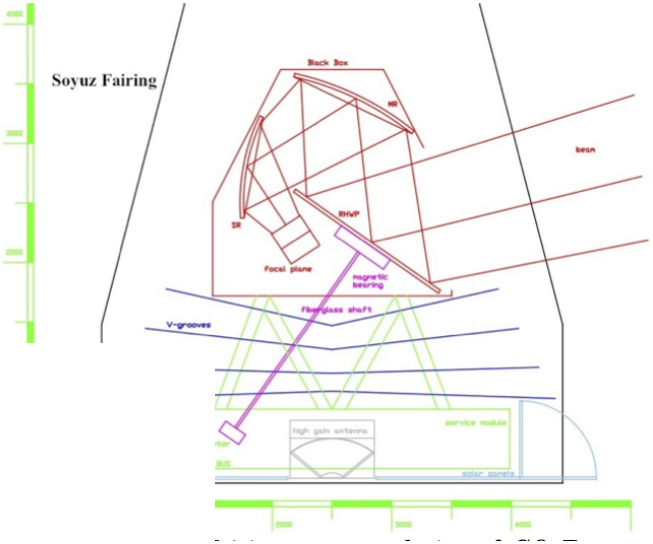
→ needs faster optics

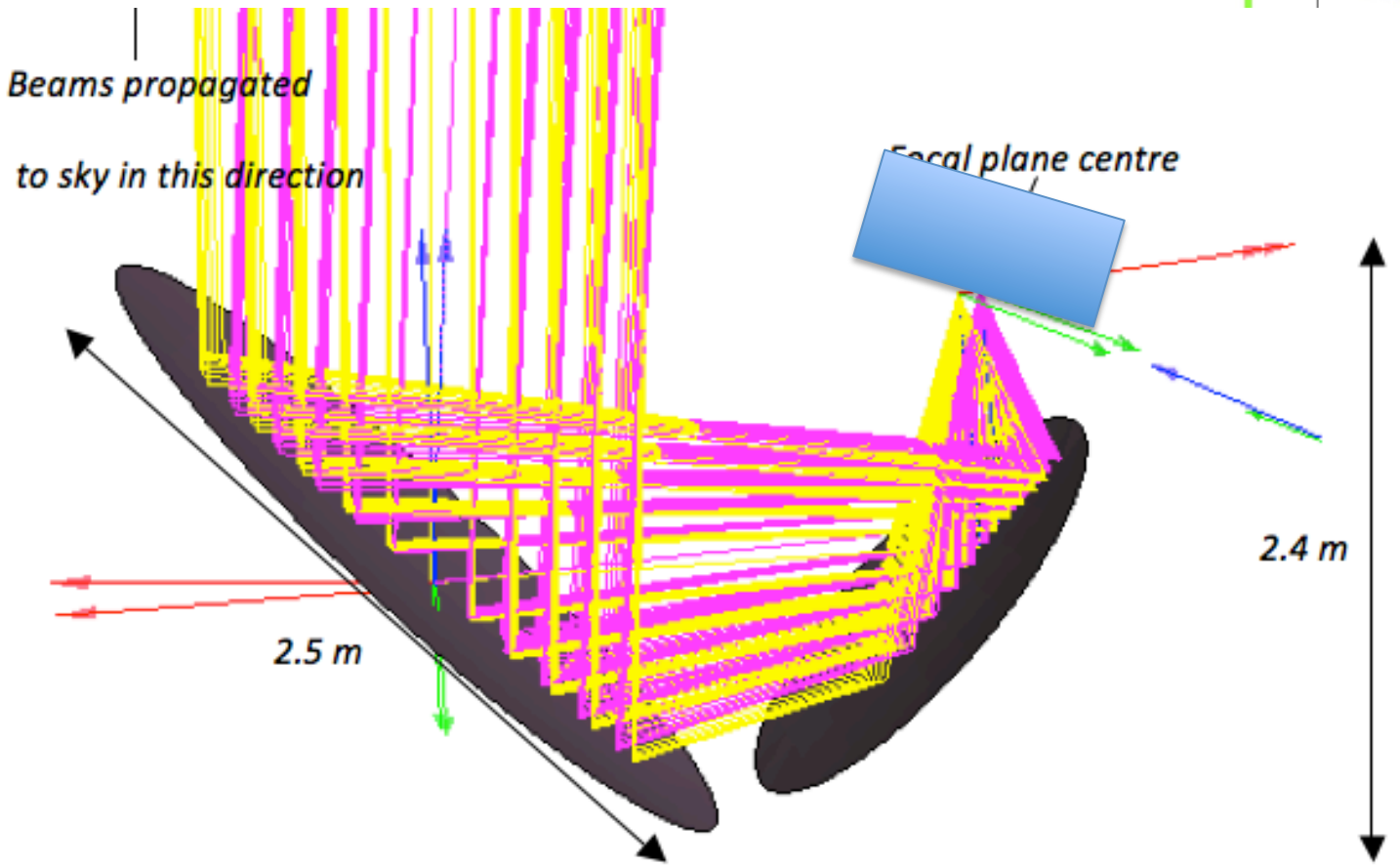
1.2m F2 CATR telescope



- Faster optics
  - More compact
  - Pixel size can be smaller
  - Larger aberrations

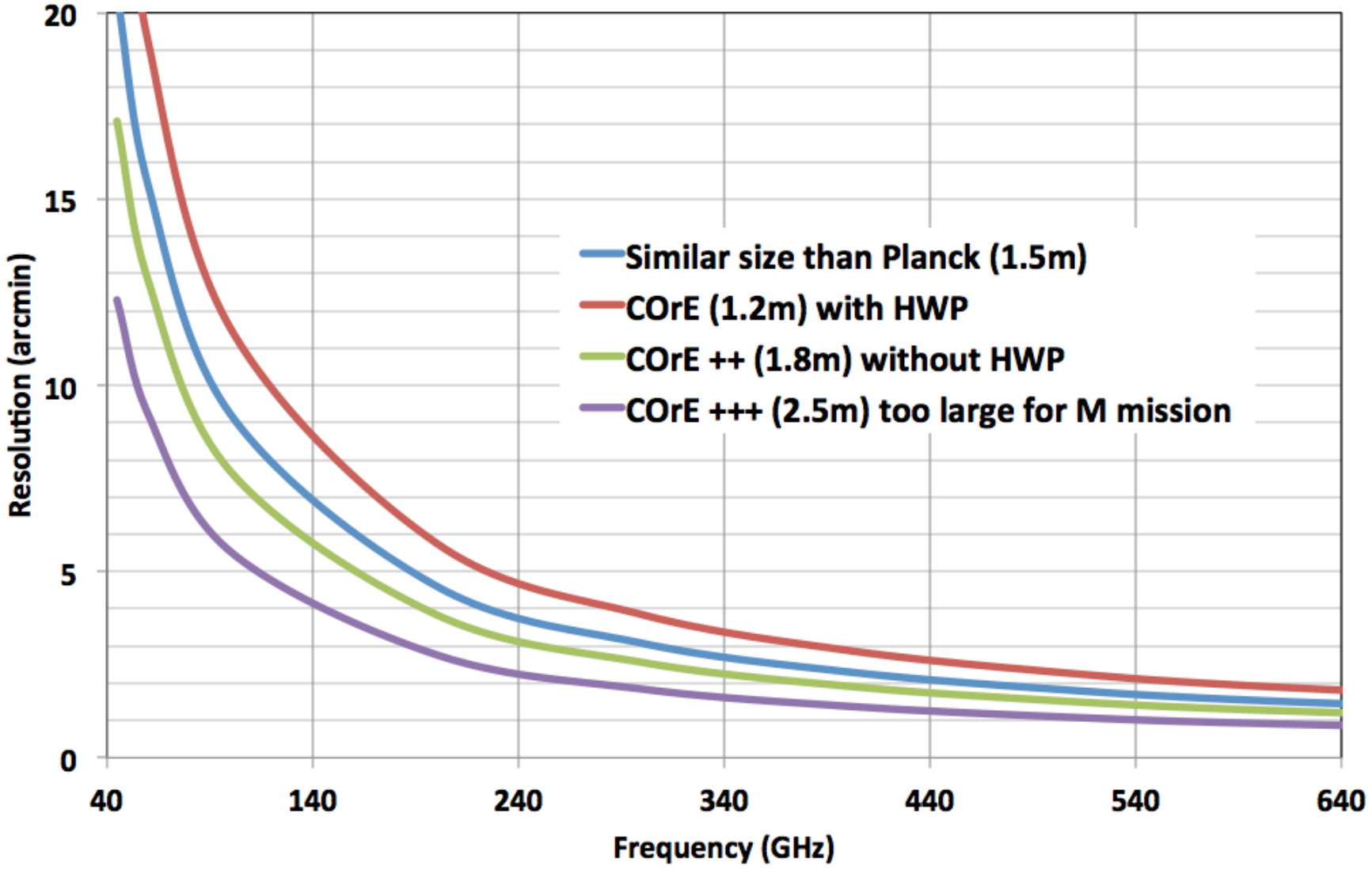
2.5m F2 Dragonian telescope (~1.8m projected max)





~ within 3m

Spatial Resolution



Discussion and work to be done

- While the with/without HPW options impact the design, the gain in resolution is not dramatic
  - ~ 1.3m projected aperture with HWP might be duable
  - 1.8m projected aperture without HWP should be feasible
  - Needs more work with a more realistic payload
- However, that will have an impact on the RF properties
  - Smaller aberrations / or more detectors
  - Impact of focal plane design
    - Frequency coverage, band definition, ...
- We have to make some choices
  - HWP → will be incompatible with spectro
  - No HWP and tbd telescope size, maybe room to fit spectro